BIRS 2023 Annual Report

Banff International Research Station
for Mathematical Innovation and Discovery

CMO Casa Matemática Oaxaca
Centro de investigación y enseñanza

数学高等研究院
INSTITUTE FOR ADVANCED STUDY IN MATHEMATICS

UBC THE UNIVERSITY OF BRITISH COLUMBIA
Okanagan Campus

Alberta Government

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Instituto de Matemáticas

5-Day Workshops 2023

Jan 8   Jan 13   The Mathematics of Microbial Evolution: Beyond the Limits of Classical Theory
Jan 15   Jan 20   Arithmetic Aspects of Deformation Theory
Jan 22   Jan 27   Computational Modelling of Cancer Biology and Treatments
Jan 29   Feb 3   Applications of Hodge Theory on Networks
Feb 5   Feb 10   Women in Nonlinear Dispersive PDEs
Feb 12   Feb 17   Non-Markovianity in Open Quantum Systems
Feb 19   Feb 24   Neostability
Feb 26   Mar 3   Around Symmetries of K3 Surfaces
Feb 26   Mar 3   Explicit Moduli Problems in Higher Dimensions
Mar 5   Mar 10   Sex Differences in Physiology: Mathematical Modelling and Analysis
Mar 5   Mar 10   Perspectives on Matrix Computations: Theoretical Computer Science Meets Numerical Analysis
Mar 12   Mar 17   Algebraic Aspects of Matroid Theory
Mar 19   Mar 24   A Convergence of Computable Structure Theory, Analysis, and Randomness
Mar 19   Mar 24   Mathematical Approaches of Atmospheric Constituents Data Assimilation and Inverse Modeling
Mar 26   Mar 31   WIN6: Women in Numbers 6
Apr 2   Apr 7   Interactions Between Topological Combinatorics and Combinatorial Commutative Algebra
Apr 2   Apr 7   Compensated Compactness and Applications to Materials
Apr 9   Apr 14   Dynamics of Hénon Maps: Real, Complex and Beyond
Apr 9   Apr 14   Interactions between Symplectic and Holomorphic Convexity in 4 Dimensions
Apr 16   Apr 21   Differential-Algebraic Equations and Operator Pencils
Apr 16   Apr 21   Random Algebraic Geometry
Apr 23   Apr 28   A Unified View of Quasi-Einstein Manifolds
Apr 23   Apr 28   Systematic Effects and Nuisance Parameters in Particle Physics Data Analyses
Apr 30   May 5   Applications of Stochastic Control to Finance and Economics
May 7   May 12   Recent Advances in Banach lattices
May 14   May 19   Extremal Graphs arising from Designs and Configurations
May 14   May 19   Mathematical Methods in Cancer Biology, Evolution and Therapy
May 21   May 26   Formalization of Cohomology Theories
May 21   May 26   Joint Spectra and related Topics in Complex Dynamics and Representation Theory
May 28   Jun 2   Spinorial and octonionic aspects of G2 and Spin(7) geometry
May 28   Jun 2   Random Growth Models and KPZ Universality
Jun 4   Jun 9   Quantum Information Theory in Quantum Field Theory and Cosmology
Jun 11   Jun 16   Geometry, Topology and Control System Design
Jun 18   Jun 23   Scientific Machine Learning
Jun 25   Jun 30   Women in Operator Algebras III
Jul 2   Jul 7   Single-Cell Plus - Data Science Challenges in Single-Cell Research
Jul 9   Jul 14   3D Generative Models
Jul 16   Jul 21   Inverse Problems and Nonlinearity
Jul 23   Jul 28   New Trends in Fluids and Collective Dynamics
Jul 23   Jul 28   Putting Together Resources to Support Current and Future Elementary School Teachers
Jul 30   Aug 4   Applied and Computational Differential Geometry and Geometric PDEs
Aug 6   Aug 11   Curves: Algebraic, Tropical, and Logarithmic
Aug 13   Aug 18   Women in Mathematical Physics II
Aug 20   Aug 25   Isogeny Graphs in Cryptography
Aug 27   Sep 1   New Directions in Applied Linear Algebra
Sep 3   Sep 8   Mathematical Methods for Exploring and Analyzing Morphological Shapes across Biological Scales
Sep 10   Sep 15   Mechanics of Cells and Polymer Networks: Bridging Theory, Simulation and Experiment
Sep 17   Sep 22   Approximation Algorithms and the Hardness of Approximation
Sep 24   Sep 29   Women in Geometry 3
Oct 1   Oct 6   Fluid Equations, A Paradigm for Complexity: Regularity vs Blow-up, Deterministic vs Stochastic
Oct 8   Oct 13   Motives and Invariants: Theory and Applications to Algebraic Groups and their Torsors
Oct 15   Oct 20   Complex Lagrangians, Mirror Symmetry, and Quantization
Oct 22   Oct 27   The Mathematics and Physics of Moire Superlattices

Oct 29   Nov 3   Astrostatistics in Canada and Beyond
Nov 5   Nov 10   Infinite Dimensional Geometry and Fluids
Nov 12   Nov 17   The Canadian Network for Modelling Infectious Diseases
Nov 19   Nov 24   Harmonic Analysis and Convexity
Nov 26   Dec 1   Spaces of Manifolds: Algebraic and Geometric Approaches
Dec 3   Dec 8   Subfactors and Fusion (2-)Categories

2-Day Workshops 2023

Jan 19   Jan 22   Charting a Future for Emerging Infectious Disease Modelling in Canada
Mar 31   Apr 2   Alberta Number Theory Days XIV
Apr 28   Apr 30   Ted Lewis SNAP Math Fair Workshop
May 19   May 21   Stochastic Modelling of Big Data in Finance, Insurance and Energy Markets
Jun 23   Jun 25   Alberta-Montana Combinatorics and Algorithms Day
Jul 28   Jul 30   Open-Source Tools to Enable Geophysical Data Processing and Inversion
Aug 18   Aug 20   2023 Math Attack Summer Camp for Girls
Aug 25   Aug 27   Emerging Mathematical Challenges in Synthetic Biological Network Design
Sep 1   Sep 3   Mathematical Challenges in Adaptation of Quantum Chemistry to Quantum Computers

Focused Research Group

Aug 27   Sep 1   Conformal Geodesics

Research in Teams

Mar 26   Apr 1   On Complex Notions of Convexity
Apr 7   Apr 14   Cohen-Macaulay Rings (Cancelled)
Apr 16   Apr 30   Spectral Synthesis and Weak Amenability of Uniform Algebras
May 21   May 28   Multidimensional Discrete-Time Systems, Algebraic Curves and Commuting Nonunitary Operators
Jul 9   Jul 23   Elliptic Stable Envelopes and R-matrices for Superspin Chains from 3d N=2 Gauge Theories
Jul 16   Jul 23   Boundary Regularity of Degenerate Elliptic Operators
Jul 23   Jul 30   Optimal Transport for Next Generation
Aug 20   Sep 3   Basis Properties of the Eigensystem of non-self-adjoint Operators
Sep 24   Oct 1   Correlation Chains and Quantum Hierarchies
Oct 15   Oct 22   Mathematics Teaching & Learning in Rural Tanzania
Nov 5   Nov 12   Graph Fourier Transform for Samples of Structured Graphons
Nov 19   Nov 26   Quantum Damour Equation

Banff International Research Station

2023

5-Day Workshops

The Mathematics of Microbial Evolution: Beyond the Limits of Classical Theory
January 8 - 13, 2023

Organizers:

Lindi Wahl (University of Western Ontario)
Helen Alexander (University of Edinburgh)

Sylvain Gandon (CNRS)
Sally Otto (University of British Columbia)

Bacteria, viruses and other microbial populations evolve rapidly, developing resistance to antibiotics, infecting new host species, or emerging as highly pathogenic strains. The importance of microbial evolution has been thrown into sharp relief by the pandemic spread of the SARS-CoV-2 virus causing Covid-19, and the ongoing emergence of variants of concern. Mathematical models play a central role in our understanding of evolution, but have largely been developed to describe evolution in humans and animal species. Since microbial evolution differs, often quite profoundly, from evolution in higher organisms, new mathematical approaches must be developed.

This workshop brought microbiologists, evolutionary biologists and applied mathematicians together to discuss recent experimental discoveries in microbial genetics and evolution. Our aim was to develop new mathematical approaches and predictive models that account for the complexity and diversity of microbial evolution. Overall, a deeper understanding of the ever-changing microbial populations within and around us will be critical in responding to novel pathogens and changing environments.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5079

Participants:

Alexander, Helen (University of Edinburgh)
Bank, Claudia (University of Bern)
Bernheim, Aude (INSERM)
Bonhoeffer, Sebastian (ETH Zurich)
Bos, Julia (Institut Pasteur)
Bukari, Abdul-Rahman (University of Manitoba)
Burch, Christina (University of North Carolina)
Calvez, Vincent (CNRS)
Calvo-Villamanan, Alicia (CSIC, Madrid)

Carja, Oana (Carnegie Mellon University)
Day, Troy (Queen's University)
de Visser, Arjan (Wageningen University)
Ezadian, Mojgan (Western University)
Feder, Alison (University of Washington)
Fusco, Diana (University of Cambridge)
Gandon, Sylvain (CNRS)
Gerrish, Philip (University of New Mexico)
Gerstein, Aleeza (University of Manitoba)

Gifford, Danna (The University of Manchester)
Guillemet, Martin (CNRS France)
Hallatschek, Oskar (University of California - Berkeley)
Henderson, Alyssa (ETH Zurich)
Hermisson, Joachim (University of Vienna)
Igler, Claudia (ETH Zurich)
Ingalls, Brian (University of Waterloo)
Knight, Chris (University of Manchester)
Krasovec, Rok (University of Manchester)
Krug, Joachim (University of Cologne)
Lehtinen, Sonja (ETH Zurich)
Levien, Ethan (Dartmouth College)
Loo, Sara (Johns Hopkins University)
Louca, Stilianos (University of Oregon)
Loverdo, Claude (Sorbonne Universite)
MacPherson, Ailene (Simon Fraser University)
Martin, Guillaume (CNRS)
McLaughlin, Angela (University of British Columbia)
McLeod, David (University of Bern)
Méléard, Sylvie (Ecole polytechnique)
Mulberry, Nicola (SFU)
Nooranidoost, Mohammad (Florida State University)
Nouri, Zahra (National Cancer Center)
Peña Miller, Rafael (UNAM)
Regoes, Roland (ETH Zurich)
Robert, Lydia (inrae)
Selmecki, Anna (University of Minnesota)
Turner, Paul (Yale University)
Uecker, Hildegard (Max Planck Institute for Evolutionary Biology)
Waclaw, Bartlomiej (Polish Academy of Sciences)
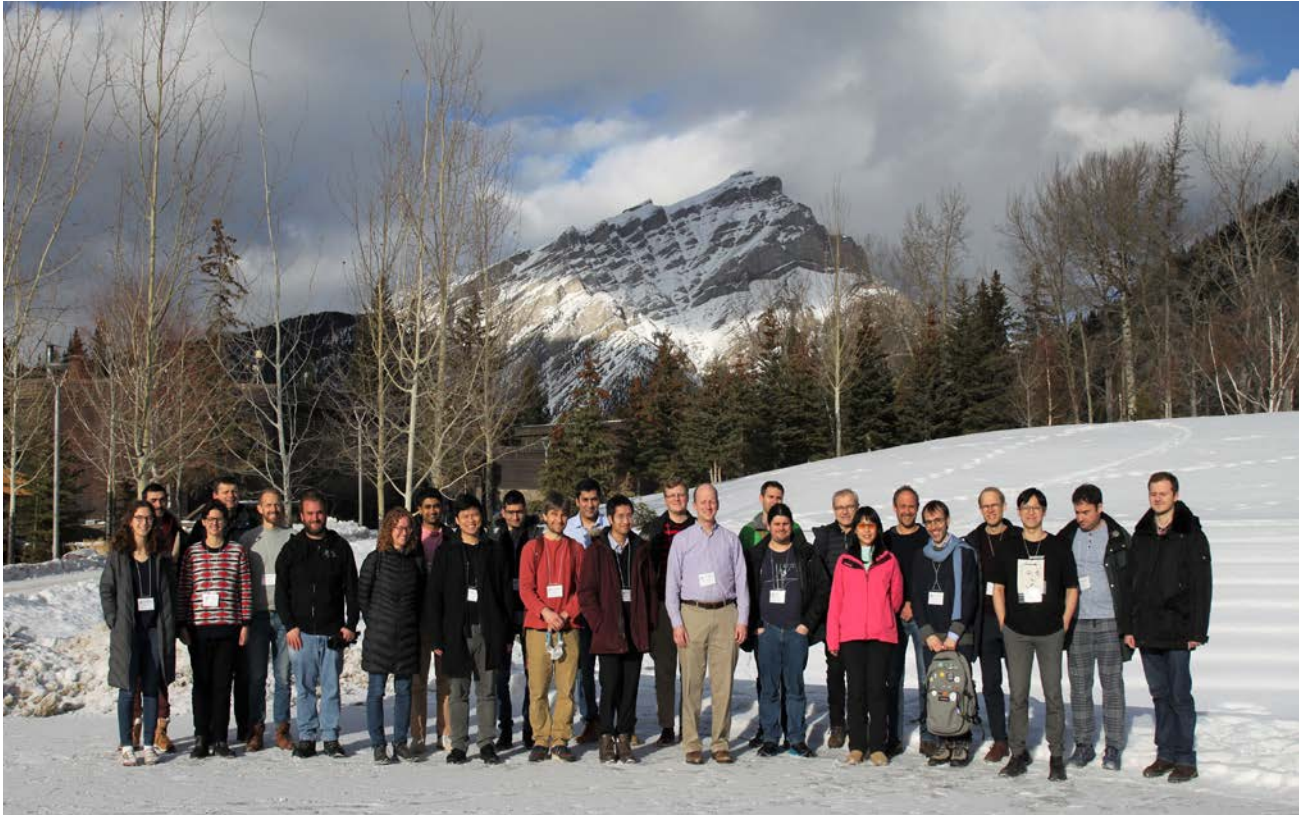**Wahl, Lindi** (University of Western Ontario)
Weissman, Daniel (Emory University)

Arithmetic Aspects of Deformation Theory
January 15 - 20, 2023

Organizers:

Patrick Allen (McGill University)   **Preston Wake** (Michigan State University)
Chandrashekhar Khare (UCLA)

One focus of modern number theory is to study symmetries of numbers that are roots of polynomial equations. Collections of such symmetries are called Galois groups, and they often encode interesting arithmetical information. The theory of Galois representations provides a way to understand these Galois groups and in particular, how they interact with other areas of mathematics. This workshop investigated how these Galois representations can be put together into families, and search for new arithmetic applications of these families.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5134

Participants:

Allen, Patrick (McGill University)
Alonso Rodriguez, Raul (Princeton University)
Bellovin, Rebecca (University of Glasgow)
Bergdall, John (University of Arkansas)
Böckle, Gebhard (Universität Heidelberg)
Burungale, Ashay (UT Austin)
Calegari, Frank (University of Chicago)
Caraiani, Ana (University of Bonn / Imperial College London)
Castella, Francesc (University of California Santa Barbara)
Chabat, Marsault (Laboratoire de Mathématiques de Besançon)
Coupek, Pavel (Michigan State University)

Do, Kim Tuan (UCLA)
Dotto, Andrea (University of Chicago)
Emerton, Matthew (University of Chicago)
Feng, Tony (Berkeley)
Fouquet, Olivier (Laboratoire de Mathématiques de Besançon)
Gee, Toby (Imperial College London)
Harris, Michael (Columbia University)
Hellmann, Eugen (Universitat Munster)
Herzig, Florian (University of Toronto)
Hida, Haruzo (UCLA)
Hsu, Chi-Yun (Université de Lille)
Iyengar, Ashwin (Johns Hopkins)
Kansal, Kalyani (Johns Hopkins University)

Koziol, Karol (Baruch College)
Kundu, Debanjana (PIMS/ UBC Vancouver)
Lang, Jaclyn (Temple University)
Le, Daniel (Purdue University)
Le Hung, Bao (Northwestern University)
Lecoutuier, Emmanuel (Tsinghua Univerisity)
Lee, Heejong (Purdue University)
Liu, Zheng (University of California - Santa Barbara)
Manning, Jeffrey (Imperial College London)
Medvedovsky, Anna (Boston University)
Moakher, Mohamed (Université Sorbonne Paris Nord)
Morra, Stefano (Université Paris 8)
Mundy, Sam (Princeton University)
Newton, James (University of Oxford)
Oh, Gyujin (Columbia University)
Paskunas, Vytautas (Universitaet Duisburg Essen)
Patrikis, Stefan (Ohio State Univerity)
Perrin-Riou, Bernadette (NA)
Pham, Dat (Université Sorbonne Paris Nord)
Pozzi, Alice (Imperial College London)
Quast, Julian (University of Heidelberg)
Ray, Anwesh (Université de Montréal)
Savitt, David (Johns Hopkins University)
Sharifi, Romyar (University of California - Los Angeles)
Shotton, Jack (Durham University)
Sweeting, Naomi (Harvard)
Tang, Shiang (Purdue University)
Thorne, Jack (Cambridge University)
Tilouine, Jacques (Universite Paris 13)
Wake, Preston (Michigan State University)
Wang-Erickson, Carl (University of Pittsburgh

Computational Modelling of Cancer Biology and Treatments
January 22 - 27, 2023

Organizers:

Morgan Craig (Sainte-Justine University Hospital Research Centre/Université de Montréal)

Adrianne Jenner (Queensland University of Technology)

Over the last two decades, mathematics has become a major foundation in cancer biology and treatment research. Computational modelling in oncology is an interdisciplinary field aimed at using mathematical techniques to further our understanding of how cancer develops and interacts within each individual, and how an understanding of these interactions can be leveraged to improve therapeutic outcomes. Recent progress in computational oncology has allowed experimentalists and clinicians to visualize tumour formation with and without treatment and establish novel therapeutic approaches both less invasively and more cost effectively. This workshop focused on two main techniques of computational modelling used in cancer research: in silico clinical trials and agent-based models.

In this workshop, we discussed the current state of computational modelling in cancer biology and treatment. Through the exploration of in silico trials and ABMs, workshop participants will establish new, cutting-edge approaches in computational oncology, establishing new paradigms for understanding how cancer develops and how we can improve treatment outcomes in patients.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5007

Participants:

Altrock, Philipp (Max Planck Institute for Evolutionary Biology)
Bozic, Ivana (University of Washington)
Brady-Nicholls, Renee (Moffit Cancer Centre)
Browning, Alexander (University of Oxford)
Brueningk, Sarah (ETH Zurich)

Brunetti, Mia (Université de Montréal)
Cassidy, Tyler (University of Leeds)
Craig, Morgan (Sainte-Justine University Hospital Research Centre/Université de Montréal)
de Pillis, Lisette (Harvey Mudd College)
Faria, Matt (University of Melbourne)

Fertig, Elana (John Hopkins)
Ford Versypt, Ashlee (University at Buffalo, The State University of New York)
Gallaher, Jill (Moffitt Cancer Center)
Gevertz, Jana (The College of New Jersey)
Glazier, James (Indiana Univ)
Haupt, Saskia (Heidelberg University)
Hillen, Thomas (University of Alberta)
Jahedi, Sana (McMaster University)
Jenner, Adrianne (Queensland University of Technology)
Kareva, Irina (EMD Serono)
Kim, Yangjin (Konkuk University)
Kirouac, Dan (Notch Therapeutics)
Kohandel, Mohammad (University of Waterloo)
Komarova, Natalia (University of California Irvine)
Kumar Jolly, Mohit (Indian Institute of Science)
Lafitte, Olivier (Université Sorbonne Paris Nord)
Macklin, Paul (Indiana University)
MacLean, Adam (University of Southern California)
Mahasa, Khaphetsi Joseph (National University of Lesotho)
Metzcar, John (Indiana University)
Mongeon, Blanche (Université de Montréal/Sainte-Justine University Hospital Research Centre)
Montagud, Arnau (Barcelona Supercomputing Center)
Oke, Segun (Ohio University)
Powathil, Gibin (Swansea University)
Rockne, Russ (City of Hope)
Ryu, Hwayeon (Elon University)
Sahoo, Sarthak (Indian Institute of Science)
Schenck, Ryan (Stanford Cancer Institute)
Shuttleworth, Robyn (University of Saskatchewan)
Tøndel, Kristin (Norwegian University of Life Sciences)
Weghorn, Donate (Centre for Genomic Regulation)
West, Jeffrey (Moffit Cancer Center)
Whiting, Freddie (The Institute of Cancer Research)
Wilkie, Kathleen (Toronto Metropolitan University)
Yankeelov, Tom (The University of Texas at Austin)
Zmurchok, Cole (Notch Therapeutics)

Applications of Hodge Theory on Networks
January 29 - February 3, 2023

Organizers:

Alexander Strang (University of Chicago)   **Anthea Monod** (Imperial College London)
David Rosenbluth (Lockheed Martin)

The discrete Helmholtz Hodge decomposition (HHD) separates an edge flow on a graph into meaningful components. The interpretation of the graph and edge flow depend on the application area, which makes the technique flexible. That flexibility allows for cross-pollination between apparently disparate areas of study, an increasingly important strategy for solving the most pressing and challenging data science problems.

We aimed to unite the study of structure and dynamics by fostering conversations between researchers who use the HHD in areas including economics, game theory, statistical physics, and machine learning. We also aimed to promote collaboration between industrial and academic teams using the HHD.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5116

Participants:

Abbott, Karen (Case Western Reserve University)
Alcedo, Kevin (Lockheed Martin)
Cao, Yueqi (Imperial College London)
Cebra, Christopher (University of Illinois)
Friedman, Joel (University of British Columbia)
Fujiwara, Yoshi (University of Hyogo)
García-Redondo, Inés (London School of Geometry and Number Theory)
Guzman Tristan, Araceli (CIMAT)
Hinczewski, Michael (Case Western Reserve University)

Hirani, Anil (University of Illinois at Urbana-Champaign)
Lee, Kang-Ju (Seoul National University)
Lim, Lek-Heng (University of Chicago)
Lisi, Samuel (University of Mississippi)
Maroulas, Vasileios (University of Tennessee, Knoxville)
Monod, Anthea (Imperial College London)
Perea, Jose (Northeastern University)
Piliouras, Georgios (DeepMind / Singapore Univ. of Technology and Design)

Rieser, Antonio (CONACYT-CIMAT)
Riess, Hans (Duke University)
Rosenbluth, David (Lockheed Martin)
Ross, Patrick (Lockheed Martin Aritificial Intelligence Center)
Saucan, Emil (Braude College of Engineering)
Schaub, Michael (RWTH Aachen University)
Strang, Alexander (University of Chicago)
Taylor, Dane (University at Buffalo - SUNY)
Veneziale, Sara (Imperial College London)
Viganò, Francesco (Imperial College London)
Wei, Guowei (Michigan State University)
Wolf, Arne (University College London)
Yan, Fangjia (Beijing Institute of Technology)
Yao, Yuan (Hong Kong University of Science and Technology, Peking University)

Women in Nonlinear Dispersive PDEs
February 5 - 10, 2023

Organizers:

Mihaela Ifrim (University of Wisconsin-Madison)
Birgit Schörkhuber (University of Innsbruck)

Katharina Schratz (Sorbonne Université)

In this workshop we brought together leading experts - both from the theoretical and numerical analysis of non-linear PDEs to discuss the open challenging problems in the field and exchange state of the art tools available both in mathematical and computational analysis. We aimed for a mixture of junior and senior mathematicians with the sincerely hope that the resulting interactions will lead to new collaborations, and progress of the above mentioned research venues. The many new discoveries and major developments in several areas of the non-linear PDE field, make the timing of the proposed workshop a perfect one in terms of crystallizing the new ideas and of fostering interactions, as well as training the next generation of researchers.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5059

Participants:

Alama Bronsard, Yvonne (Sorbonne Université, LJLL)
Bahouri, Hajer (Sorbonne université)

Banica, Valeria (Sorbonne Université)
Brull, Gabriele (Lund University)
Bulut, Aynur (Louisiana State University)

Byars, Allison (UW Madison)
Charlotte, Perrin (I2M in Marseille)
Chirilus-Bruckner, Martina (Leiden University)
Czubak, Magdalena (University of Colorado Boulder)
Dalibard, Anne-Laure (Sorbonne université)
Geyer, Anna (TU Delft)
Goffi, Fatima Zohra (Karlsruhe Institute of Technology)
Gutierrez, Susana (University of Birmingham)
Haziot, Susanna (Brown University)
Huang, Kaiyi (university of Wisconsin Madison)
Ifrim, Mihaela (University of Wisconsin-Madison)
Ignatova, Mihaela (Temple University)
Ivanovici, Oana (CNRS & Sorbonne Université)
Kaltenbacher, Barbara (University of Klagenfurt)
Kistner, Sarah (Innsbruck University)
Kropielnicka, Karolina (Polish Academy of Sciences)
Lasiecka, Irena (University of Memphis)
Liao, Xian (Karlsruhe Institute of Technology)
Marsden, Katie (EPFL)
Mazzucato, Anna (Penn State University)
Monniaux, Sylvie (Aix Marseille Université)
Ntekoume, Maria (Rice University)
Nussenzveig Lopes, Helena (Universidade Federal do Rio de Janeiro)
Park, Jaeun (N/A)
Perelman, Galina (Paris-Est-Creteil University)
Pocovnicu, Oana (Heriot-Watt University)
Roudenko, Svetlana (Florida International University)
Sanwal, Akansha (Universität Innsbruck)
Schönlieb, Carola (University of Cambridge)
Schörkhuber, Birgit (University of Innsbruck)
Schratz, Katharina (Sorbonne Université)
Stingo, Annalaura (Ecole Polytechnique)
Strani, Marta (Ca Foscari University of Venice)
Thalhammer, Mechthild (Leopold-Franzens Universität Innsbruck)
Trichtchenko, Olga (University of Western Ontario)
Visan, Monica (UCLA)
Vlasiou, Maria (University of Twente)
Wroblewska-Kaminska, Aneta (Institute of Mathematics, Polish Academy of Sciences)
Yu, Xueying (University of Washington)

Non-Markovianity in Open Quantum Systems
February 12 - 17, 2023

Organizers:

Marco Merkli (Memorial University of Newfoundland)
Nicole Yunger Halpern (National Institute of Standards and Technology)

Susana Huelga (Ulm University)
Kavan Modi (Monash University)
Francesco Petruccione (Stellenbosch University)

The workshop deals with the behaviour of quantum objects (atoms, molecules...) which are subjected to external noises (light, vibrations...). The objects are very `tiny'; they react drastically to the slightest contact with their surroundings. Understanding and modelling the dynamical processes is the central task of the {\em theory of open quantum systems}. Examples of open systems are molecules in plants exposed to sunlight ($\rightarrow$ photosynthesis), or basic building blocks (quantum bits) in a quantum computer, mounted on a substrate.

In this workshops we brought together beginning and experienced researchers from various scientific and cultural backgrounds. We planned presentations and discussions about the latest developments in the field, but there were introductory level lectures, as some of the participants were graduate students and beginning researchers. Our goal was to amalgamate a diverse group of participants and to combine their research efforts into new collaborations.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5083

Participants:

Abbasi, Maryam (Washington University St. Louis)
Albert, Victor (NIST & UMD College Park)
Altherr, Anian (ETH Zürich)
Anindita, Bera (Nicolaus Copernicus University Poland)
Antosztrikacs, Nicholas (U of Toronto)
Bhattacharya, Debankur (U. of Maryland)
Boyd, Alec (Trinity College Dublin)
Braasch, Billy (NIST)

Brenes, Marlon (University of Toronto)
Burgelman, Michiel A. (Dartmouth College)
Cenatiempo, Serena (Gran Sasso Science Institute)
Chruscinski, Dariusz (Nicolaus Copernicus University)
Chu, Guo (Henan Key Laboratory of Quantum Information and Cryptography)
Ciccarello, Francesco (University of Palermo & NEST, Pisa)

Cohen, Guy (Tel Aviv University)
Cresser, James (University of Exeter)
Damanet, François (Uni Liège)
De Sousa, Guilherme (U. of Maryland)
Debecker, Baptiste (Université de Liège)
Deffner, Sebastian (UMBC)
Di Meglio, Giovanni (Universität Ulm)
Dowling, Neil (Monash University)
Fay, Thomas (UC Berkeley)
Filippov, Sergei (Steklov Mathematical Institute of Russian Academy of Sciences)
García-Pintos, Luis Pedro (Los Alamos National Lab)
Gatto Lamas, Amanda (U. of Illinois at Urbana-Champaign)
Gauger, Erik (Heriot-Watt University)
Gerry, Matthew (University of Toronto)
Gour, Gilad (University of Calgary)
Gu, Mile (Nanyang Technological University)
Head Marsden, Kade (Washington University in St. Louis)
Huelga, Susana (Ulm University)
Joye, Alain (Univ. Grenoble Alpes)
Kessing, Kevin (University of Ulm)
Krogmeier, Timothy (Washington University St. Louis)
Latune, Camille (ENS Lyon)
Lautenbacher, Lea (Universität Ulm)
Lee, Ahreum (University of Maryland College Park)
Limmer, David (UC Berkeley)
Majidy, Shayan (U. of Waterloo)
Marcantoni, Stefano (SISSA Trieste)
Marín Guzmán, José Antonio (University of Maryland)
Merkli, Marco (Memorial University of Newfoundland)
Milz, Simon (Institute for Quantum Optics and Quantum Information Vienna)
Min, Brett (U of Toronto)
Mitchison, Mark (Trinity College Dublin)
Modi, Kavan (Monash University)
Munson, Anthony (U. of Maryland)
Oruganti, Greeshma Shivali (University of Maryland)
Palma, Massimo (Uni Palermo)
Paternostro, Mauro (Queen's University Belfast)
Paz Silva, Gerardo (Griffith university)
Periwal, Avikar (Stanford University)
Petruccione, Francesco (Stellenbosch University)
Plenio, Martin (Ulm University)
Ringbauer, Martin (University of Innsbruck)
Rivas, Ángel (Universidad Complutense de Madrid)
Sarbicki, Gniewomir (Nicolaus Copernicus University)
Scandolo, Carlo Maria (University of Calgary)
Schlau-Cohen, Gabriela (MIT)
Segal, Dvira (University of Toronto)
Simon, Christoph (University of Calgary)
Sinayskiy, Ilya (University of KwaZulu-Natal)
Smirne, Andrea (University of Milan)
Sorochkin, Timothy (University of Toronto)
Spaventa, Giovanni (Ulm University)

Spehner, Dominique (Universidad de Concepción)
Strasberg, Philipp (Universitat Autonoma de Barcelona)
Taherizadegan, Shahrzad (University of Calgary)
Theurer, Thomas (U Calgary)
Thingna, Juzar (University of Massachusetts Lowell)
Trushechkin, Anton (Steklov Mathematical Institute of Russian Academy of Sciences)
Upadhyaya, Twesh (UMD)
Vacchini, Bassano (University of Milan & INFN)
Viola, Lorenza (Dartmouth College)
White, Gregory (The University of Melbourne)
Yunger Halpern, Nicole (National Institute of Standards and Technology)
Zanoni, Elia (U Calgary)

Neostability
February 19 - 24, 2023

Organizers:

Thomas Scanlon (University of California, Berkeley)
Alf Onshuus (Universidad de los Andes)
Frank Wagner (Université Claude Bernard Lyon 1)
Anand Pillay (University of Notre Dame)
Caroline Terry (The Ohio State University)

Stability theory, in the sense of mathematical logic, consists of a collection of technical methods first developed to address the logical problem of classifying abstract models of mathematical theories. Stability theory has proven to be applicable to other mathematical problems such as understanding rational solutions of algebraic equations. It has recently been shown that the techniques and methods used for the classification described above can be used in much more general settings with applications to other areas of mathematics such as algebraic geometry, additive combinatorics and extremal graph theory. Researchers at this meeting studied these developments to deepen these applications, and to extend the scope of stability theory to an even wider range of mathematical theories.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5145

Participants:

Baldwin, John (University of Illinois at Chicago)
Bejarano, Diego (UC Berkeley)
Ben Yaacov, Itaï (Université Lyon 1)
Block Gorman, Alexi (The Fields Institute)
Bossut, Yvon (Claude Bernard University Lyon 1)
Bouscaren, Élisabeth (CNRS - Université Paris Saclay)
Boxall, Gareth (Stellenbosch University)
Bradley-Williams, David (Heinrich-Heine-Universitaet Duesseldorf)
Burka, Alex (University of California - Berkeley)
Castle, Benjamin (Ben Gurion University of the Negev)
Chatzidakis, Zoé (CNRS)
Chernikov, Artem (University of California, Los Angeles)
Conant, Gabriel (Ohio State University)
d'Elbée, Christian (Universität Bonn)
Dobrowolski, Jan (University of Manchester)

Freitag, James (University of Illinois at Chicago)
Gannon, Kyle (University of California, Los Angeles)
García, Darío (Universidad de los Andes)
Guingona, Vince (Towson University)
Hart, Bradd (McMaster University)
Haskell, Deirdre (McMaster University)
Hasson, Assaf (Ben Gurion University)
Hempel, Nadja (Heinrich Heine Universität Düsseldorf)
Hils, Martin (Westfälische Wilhelms-Universität Münster)
Jimenez, Léo (Waterloo)
Johnson, Will (Fudan University)
Kaplan, Itay (Hebrew University of Jerusalem)
Kaplan, Elliot (McMaster)
Kestner, Charlotte (Imperial College London)
Kim, Byunghan (Yonsei University)
Kruckman, Alex (Wesleyan University)
Krupinski, Krzysztof (Uniwersytet Wroclawski)

Macpherson, Dugald (University of Leeds)
Malliaris, Maryanthe (University of Chicago)
Martin Pizarro, Amador (University of Freiburg)
Mutchnik, Scott (University of California, Berkeley)
Newelski, Ludomir (Uniwersytet Wroclawski)
O'Gorman, Ronan (University of California - Berkeley)
Onshuus, Alf (Universidad de los Andes)
Palacín, Daniel (Universidad Complutense de Madrid)
Parnes, Miriam (Towson University)
Patel, Rehana (AIMS-Senegal)
Pillay, Anand (University of Notre Dame)
Pinzon, Santiago (Universidad de los Andes)
Ramsey, Nick (University of California Los Angeles)
Rzepecki, Tomasz (Czech Academy of Sciences, Uniwersytet Wroclawski)
Scanlon, Thomas (University of California - Berkeley)
Scow, Lynn (California State University, San Bernardino)
Shami, Ziv (Ariel university)
Sinclair, Peter (Douglas College)
Starchenko, Sergei (University of Notre Dame)
Stonestrom, Atticus (Notre Dame)
Tent, Katrin (University of Muenster)
Terry, Caroline (The Ohio State University)
Tran, Chieu-Minh (National University of Singapore)
Usvyatsov, Alex (Universidade de Lisboa)
Vasilyev, Yevgeniy (Memorial University of Newfoundland)
Vicaría, Mariana (UCLA)
Wagner, Frank (Université Claude Bernard Lyon 1)
Wells, Harper (University of California)
Wood, Carol (Wesleyan University)
Yao, Ningyuan (Fudan University)
Ye, Jinhe (IMJ-PRG)
Zou, Tingxiang (University of Muenster)

Around Symmetries of K3 Surfaces
February 26 - March 3, 2023

Organizers:

Jimmy Dillies (University of Georgia)   **Nathan Priddis** (Brigham Young University)
Paola Comparin (Universidad de La Frontera)   **Alessandra Sarti** (University of Poitiers)

Algebraic geometers are mathematicians who study the geometry of polynomials. Some of their favorite objects are K3 surfaces as these surfaces have elegant properties yet are explicit enough to help them understand more general problems. But K3 surfaces are far from being simply important to algebraic geometry, their study has had important influence in several other fields. While the study of K3 surfaces has been very active over the last hundred years, many important problems remain unanswered even today concerning their symmetry and the way these surfaces are related to one another. There are today many young researchers who are focusing their energy on understanding the geometry of K3 surfaces and this workshop is a key ingredient in the diffusion of new ideas.

This conference was to gather the experts on the most recent developments regarding the study of symmetries of K3 surfaces and the geometric conditions under which these surfaces are uniquely determined, in order to advance our understanding of these surfaces, with an eye toward several important open problems.

We brought together experts from around the world who study both K3 surfaces from their intrinsic properties and from their characteristics as they vary in families. The two perspectives should mutually resonate and allow for even deeper results than those obtained when working in parallel.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5065

Participants:

Alexeev, Valery (University of Georgia)
Artebani, Michela (Universidad de Concepción)
Baragar, Arthur (University of Nevada, Las Vegas)
Bayer-Fluckiger, Eva (Ecole Polytechnique
Federale de Lausanne (EPFL))
Boissiere, Samuel (University of Poitiers)

Camere, Chiara (University of Milan)
Clingher, Adrian (University of Missouri - St. Louis)
Comparin, Paola (Universidad de La Frontera)
Correa Deisler, Claudia (Universidad de Tarapacá)
Dillies, Jimmy (University of Georgia)
Dolgachev, Igor (University of Michigan)

Elkies, Noam D. (Harvard University)
Festi, Dino (Università degli Studi di Milano)
Fusi, Davide (USCB)
Galluzzi, Federica (Università di Torino)
Garbagnati, Alice (Universita' degli Studi di Milano Satatle)
Garza, D. Zachary (University of Georgia)
Grossi, Annalisa (Technische Universität Chemnitz)
Han, Changho (University of Waterloo)
Honigs, Katrina (Simon Fraser University)
Hulek, Klaus (Leibniz University Hannover)
Kelly, Tyler (University of Birmingham)
Knutsen, Andreas Leopold (University of Bergen)
Li Bassi, Lucas (University of Poitiers)
Logan, Adam (Government of Canada)
Malmendier, Andreas (Utah State University)
Monti, Martina (Università degli studi di Milano)
Onorati, Claudio (Università di Roma Tor Vergata)
Paiva Peñuela, Daniela (IMPA)
Piroddi, Benedetta (Università degli studi di Milano)
Priddis, Nathan (Brigham Young University)
Prieto Montanez, Yulieth (The Abdus Salam International Centre for Theoretical Physics)
Quedo, Ana Victoria (IMPA/ U. Poitiers)
Quezada, Pablo (Universidad de la Frontera)
Roulleau, Xavier (Angers University)
Salgado, Cecilia (Rijksuniversiteit Groningen)
Sankaran, Gregory (University of Bath)
Sarti, Alessandra (University of Poitiers)
Schutt, Matthias (Leibniz University Hannover)
Symington, Margaret (Mercer University)
Veniani, Davide Cesare (Universität Stuttgart)
Verra, Alessandro (University Roma Tre)
Whitcher, Ursula (American Mathematical Society)
Yui, Noriko (Queen's University)

Explicit Moduli Problems in Higher Dimensions
February 26 - March 3, 2023

Organizers:

Kenneth Ascher (University of California - Irvine)   **Kristin DeVleming** (UMass Amherst)
Dori Bejleri (Harvard University)

The central problem in algebraic geometry is to classify so-called algebraic varieties: geometric shapes cut out by algebraic equations. Algebraic varieties are parametrized by certain moduli spaces (parameter spaces whose points correspond to these different varieties) and the geometry of these moduli spaces encodes the ways of continuously deforming these shapes. Furthermore, classification questions for algebraic varieties often boil down to understanding the geometry of these moduli spaces. In the past few years, powerful new tools have been developed in moduli theory but there are still many open questions, especially in higher dimensions. This workshop brought together a diverse group of researchers in moduli theory in order to apply these new tools to explicit examples of the classification of higher dimensional algebraic varieties and their moduli spaces and push our understanding of higher dimensional algebraic geometry to new frontiers.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5131

Participants:

Abban, Hamid (University of Nottingham)
Abramovich, Dan (Brown University)
Araujo, Carolina (IMPA)
Ascher, Kenneth (University of California - Irvine)
Bejleri, Dori (Harvard University)
Bishop, Martin (University of Washington)
Blum, Harold (University of Utah)
Bryan, Jim (UBC)
Casalaina-Martin, Sebastian (University of Colorado at Boulder)

Castravet, Ana-Maria (Paris Saclay University Versailles)
Cheltsov, Ivan (University of Edinburgh)
Deopurkar, Anand (Australian National University)
DeVleming, Kristin (UMass Amherst)
Engel, Philip (University of Georgia)
Giovenzana, Luca (Loughborough University)
Grassi, Antonella (Universita di Bologna)
Han, Changho (University of Waterloo)
Ilten, Nathan (Simon Fraser University)

Inchiostro, Giovanni (University of Washington)
Ji, Lena (University of Michigan)
Jiang, Yunfeng (University of Kansas)
Kaloghiros, Anne-Sophie (Brunel University)
Kovacs, Sandor (University of Washington)
Laza, Radu (Stony Brook University)
Li, Jennifer (Princeton University)
Marquand, Lisa (Stony Brook University)
Moon, Han-Bom (Fordham University)
Nugent, Brian (University of Washington)
Pardini, Rita (Universita di Pisa)
Patakfalvi, Zsolt (EEcole polytechnique fedeerale de Lausanne)
Petracci, Andrea (Università di Bologna)
Quek, Ming Hao (Brown)
Rana, Julie (Lawrence University)
Rollenske, Soenke (University of Marburg)
Schaffler, Luca (Roma Tre University)
Schock, Nolan (University of Illinois, Chicago)
Tayou, Salim (Harvard University)
Thompson, Alan (Loughborough University)
Viswanathan, Nivedita (Loughborough University)
Zanardini, Aline (Leiden University)
Zhou, Chuyu (Ecole Polytechnique Fedeale de Lausanne)
Zhuang, Ziquan (JHU/Princeton)

Sex Differences in Physiology: Mathematical Modelling and Analysis
March 5 - 10, 2023

Organizers:

Aurélie Carlier (Maastricht University)   **Anita Layton** (University of Waterloo)

The long-term goals of this 5-day workshop was to foster new collaborations, with a particular focus on junior researchers, to promote new research at the interface between mathematics and physiology that takes into account the influence of sex and gender, and ultimately to address the knowledge gap in healthcare between the sexes and genders. The workshop included keynote lectures as well as sessions for poster presentations, panel discussions, and mentoring.

Firstly, in the past, most basic and clinical research focused on male subjects or animals to exclude potential confounding factors arising from the fluctuating hormone levels and to reduce costs (as replicating experiments in both sexes requires twice the resources). Computational models have a rich potential to enhance our understanding of sex-specific processes. In particular, they are cheaper than in vitro or in vivo experiments. Moreover, they also require less time to calculate the simulation results, allowing a significant speed-up of the experiments. Finally, they can help untangle the interactions between hormone levels, sex-specific anatomy, and signaling and protein expression by providing a quantitative framework for simulation and hypothesis testing.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5045

Participants:

Ahmadi, Atiyeh (University of Waterloo)
Ahmed, Maliha (University of Waterloo)
Ansoms, Pieter (KULeuven)
Bertram, Richard (Florida State University)
Borgiani, Edoardo (KU Leuven)
Bruce, Lauryn (UC San Diego)
Carlier, Aurélie (Maastricht University)
Chen, Liang (University of Waterloo)
Chugunova, Marina (University of Waterloo)
Deng, Xiaoyan (University of Montreal)

Dutta, Pritha (University of Waterloo)
Farhang Sardroodi, Suzan (University of Manitoba)
Fischer-Holzhausen, Sophie (Univesity of Bergen)
Ford Versypt, Ashlee (University at Buffalo, The State University of New York)
Gholami, Samaneh (York University)
Grant, Rhiannon (Maastricht University)
Hakimi, Shervin (University of Waterloo)
Humphries, Tony (McGill University)
Huynh, Linh (University of Utah)

Kent, Amy (Oxford University)
Lafuente Gracia, Laura (KU Leuven)
Layton, Anita (University of Waterloo)
Leiderman, Karin (University of North Carolina at Chapel Hill)
Madrigal, Jamie (University of North Carolina at Chapel Hill)
Mai, Juliane (University of Waterloo)
Ndiaye, Jean François (University of Montreal)
Nelson, Anna (Duke University)
Nie, Shikun (University of British Columbia)
Norton, Kerri-Ann (Bard College)
Sadria, Mehrshad (University of Waterloo)
Saghafifar, Fatemeh (UBC)
Saville, Helen (University of Cambridge)
Stadt, Melissa (University of Waterloo)
Sultan, Shabaz (Radboud University)
Swapnasrita, Sangita (Maastricht University)
Tchouaga, Laurence (U Ottawa)
Wang, Zhao (Wendy) (McGill University)
Waters, Sarah (University of Oxford)
Wei, Ning (Purdue University)
West, Chris (University of Waterloo)
Xiong, Ivy (University of Southern California)
Yeo, Edwina (Oxford Univeristy)
Yih, Liam (UBC)
Zachariou, Margarita (Cyprus Institute of Neurology and Genetics)
Zavala, Eder (University of Birmingham)
Zhang, Yun (KU Leuven)
Zhao, Lihong (University of California)

Perspectives on Matrix Computations: Theoretical Computer Science Meets Numerical Analysis
March 5 - 10, 2023

Organizers:

Erin Carson (Charles University)
Daniel Kressner (Ecole Polytechnique Federale de Lausanne)

Joerg Liesen (Technical University of Berlin)
Richard Peng (University of Waterloo)
Nikhil Srivastava (University of California - Berkeley)

Computations with matrices, such as their multiplication, are fundamental operations that are executed on millions of devices, from smartphones to supercomputers, every day. But what is the minimum number of operations it takes to multiply two matrices? Surprisingly, the answer is currently unknown. The problem of determining the complexity, or the number of operations required to perform a certain computation, goes back to the very origins of computing. In the age of large-scale scientific computing, big data, and machine learning, understanding the complexity of computations is crucial for designing algorithms that are efficient in terms of both time and energy.

There were two distinct research communities in computer science and mathematics working to answer these questions. Each community brought different perspectives and different approaches, but they rarely interacted with each other to the detriment of both. To truly advance the state-of-the-art and tackle huge computational problems, cooperation and collaboration is needed. This workshop brought together a diverse group of researchers in theoretical computer science and numerical analysis to shape the future of research on the complexity of matrix computations.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2022/5-day-workshops/23w5108

Participants:

Alman, Josh (Columbia U)
Bai, Zhaojun (University of California - Davis)
Bakshi, Ainesh (MIT)
Beltran, Carlos (Universidad de Cantabria)
Bindel, David (Cornell University)
Boulle, Nicolas (University of Oxford)
Burgisser, Peter (TU Berlin)

Carson, Erin (Charles University)
Chen, Tyler (New York University)
Chow, Edmond (Georgia Institute of Technology)
Cortinovis, Alice (Stanford University)
Dauzickaite, Ieva (Charles University)
Demmel, Jim (Berkeley)
Derezinski, Michal (University of Michigan)

Drineas, Petros (Purdue University)
Dumitriu, Ioana (UC San Diego)
Edelman, Alan (Massachusetts Institute of Technology)
Epperly, Ethan (California Institute of Technology)
Garza-Vargas, Jorge (Berkeley)
Greenbaum, Anne (U Washington)
Grigori, Laura (EPFL)
Haddock, Jamie (Harvey Mudd College)
Higham, Nick (University of Manchester)
Holtz, Olga (University of California, Berkeley)
Ipsen, Ilse (North Carolina State University)
Kapralov, Michael (EPFL)
Kressner, Daniel (Ecole Polytechnique Federale de Lausanne)
Kyng, Rasmus (ETH Zurich)
Langou, Julien (University of Colorado Denver)
Liesen, Joerg (Technical University of Berlin)
Mahoney, Michael (Berkeley)
Martinsson, Per-Gunnar (UT Austin)
Mary, Theo (CNRS)
Massei, Stefano (University of Pisa)
Meyer, Raphael (NYU)
Moler, Cleve (MathWorks)
Musco, Christopher (New York University)
Musco, Cameron (UMass Amherst)
Nakatsukasa, Yuji (University of Oxford)
Palitta, Davide (U Bologna)
Peng, Richard (University of Waterloo)
Persson, David (EPFL)
Pozza, Stefano (Charles University)
Saad, Yousef (U Minnesota)
Sachdeva, Sushant (University of Toronto)
Shah, Rikhav (UC Berkeley)
Sidford, Aaron (Stanford Univrsity)
Srivastava, Nikhil (University of California, Berkeley)
Strakos, Zdenek (Charles University, Prague)
Toledo, Sivan (Tel Aviv University)
Townsend, Alex (Cornell University)
Trogdon, Thomas (U Washington)
Tropp, Joel (California Institute of Technology)
Udell, Madeleine (Stanford)
Urschel, John (MIT)
Vavasis, Stephen (University of Waterloo)
Vempala, Santosh (Georgia Institute of Technology)
Wang, Ke (The Hong Kong University of Science and Technology)
Webber, Rob (Caltech)
Wilber, Heather (University of Texas at Austin)
Woodruff, David (CMU)
Zhang, Peng (Rutgers University)

Algebraic Aspects of Matroid Theory
March 12 - 17, 2023

Organizers:

Matthew Baker (Georgia Tech)
June Huh (Princeton University)

Felipe Rincón (Queen Mary University of London)
Kris Shaw (University of Oslo)

The researchers participated in this workshop came from several mathematical subdisciplines, including combinatorics, algebraic geometry, and theoretical computer science. Their work and common interest here was to investigate new interactions between discrete mathematics, algebra, algebraic geometry, tropical geometry, and combinatorial algorithms. Some participants have collaborated before in smaller groups, but this meeting provided an opportunity to work together more intensively. Several recent mathematical breakthroughs highlighted in the workshop, including the recent resolution of some long-standing open problems about graphs and matroids. These breakthroughs used a surprising combination of interdisciplinary techniques which the organizers expect to have exciting further applications.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5149

Participants:

Adiprasito, Karim (University of Copenhagen)
Amini, Omid (CNRS-Ecole Polytechnique)
Anari, Nima (Stanford University)
Anderson, Nicholas (Queen Mary University)
Ardila, Federico (San Francisco State University)
Backman, Spencer (University of Vermont)
Baker, Matthew (Georgia Tech)
Berget, Andrew (Western Washington University)
Bowler, Nathan (Universität Hamburg)
Crowley, Colin (University of Wisconsin-Madison)
Denham, Graham (University of Western Ontario)
Draisma, Jan (University of Bern)
Eur, Christopher (Harvard University)
Fife, Tara (Queen Mary University of London)
Fink, Alex (Queen Mary University of London)
Huh, June (Princeton University)

Jarra, Manoel (IMPA / University of Groningen)
Jensen, David (University of Kentucky)
Jin, Tong (Georgia Tech)
Katz, Eric (The Ohio State University)
Klivans, Caroline (Brown University)
Larson, Matt (Stanford University)
Li, Shiyue (Institute for Advanced Study)
Lopez de Medrano, Lucia (UNAM)
Lorscheid, Oliver (University of Groningen / IMPA)
Maclagan, Diane (University of Warwick)
Matherne, Jacob (University of Bonn and Max Planck Institute for Mathematics)
Meszaros, Karola (Cornell University)
Nathanson, Anastasia (University of Minnesota)
Oxley, James (Louisiana State University)
Payne, Sam (UT Austin)

Pendavingh, Rudi (Eindhoven University)
Proudfoot, Nicholas (University of Oregon)
Rau, Johannes (Universidad de los Andes)
Rincón, Felipe (Queen Mary University of London)
Schroeter, Benjamin (Goethe University Frankfurt)
Shaw, Kris (University of Oslo)
Speyer, David (Univ of Michigan)
Spink, Hunter (Stanford University)
Umer, Ahmed (Abdus Salam School of Mathematical Sciences)
Walsh, Zach (Georgia Institute of Technology)
Wang, Botong (University of Wisconsin-Madison)
Williams, Lauren (Harvard University)
Yu, Josephine (Georgia Tech)
Yuen, Chi Ho (University of Oslo)

A Convergence of Computable Structure Theory, Analysis, and Randomness
March 19 - 24, 2023

Organizers:

Johanna Franklin (Hofstra University)   **Linda Westrick** (Penn State University)
Timothy McNicholl (Iowa State University)

This workshop focused on the newly developing connection between computable structure theory, computable analysis, continuous logic, and algorithmic randomness. While metric structures can be studied through the model-theoretic lens of continuous logic with no additional constraints, computable structure theory has historically been centered around countable algebraic structures such as algebraically closed fields and linear orders. However, with some care, it is possible to study uncountable structures such as Banach spaces and metric spaces in this context and to define the notion of an algorithmically random structure. This workshop brought together researchers in these four areas to build on recent advances in the intersection of these topics and develop new questions in and new approaches to this emerging field of study.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5055

Participants:

Burton, Peter (Iowa State University)
Calvert, Wesley (Southern Illinois University)
Eagle, Christopher (University of Victoria)
Fox, Alec (University of California, Irvine)
Franklin, Johanna (Hofstra University)
Goldbring, Isaac (University of California at Irvine)
Gruner, Emma (Penn State University)
Hanson, James (University of Maryland)
Harrison-Trainor, Matthew (University of Illinois Chicago)
Hart, Bradd (McMaster University)
Hoyrup, Mathieu (Inria)
Marchuk, Margarita (Sobolev Institute of Mathematics)
Mayordomo, Elvira (Universidad de Zaragoza)

McNicholl, Timothy (Iowa State University)
Melnikov, Alexander (Victoria University of Wellington)
Miller, Joseph S. (University of Wisconsin–Madison)
Miller, Russell (City University of New York)
Ng, Keng Meng (Nanyang Technological University)
Noquez, Victoria (St. Mary's College of California)
Pauly, Arno (Swansea University)
Rojas, Diego (University of Dallas)
Selivanova, Svetlana (KAIST)
Slutsky, Konstantin (Iowa State University)
Soskova, Mariya (University of Wisconsin–Madison)
Thewmorakot, Teerawat (University of Connecticut)
Turetsky, Dan (Victoria University of Wellington)
Villano, Java (University of Connecticut)

Mathematical Approaches of Atmospheric Constituents Data Assimilation and Inverse Modeling
March 19 - 24, 2023

Organizers:

Marc Bocquet (Ecole des Ponts ParisTech)
Kayo Ide (University of Maryland)
Dylan Jones (University of Toronto)

Richard Menard (Environment and Climate Change Canada)
Sahani Pathiraja (UNSW Sidney)

As the world population lives more and more in large urban areas, and as we are about to reach critical levels of greenhouse gases concentrations, the changing atmospheric composition has increasingly important economic, environmental and health impacts. It is thus becoming important to better quantify air pollution and its sources, using all the available information from observations to computer models, and use it in a synergistic way to maximize the information content – this is what data assimilation and inverse modeling aim for.

This interdisciplinary workshop brought together engineers and researchers from numerical mathematics, statistics, and environmental sciences, to develop and innovate on the assimilation and inverse methods to address the specific issues related to atmospheric composition and chemistry. It was a forum to train new scientists in this emerging field, and to promote the research towards new operational monitoring products.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5093

Participants:

Anderson, Jeffrey (National Center for Atmospheric Research)
Arellano, Avelino (University of Arizona)
Balogun, Olalekan (University of Toronto)
Baray, Sabour (Environment and Climate Change Canada)
Bocquet, Marc (Ecole des Ponts ParisTech)
Bousserez, Nicolas (European Centre for Medium Range Forecasting)
Bruhwiler, Lori (NOAA ESRL Global Monitoring Division)
Chai, Tianfeng (NOAA/OAR/ARL, CISESS, University of Maryland, College Park)
Chen, Hans (Chalmers University of Technology)
Cheng, Haiyan (Willamette University)
Cohn, Stephen (NASA Goddard Space Flight Center)
DiMaria, Christian (University of Toronto)
Dumont Le Brazidec, Joffrey (Ecole Nationale des Ponts et Chaussees)

Elbern, Hendrik (Universität zu Köln)
Farchi, Alban (CEREA)
Fletcher, Steven (Colorado State University)
Gilpin, Shay (University of Colorado Boulder)
Hammerling, Dorit (Colorado School of Mines)
Henze, Daven (University of Colorado)
Ide, Kayo (University of Maryland)
Jones, Dylan (University of Toronto)
Kim, Jinwoong (Environment and Climate Change Canada)
Lange, Anne Caroline (Forschungszentrum Jülich GmbH)
Lauvaux, Thomas (University of Reims Champagne Ardenne)
Marey, heba-allah s marey (University of Toronto)
Martinez, Vincent (CUNY)
Mastrogiacomo, Jon-Paul (University of Toronto)
McGuffin, Dana (Lawrence Livermore National Laboratory)
Menard, Richard (Environment and Climate Change Canada)
Miyazaki, Kazuyuki (Jet Propulsion Laboratory, California Institute of Technology)
Mizzi, Arthur (NASA Ames Research Center)
Pannekoucke, Olivier (INPT-ENM / CNRM / CERFACS)
Pathiraja, Sahani (UNSW Sidney)
Polavarapu, Saroja (Environment and Climate Change Canada)
Qi, Di (Purdue University)
Qu, Zhen (North Carolina State University)
Ruckstuhl, Yvonne (Ludwig Maximilian University of Munich)
Singh, Kulwinder (I.K. Gujral Punjab Technical University)
Sitwell, Michael (Environment and Climate Change Canada)
Vogel, Annika (Environment and Climate Change Canada)
Voshtani, Sina (Carleton University /Environment and Climate Change Canada)
Weir, Brad (NASA GSFC/Morgan State Univ)
Xiao, Zixuan (University of Toronto)

WIN6: Women in Numbers 6
March 26 - 31, 2023

Organizers:

Shabnam Akhtari (Pennsylvania State University)
Alina Bucur (University of California San Diego)

Jennifer Park (Ohio State University)
Renate Scheidler (University of Calgary)

Despite recent progress in gender equality in STEM fields, women continue to be underrepresented in the research landscape of many areas of mathematics, including number theory. The Women in Numbers (WIN) network was created in 2008 for the purpose of increasing the number of active women researchers in number theory. For this purpose, WIN sponsors regular conferences, taking place approximately every three years, where women scholars gather to collaborate on cutting-edge research in the field and produce publishable scientific results. The WIN workshops provide an ongoing forum for involving each new generation of junior faculty and graduate students in state-of-the-art research in number theory. They have to come be highly regarded among the broader number theory community due to the quality of research produced by these collaborations.

WIN6 brought together women number theorists at various career stages for research collaboration and mentorship. As always, the scientific program focused on onsite collaboration on open research problems in number theory, conducted in small groups comprised of senior and junior scholars as well as graduate students.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5175

Participants:

Akhtari, Shabnam (Pennsylvania State University)
Andeson, Jacqueline (Bridgewater State University)
Balcik, Irmak (University of Texas, Austin)
Chan, Stephanie (University of Michigan)
Deines, Alyson (Center for Communications Research La Jolla)
Desjardins, Julie (University of Toronto)
Dijols, Sarah (UBC)
Duque Rosero, Juanita (Dartmouth College)
Florea, Alexandra (UC Irvine)

Frechette, Claire (Boston College)
Fu, Yu (University of Wisconsin)
Gerbelli-Gauthier, Mathilde (McGill University)
Goodson, Heidi (Brooklyn College, CUNY)
Hamakiotes, Asimina (University of Connecticut)
Hamieh, Alia (University of Northern British Columbia)
Iorga, Andreea (University of Chicago)
Isham, Kelly (Colgate University)
Jones, Edna (Duke University)
Lalin, Matilde (Université de Montréal)

Lauter, Kristin (Meta)
Li, Cathy (Meta)
Liu, Yuan (University of Illinois Urbana-Champaign)
Lorenzo Garcia, Elisa (Universite de Neuchâtel)
Malmskog, Beth (Colorado College)
Maughan, Krystal (University of Vermont)
Namoijam, Changningphaabi (Colby College)
Newton, Rachel (King's College London)
Parimala, Raman (Emory University)
Park, Jennifer (Ohio State University)
Pieropan, Marta (Utrecht University)
Ramdorai, Sujatha (University of British Columbia)
Roy, Manami (Fordham University)
Sankar, Soumya (Ohio State University)
Scheidler, Renate (University of Calgary)
Serrano Lopez, Allechar (Harvard University)
Srivastava, Megha (Stanford University)
Stacy, Emerald (Washington College)
Tanabe, Naomi (Bowdoin College)
Tobin, Bella (Oregon State University)
Ure, Charlotte (University of Virginia)
Varma, Ila (University of Toronto)
Viray, Bianca (University of Washington)
Watson, Lori (Trinity College)
Winter, Rosa (King College London)

Interactions Between Topological Combinatorics and Combinatorial Commutative Algebra
April 2 - 7, 2023

Organizers:

Sara Faridi (Dalhousie University)
Satoshi Murai (Waseda University)

Adam Van Tuyl (McMaster University)
Mina Bigdeli (Institute for Research in Fundamental Sciences)

Starting with the pioneering work of Stanley and Hochster in the early seventies, commutative algebra methods have become an essential part of geometric and algebraic combinatorics, and more specifically face enumeration theory. The connecting language between commutative algebra and combinatorics is that of monomial ideals in polynomial rings. For instance, the Stanley--Reisner ideal of a simplicial complex is a monomial ideal generated by monomials representing the non-faces of the complex. The algebraic properties of this ideal are strongly related to the combinatorial and topological invariants of the complex in question. The Stanley--Reisner connection has been used heavily by researchers in combinatorics. In fact, some of the most beautiful results in the theory of face numbers of simplicial (and more general) complexes on one hand and graded Betti numbers of monomial ideals on the other were proved by using this language along with a subtle combination of algebraic and geometric arguments (e.g., Lefschetz elements, generic and not-so-generic initial ideals, local cohomology, rigidity, etc.).

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5003

Participants:

Almousa, Ayah (University of Minnesota - Twin Cities)
Athanasiadis, Christos (National and Kapodistrian University of Athens)
Benedetti, Bruno (University of Miami)
Bigdeli, Mina (Institute for Research in Fundamental Sciences)
Bisui, Sankhaneel (University of Manitoba)
Chau, Trung (University of Utah)
Constantinescu, Alexandru (Freie Universität Berlin)
Cooper, Susan (University of Manitoba)
Dao, Hailong (University of Kansas)

Dochterman, Anton (Texas State University)
Duval, Art (University of Texas at El Paso)
Faridi, Sara (Dalhousie University)
Holleben, Thiago (Dalhousie)
Juhnke-Kubitzke, Martina (Universität Osnabrück)
Kara, Selvi (University of Utah)
Klein, Patricia (Texas A&M University)
Mahmood, Hasan (Dalhousie University)
Matsuda, Kazunori (Kitami Institute of Technology)
Morey, Susan (Texas State University)
Murai, Satoshi (Waseda University)
Nagel, Uwe (University of Kentucky)
Nevo, Eran (Hebrew University of Jerusalem)

Nguyen, Thai Thanh (MacMaster University)
Novik, Isabella (University of Washington)
Papadakis, Stavros (University of Ioannina)
Reiner, Victor (University of Minnesota)
Saeedi Madani, Sara (Amirkabir University of Technology (Tehran Polytechnic) and IPM)
Samper, Jose (Pontificia Universidad Católica de Chile)
Schweig, Jay (Oklahoma State University)
Sega, Liana (University of Missouri-Kansas City)
Singh, Anurag (Indian Institute of Technology (IIT) Bhilai)
Swartz, Ed (Cornell University)
Van Tuyl, Adam (McMaster University)
Venturello, Lorenzo (Università di Pisa)
Welker, Volkmar (Philipps-Universitaet Marburg)
Woodroofe, Russ (University of Primorska)
Yazdan Pour, Ali Akbar (IASBS)
Zheng, Hailun (University of Houston)

Compensated Compactness and Applications to Materials
April 2 - 7, 2023

Organizers:

Jean-Francois Babadjian (Université Paris Saclay)
Flaviana Iurlano (CNRS and Sorbonne Université)

Filip Rindler (University of Warwick)

The workshop "Compensated Compactness and Applications to Materials" brought together experts from the theory of compensated compactness with researchers in material science. Classical compensated compactness is a theory that allows to study the limit of solutions of some partial differential equations with strongly oscillating coefficients. A particular focus was on the very recent developments in the compensated compactness theory involving concentration effects and formation of singularities. These developments have enabled many new results, for instance in the theories of microstructure, shape optimization, dislocation theory, fracture, and plasticity, and they also hold much promise for future applications. To facilitate further breakthroughs, this workshop aimed to balance theoretical and more applied talks to give the participants the opportunity to exchange the latest ideas, learn new methods, and start new collaborations.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5018

Participants:

Acharya, Amit (Carnegie Mellon University)
Alberti, Giovanni (Università di Pisa)
Allaire, Grégoire (Centre de Mathématiques Appliquées - Ecole Polytechnique)
Arroyo-Rabasa, Adolfo (University of Bonn)
Babadjian, Jean-Francois (Université Paris Saclay)
Bach, Annika (Sapienza University of Rome)
Bonhomme, Elise (Université Paris-Saclay)
Bonicatto, Paolo (University of Warwick)
Bouchitté, Guy (Université du Sud-Toulon-Var)
Buttazzo, Giuseppe (Universita` di Pisa)
Davoli, Elisa (TU Wien)
Fonseca, Irene (Carnegie Mellon University)
Francfort, Gilles (Université Paris Nord)
Garroni, Adriana (Universita` di Roma Sapienza)

Goldman, Michael (Ecole Polytechnique)
Guerra, Andre (ETH Zürich)
Henao, Duvan (Universidad de O'Higgins)
Hudson, Tom (University of Warwick)
Iurlano, Flaviana (CNRS and Sorbonne Université)
Kreisbeck, Carolin (Katholische Universität Eichstätt-Ingolstadt)
Lorent, Andrew (Anthem)
Merlet, Benoit (Université de Lille)
Mooney, Connor (University of California, Irvine)
Olbermann, Heiner (Université catholique de Louvain)
Palombaro, Mariapia (University of L' Aquila)
Rindler, Filip (University of Warwick)
Tobasco, Ian (University of Illinois Chicago)
Zeppieri, Caterina Ida (Universität Münster)

Dynamics of Hénon Maps: Real, Complex and Beyond
April 9 - 14, 2023

Organizers:

Jasmin Raissy (Université de Bordeaux)
Tatiana Firsova (Kansas State University)

Liviana Palmisano (KTH)
Gabriel Vigny (Université de Picardie-Jules Verne)

In the past forty years Henon maps have been extensively studied from different perspectives: 1) in real dynamics with the existence of strange attractor, 2) in complex dynamics, in the point of view of ergodic theory and bifurcation phenomena, 3) in arithmetic dynamics with the use of dynamical height to understand arithmetic phenomena. Recently, the study of Henon maps has undergone new exciting developments, like the recent proof of the existence of wandering domain for complex H\'enon maps. This result was achieved by mixing techniques from different parts of dynamics, namely real and complex. In this workshop we pursued this trend by bringing together experts on real, complex and non-archimedean dynamics to get new perspectives in the study of Henon maps.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5038

Participants:

Abate, Marco (Università di Pisa)
Abboud, Marc (Université de Rennes)
Arai, Zin (Chubu University Academy of Emerging Sciences)
Bedford, Eric (Stony Brook University)
Benini, Anna Miriam (University of parma)
Bera, Sayani (Indian Association for the Cultivation of Science)
Berger, Pierre (CNRS - Sorbonne Université)
Bianchi, Fabrizio (CNRS - Université de Lille)
Binder, Ilia (University of Toronto)
Birkett, Richard (University of Notre Dame)

Boc Thaler, Luka (University of Ljubljana)
Bonifant, Araceli (University of Rhode Island)
Boronski, Jan (Jagiellonian University in Kraków)
Buff, Xavier (Université de Toulouse)
Crovisier, Sylvain (CNRS)
Dang, Nguyen-Bac (Université Paris Saclay)
Diller, Jeffrey (University of Notre Dame)
Dujardin, Romain (Sorbonne Université)
Favre, Charles (CNRS)
Firsova, Tatiana (Kansas State University)
Fornaess, John (NTNU)
Gaidashev, Denis (University of Uppsala)

Gauthier, Thomas (Université Paris-Saclay)
Geyer, Lukas (Montana State University)
Goncharuk, Nataliya (Texas A&M)
Gong, Chen (Ecole Polytechnique)
Gorbovickis, Igors (Constructor University - Bremen)
Hlushchanka, Misha (Utrecht University)
Huguin, Valentin (Jacobs University)
Ingram, Patrick (York University)
Irokawa, Reimi (NTT)
Ishii, Yutaka (Kyushu University)
Jaramillo-Martinez, David (York University)
Jonsson, Mattias (University of Michigan)
Kim, Kyounghee (Florida State University)
Krieger, Holly (University of Cambridge)
Le, Van Tu (Hanoi University of Science and Technology)
Lee, Chong Gyu (Soongsil University)
López Hernanz, Lorena (University of Alcalá)
Luo, Yusheng (Stony Brook University)
Lyubich, Mikhail (Stony Brook University)
Mavraki, Myrto (Harvard University)
Moreno Rocha, Mónica (CIMAT)
Mummert, Phil (Purdue University)
Nguyen, Dang Khoa (University of Calgary)
Okuyama, Yusuke (Kyoto institute of technology)
Ovsyannikov, Ivan (Universität Hamburg)
Pal, Ratna (IISER Mohali)
Palmisano, Liviana (KTH)
Radu, Remus (Institute of Mathematics of the Romanian Academy)
Raissy, Jasmin (Université de Bordeaux)
Ramadas, Rohini (University of Warwick)
Roeder, Roland (Indiana University Purdue University)
Silverman, Joseph (Brown University)
Silversmith, Rob (University of Warwick)
Stimac, Sonja (University of Zagreb)
Tabaro, Matteo (Imperial College London)
Taflin, Johan (Université de Bourgogne)
Tanase, Raluca (Institute of Mathematics of the Romanian Academy)
Tao, Zhuang (KTH, Sweden)
Verjovsky, Alberto (UNAM Mexico)
Vigny, Gabriel (Université de Picardie-Jules Verne)
Vivas, Liz (Ohio State University)
Wu, Hao (National University of Singapore)
Yampolsky, Michael (University of Toronto)
Yang, Jonguk (University of Zurich)
Zhang, Yugang (Instituit de Mathématique d'Orsay)
Zhang, Zhiyuan (CNRS and Université Paris 13)
Zheng, Reila (University of Toronto)

Interactions between Symplectic and Holomorphic Convexity in 4 Dimensions
April 9 - 14, 2023

Organizers:

Thomas Mark (University of Virginia)   **Bulent Tosun** (University of Alabama)
Laura Starkston (University of California, Davis)

A shape is "convex" if for any two points in the shape, the line segment connecting them does not pass out of the shape. This fundamental notion is the beginning of a wide array of ideas in geometry and analysis, leading to much more general theories in which "line segment" is replaced by other more flexible objects, or where "convexity" is determined by properties only analogous to the classical ones. Such generalized ideas of convexity are particularly important in the mathematical fields of symplectic topology and complex geometry. While links between the symplectic and complex versions of complexity have been recognized for some time, recent years have begun to see the emergence of an even closer relationship in which techniques and tools from one field can shed light or inspire new directions in the other.

This workshop included specialists in complex analysis, symplectic geometry, contact topology, and smooth manifold theory, with the goal of introducing researchers in these fields to the techniques, ideas, and open problems in the others, united by the theme of convexity in various forms. Students and emerging researchers grouped with established scholars to establish new professional connections and research directions, and groups worked together to begin to bring their various tools together toward the solution of major open problems in the field.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5123

Participants:

Auyeung, Shamuel (Stony Brook University)
Baykur, Inanc (University of Massachusetts Amherst)
Boudreaux, Blake (University of Western Ontario)
Breen, Joseph (University of Iowa)
Brendel, Joé (Tel Aviv University)
Capovilla-Searle, Orsola (uc davis)
Casals, Roger (UC Davis)
Choi, Hakho (QSMS, Seoul National University)

Christian, Austin (Georgia Tech)
Cristofaro-Gardiner, Daniel (University of Maryland)
Dey, Subhankar (University of Alabama)
Dimitroglou Rizell, Georgios (Uppsala University)
Edtmair, Oliver (University of California Berkeley)
Etnyre, John (Georgia Institute of Technology)
Evans, Jonathan (Lancaster)
Golla, Marco (CNRS and University of Nantes)

Gompf, Bob (University of Texas Austin)
Gupta, Purvi (Indian Institute of Science, Bangalore)
Hayden, Kyle (Rutgers University - Newark)
Hutchings, Michael (University of California)
Hyunki, Min (University of California - Los Angeles)
Izzo, Alexander John (Bowling Green State University)
Knavel, Sierra (Georgia Institute of Technology)
Lambert-Cole, Peter (University of Georgia)
Lazarev, Oleg (University of Massachusetts Boston)
Lisi, Samuel (University of Mississippi)
Magill, Nicki (Cornell University)
Mark, Thomas (University of Virginia)
Min, Jie (University of Massachusetts - Amherst)
Nelson, Jo (Rice)
Nemirovski, Stefan (Ruhr-Universität Bochum)
Ono, Kaoru (Kyoto University)
Park, Jongil (Seoul National University)
Pinzon-Caicedo, Juanita (University of Notre Dame)
Rodewald, Thomas (Georgia Institute of Technology)
Roy, Agniva (Georgia Tech)
Sakalli, Sumeyra (University of Arkansas)
Shafikov, Rasul (University of Western Ontario)
Siegel, Kyler (USC)
Slapar, Marko (University of Ljubljana)
Starkston, Laura (University of California, Davis)
Stipsicz, Andras (Renyi Institute)
Tosun, Bulent (University of Alabama)
Urzúa, Giancarlo (Pontificia Universidad Católica de Chile)
Vela-Vick, Shea (Louisiana State University)
Wan, Shunyu (University of Virginia)
Wang, Luya (Stanford University)
Weiler, Morgan (Cornell University)
Wu, Angela (Louisiana State University)

Differential-Algebraic Equations and Operator Pencils
April 16 - 21, 2023

Organizers:

Mark Embree (Virginia Tech)
Kirsten Morris (University of Waterloo)

Timo Reis (Technische Universität Ilmenau)
Felix Schwenninger (University of Twente)

Research on differential-algebraic equations is mainly done by people originating in numerical analysis, numerical linear algebra and systems theory. On the other hand, operator pencils is a concept from functional analysis, in particular, spectral theory. The link between these disciplines is that the study of differential-algebraic equations naturally leads to the analysis of operator pencils. There is a high potential that the achievements on operator pencils can contribute to the analysis on differential-algebraic equations and vice versa. However, so far, these two communities have not communicated. This workshop brought together two mathematical disciplines: differential-algebraic equations and operator pencils.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5056

Participants:

Alalabi, Ala' (University of Waterloo)
Altmann, Robert (University of Augsburg)
Ascher, Uri (UBC, Vancouver)
Behrndt, Jussi (Graz University of Technology)
Berger, Thomas (University of Paderborn)
Boegli, Sabine (Durham University)
Colbrook, Matthew (University of Cambridge)
Dopico, Froilan (Universidad Carlos III de Madrid)
Dubljevic, Stevan (University of Alberta)
Embree, Mark (Virginia Tech)
Erbay, Mehmet (University of Wuppertal)
Garcia, Nilton Alan (Virginia Tech)
Gerhat, Borbala (Czech Technical University in Prague)

Grundel, Sara (Max Planck Institute)
Gugliemi, Roberto (University of Waterloo)
Horning, Andrew (MIT)
Hosfeld, René (University of Wuppertal)
Hu, Weiwei (University of Georgia)
Jacob, Birgit (University of Wuppertal)
Jay, Laurent (University of Iowa)
Marletta, Marco (Cardiff University)
Mehl, Christian (Technical University Berlin)
Moro, Julio (Universidad Carlos III Madrid)
Morris, Kirsten (University of Waterloo)
Opmeer, Mark (University of Bath)
Pivovarchik, Vyacheslav (University Odessa)
Rapti, Zoi (University of Illinois Urbana-Champaign)

Reis, Timo (Technische Universität Ilmenau)
Respondek, Witold (INSA Rouen, France and Lodz University of Technology - Poland)
Roca, Alicia (Universitat Politècnica de València)
Schimmer, Lukas (Loughborough University)
Schwenninger, Felix (University of Twente)
Siegl, Petr (Graz University of Technology)
Skrepek, Nathanael (TU Freiberg)
Tischendorf, Caren (Humboldt-University Berlin)
Trostorff, Sascha (CAU Kiel)
Trunk, Carsten (TU Ilmenau)
Tucsnak, Marius (Université Bordeaux)
Vu, Hoang Linh (Vietnam National University)
Waurick, Marcus (Technical University Freiberg)
Wellen, Natalie (University of Washington)
Woerdeman, Hugo (Drexel University)
Wojtylak, Michal (Jagiellonian University)
Zhuk, Sergiy (IBM Research EU)

Random Algebraic Geometry
April 16 - 21, 2023

Organizers:

Paul Breiding (MPI MIS) **Gregory G. Smith** (Queen's University)
Sonja Petrovic (Illinois Institute of Technology)

High-quality randomness is a valuable commodity in computation, experimentation, and discovery. This workshop focuses on randomness as a resource within real and complex algebraic geometry. The program highlights three current research trends: understanding the statistical properties of fundamental geometric invariants, developing randomized algorithms for symbolic and numerical calculations in algebraic geometry, and exploring the synergies between algebraic geometry and data analysis. This workshop will, for the first time, bring together a wide range of mathematicians interested in random algebraic geometry.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5070

Participants:

Basu, Saugata (Purdue University)
Bernardi, Alessandra (Università degli Studi di Trento)
Breiding, Paul (MPI MIS)

Bruce, Juliette (University of California, Berkeley)
Brysiewicz, Taylor (University of Western Ontario)
Bürgisser, Peter (Technische Universität Berlin)
Coons, Jane (University of Oxford)

Di Rocco, Sandra (KTH Stockholm)
Duff, Timothy (University of Washington)
Edwards, Parker (University of Notre Dame)
Ergur, Alperen (UT San Antonio)
Erman, Daniel (University of Wisconsin-Madison)
Fairchild, Samantha (Max Planck Institute for Mathematics in the Sciences)
Garrote López, Marina (University of British Columbia)
Gorla, Elisa (University of Neuchatel)
Gross, Elizabeth (University of Hawaii at Manoa)
Hauenstein, Jonathan (University of Notre Dame)
Hosten, Serkan (San Francisco State University)
Hubert, Evelyne (INRIA Université Côte d'Azur)
Jamshidi, Sara (Lake Forest College)
Kohn, Kathlén (KTH Royal Institute of Technology)
Leykin, Anton (Georgia Tech)
Lindberg, Julia (University of Texas at Austin)
Lundberg, Erik (Florida Atlantic University)
Malajovich, Gregorio (Universidade Federal do Rio de Janeiro)
Mathis, Leo (Frankfurt university)
Nagel, Uwe (University of Kentucky)
Natarajan, Abhiram (University of Warwick)
O'Reilly, Eliza (Caltech)
Peterson, Chris (Colorado State University)
Petrovic, Sonja (Illinois Institute of Technology)
Regan, Margaret (College of the Holy Cross)
Rodriguez, Jose (University of Wisconsin Madison)
Smith, Gregory G. (Queen's University)
Sottile, Frank (Texas A&M University)
Tonelli-Cueto, Josué (John Hopkins University)
Weinstein, Maddie (Stanford University)
Yang, Jay (Washington University in St. Louis)

A unified view of Quasi-Einstein Manifolds
April 23 - 28, 2023

Organizers:

Eric Woolgar (University of Alberta)
Eric Bahuaud (Seattle University)
Guofang Wei (University of California at Santa Barbara)

Natasa Sesum (Rutgers University)
Anna Siffert (University of Muenster)

Soon after Einstein postulated the General Theory of Relativity, he introduced what he called his "greatest mistake", the so-called cosmological constant. Solutions of the Einstein equation with cosmological constant are now called Einstein manifolds, and despite Einstein's pessimistic view, play key roles both in mathematics and physics. Quasi-Einstein manifolds are generalizations of Einstein manifolds, which include not only Einstein manifolds but Ricci solitons, warped product Einstein manifolds, static Einstein manifolds, and other special manifolds. These are important in many areas of modern mathematical research, including Ricci flow, collapsed Gromov-Hausdorff limits, and general relativity.

This workshop will examine progress in seemingly disparate fields which in fact share a common nexus, namely quasi-Einstein manifolds or the related notion of Bakry-Emery Ricci curvature. Problems to be discussed include the classification problem for near horizon geometries (of black holes), for Ricci solitons and for static Einstein metrics, as well as the fundamental gap problem for Laplace and Schroedinger operators, and the formulation and application of synthetic Bakry-Emery Ricci curvature.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5072

Participants:

Bahuaud, Eric (Seattle University)
Boehm, Christoph (University of Munster)
Case, Jeffrey (Penn State University)
Catino, Giovanni (Politecnico di Milano)
Chen, Eric (UC Berkeley)
Cho, Gunhee (UCSB)
Clutterbuck, Julie (Monash University)

Dai, Xianzhe (University of California, Santa Barbara)
Dameno, Davide (Universita degli Studi di Milano Statale)
Deng, Qin (MIT)
Flynn, Joshua (McGill University)
Galloway, Greg (University of Miami)

Griffin, Erin (Seattle Pacific University)
Guenther, Christine (Pacific University)
Gunasekaran, Sharmila (The Fields Institute for Research in Mathematical Sciences)
Hassannezhad, Asma (University of Bristol)
Isenberg, Jim (University of Oregon)
Ketterer, Christian (University of Freiburg)
Khan, Gabriel (Iowa State University)
Khuri, Marcus (Stony Brook University)
Kroncke, Klaus (KTH Stockholm)
Kunduri, Hari (McMaster University)
Lai, Yi (Stanford University)
Lee, Jihye (UC Santa Barbara)
Lu, Zhiqin (University of Califronia, Irvine)
Lucietti, James (University of Edinburgh)
Mantegazza, Carlo * (University of Naples "Federico II")
Mastrolia, Paolo (Universita di Milano)
McCann, Robert (University of Toronto)
Moura do Nascimento, Thialita (University of Central Florida)
Munteanu, Ovidiu (University of Connecticut)
Mylvaganam, Saeyon (University of Toronto)
Nguyen, Xuan Hien (Iowa State University)
Ohta, Shin-ichi (Osaka University)
Pan, Jiayin (UC Santa Cruz)
Patra, Dhriti Sundar (Indian Institute of Technology - Hyderabad)
Perales, Raquel (CONACyT-UNAM)
Petersen, Peter (UCLA)
Qing, Jie (University of California, Santa Cruz)
Ribeiro, Jr, Ernani (Universidade Federal do Ceara)
Ricci, Fabio (UC Santa Barbara)
Rigoni, Chiara (University of Vienna)
Rowlett, Julie (Chalmers University and the University of Gothenburg)
Sakurai, Yohei (Saitama University)
Sesum, Natasa (Rutgers University)
Seto, Shoo (California State University, Fullerton)
Siffert, Anna (University of Muenster)
Stancu, Alina (Concordia University)
Tatsuno, Tomoya (University of Oklahoma)
Tuerkoen, Malik (UC Santa Barbara)
Vritsiou, Beatrice-Helen (University of Alberta)
Wang, Lili (Fujian Normal University)
Wang, Lu (Yale University)
Wei, Guofang (University of California at Santa Barbara)
Woolgar, Eric (University of Alberta)
Wylie, William (Syracuse University)
Zhao, Xinrui (Massachusetts Institute of Technology)
Zhou, Detang (Universidade Federal Fluminense)

Systematic Effects and Nuisance Parameters in Particle Physics Data Analyses
April 23 - 28, 2023

Organizers:

Olaf Behnke (DESY Hamburg)
Sara Algeri (University of Minnesota)
Lydia Brenner (Nikhef)

Richard Lockhart (Simon Fraser University)
Louis Lyons (Imperial College London & Oxford U)

Particle Physicists study matter at its smallest and most fundamental scale. The well-known proton, neutron and similar particles are composed of quarks. Atoms also contain electrons; together with the two heavier versions of the electron (the muon and tau), each with its associated neutrino, they make up the group of leptons. Another ingredient of the catalogue of particles is the Higgs Boson, discovered at the CERN Lab's Large Hadron Collider (LHC) in 2012.

Experiments studying these and other particles require large accelerators and detectors: the circumference of the LHC is 27 km and one of the detectors to study the collisions is 25 meters high and 45 meters long. Building and running these machines is expensive, in terms of money and human effort. It is therefore important to use the best statistical techniques to extract the maximum amount of information from the hard-won data.

This workshop brings together Statisticians and experimental Particle Physicists to discuss how best to achieve this.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5096

Participants:

Algeri, Sara (University of Minnesota)
Asawatangtrakuldee, Chayanit (Chulalongkorn University)
Atkin, Edward T (Imperial)
Balasubramanian, Rahul (Nikhef)
Barlow, Roger (University of Huddersfield)

Behnke, Olaf (DESY Hamburg)
Berger, Jim (Duke University)
Brazzale, Alessandra (University of Padova)
Brenner, Lydia (Nikhef)
Canonero, Enzo (RHUL)
Capel, Francesca (Max Planck Institute for Physics)

Chakravarti, Purvasha (University College London)
Chen, Gemai (University of Calgary)
Cousins, Robert (UCLA)
Cowan, Glen (Royal Holloway)
David, André (CERN)
Davison, Anthony (Ecole Polytechnique Fédérale de Lausanne (EPFL))
de Wit, Adinda (LLR)
Defranchis, Matteo (CERN)
Dorigo, Tommaso (INFN Padova)
Fan, Yuxin (Simon Fraser)
Feichtinger, Paul (HEPHY Vienna)
Gilbert, Andrew (LLR / Ecole Polytechnique)
Gray, Heather (UC Berkeley)
Grosso, Gaia (CERN, Uni Padova, INFN Padova)
Harrison, Jack (IFAE - Barcelona)
Heinrich, Lukas (TUM)
Held, Alexander (University of Wisconsin–Madison)
Jafari, Abideh * (DESY)
Jones, Galin (University of Minnesota)
Junk, Tom (Fermilab)
Kagan, Michael (SLAC National Accelerator Laboratory)
Kania, Lucas (CMU)
Kieseler, Jan * (KIT)
Kuusela, Mikael (Carnegie Mellon University)
Lee, Ann (Carnegie Mellon University)
Linnemann, James (Michigan State University)
Lippincott, Hugh (University of California Santa Barbara)
Lockhart, Richard (Simon Fraser University)
Lopes, Beatriz (DESY)
Loredo, Tom (Cornell University)
Lyons, Louis (Imperial College London & Oxford U)
Malaescu, Bogdan * (CNRS)
Manole, Tudor (Carnegie Mellon University)
Matorras, Francisco (Universidad de Cantabria)
Mehta, Ankita (Uni Hamburg)
Meng, Xiao-Li * (Harvard University)
Moneta, Lorenzo * (CERN)
Morange, Nicolas (IJCLab, CNRS/IN2P3, Université Paris-Saclay)
Ochoa, Ines (LIP)
Petersen, Henriette (DESY)
Prosper, Harrison (Florida State University)
Purohit, Milind (USC)
Rolke, Wolfgang (UPR)
Rousseau, David (CNRS/IN2P3 and Université Paris-Saclay)
Roy, Debarati (Amity University, Noida)
Schafer, Chad (Carnegie Mellon University)
Shen, Alex (Carnegie Mellon University)
Stanley, Michael (Carnegie Mellon University)
Stefkova, Slavomira (KIT)
Tackmann, Frank (DESY)
Tackmann, Kerstin (DESY)
Tan, Pueh-Leng (Stockholm University)
Thais, Savannah (Columbia University)
Vallecorsa, Sofia (CERN)
van Dyk, David (Imperial College London)
Vischia, Pietro (Universidad de Oviedo)
Volobouev, Igor (Texas Tech University)

Wardle, Nicholas (Imperial College London)
Wassermann, Larry (Carnegie Mellon)
Whiteson, Daniel (University of California, Irvine)
Williams, Sarah (University of Cambridge)
Windischhofer, Philipp (University of Chicago)
Wulzer, Andrea (ICREA and IFAE)
Zhu, Richard (Carnegie Mellon University)

Applications of Stochastic Control to Finance and Economics
April 30- May 5, 2023

Organizers:

Jakša Cvitanić (California Institute of Technology)
George Georgiadis (Northwestern University)

Dylan Possamaï (ETH Zürich)
Nizar Touzi (École polytechnique)

A distinguished feature of the last few decades is the increasing availability of technological innovations to an everyday broader spectrum of society. This phenomenon has rapidly paved the way for the development of new economies such as e-commerce, sharing economies and online advertising. These activities are characterised by, for instance, a higher number of agents from both the supply and demand side, and an unprecedentedly large menu of tailor-made and personalised services. Naturally, this has led to more intricate behaviours and interactions at all levels of the economy. Consequently, there is a pressing need for the creation of economic theories that are able to explain the rationale of the participants, the way their actions are aggregated in society, and which are compatible with documented evidence.

This workshop will unite specialists of stochastic control and economic theory, who will work and explore how recent theoretical developments in their respective fields can be applied to these newly identified problems.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5011

Participants:

Acciaio, Beatrice (ETH Zürich)
Aïd, René (Université Paris Dauphine–PSL)
Bernard, Carole (Vrije Universiteit Brussel)
Bloedel, Alexander (University of California Los Angeles)
Bouchard, Bruno (Université Paris Dauphine - PSL)
Cadenillas, Abel (University of Alberta)
Çetin, Umut (London School of Economics)
Choulli, Tahir (University of Alberta)
Cvitanić, Jakša (California Institute of Technology)

Durandard, Theo (Northwestern University)
Frei, Christoph (University of Alberta)
Georgiadis, George (Northwestern University)
Guasoni, Paolo (Dublin City University)
Hernández, Camilo (Princeton University)
Hernández Santibáñez, Nicolás (Universidad de Chile)
Hou, Songyan (ETH Zürich)
Hubert, Emma (Princeton University)
Hugonnier, Julien (École Polytechnique fédérale de

Lausanne)
Jofré, Alejandro (Universidad de Chile)
Kardaras, Constantinos (London School of Economics)
Kazi-Tani, Nabil (Université de Lorraine, IECL)
Ke, Rongzhu (Zhejiang University)
Kršek, Daniel (ETH Zürich)
Lazrak, Ali (University of British Columbia)
Mastrolia, Thibaut (UC Berkeley)
Nutz, Marcel (Columbia)
Pham, Huyên (Université Paris Cité)
Possamaï, Dylan (ETH Zürich)
Ren, Zhenjie (Université Paris Dauphine-PSL)
Rivera, Alejandro (University of Texas at Dallas and University of California at Berkeley)
Rodrigues, Marco (ETH Zürich)
Rossato, Chiara (ETH Zürich)
Soner, Halil Mete (Princeton University)
Strulovici, Bruno (Northwestern University)
Talbi, Mehdi (ETH Zürich)
Tan, Xiaolu (The Chinese University of Hong Kong)
Tangpi, Ludovic (Princeton University)
Touzi, Nizar (École polytechnique)
Villeneuve, Stéphane (Toulouse School of Economics)
Xing, Hao (Boston University)
Zariphopoulou, Thaleia (The University of Texas at Austin)
Zervos, Mihail (London School of Economics)
Zhang, Jianfeng (University of Southern California)
Zhou, Chao (National University of Singapore)

Recent Advances in Banach lattices
May 7 - 12, 2023

Organizers:

Vladimir Troitsky (University of Alberta)
Marcel de Jeu (Leiden University)

Pedro Tradacete (Consejo Superior de Investigaciones Cientificas)
Niushan Gao (Ryerson University)

In recent years, several areas of Banach lattice theory have experienced high rates of growth. The workshop is going to concentrate on these recent developments, including free Banach lattices, order and uo-convergence, and applications to Math Finance. The goal of the workshop is to bring together the leading experts and active young researchers to discuss the current and future directions of these developments and to identify potential applications and the main open problems. We also plan to try to understand the "big picture" of connections between these developments and other areas of Functional Analysis.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5115

Participants:

Abela, Kevin (University of Malta)
Arora, Sahiba (Technical University Dresden)
Aviles, Antonio (University of Murcia)
Ben Amor, Mohamed Amine (University of Carthage)
Bilokopytov, Eugene (University of Alberta)

Boulabiar, Karim (Université de Tunis El Manar)
Bu, Qingying (University of Mississippi)
Buskes, Gerard (University of Mississippi)
Chavez-Dominguez, Javier Alejandro (University of Oklahoma)
Chetcuti, Emanuel (University of Malta)

Conradie, Jurie (University of Cape Town)
de Hevia, David (ICMAT-CSIC)
de Jeu, Marcel (Leiden University)
de Pagter, Ben (University of Technology Delft)
Deng, Yang (Southwestern University of Finance and Economics)
Ding, Chun (Leiden University)
Drnovsek, Roman (Faculty of Mathematics and Physics, University of Ljubljana)
Emelyanov, Eduard (Sobolev Institute of Mathematics)
Erkurşun-Özcan, Nazife (Hacettepe University)
Freeman, Daniel (St Louis University)
Gao, Niushan (Ryerson University)
García-Sanchez, Enrique (CSIC - Spain)
Glueck, Jochen (University of Wuppertal)
Gramcko-Tursi, Mary Angelica (Independent Scholar)
Grobler, Jacobus (North-West University)
Hajji, Rawaa (Université de Tunis El Manar)
Iqbal, Mobashir (Punjab police)
Jiang, Xingni (Sichuan University)
Johnson, Bill (Texas A&M University)
Kalauch, Anke (TU Dresden)
Kandic, Marko (University of Ljubljana)
Laustsen, Niels (Lancaster University)
Leung, Denny (National University of Singapore)
Li, Lei (Nankai Univeristy)
Martínez-Cervantes, Gonzalo (Universidad de Alicante)
O'Loughlin, Ryan (University of Leeds)
Oikhberg, Timur (University of illinois)
Orhon, Mehmet (University of New Hampshire)
Pernecka, Eva (Czech Technical University in Prague)
Polavarapu, Achintya (University of Alberta)
Rjab, Asma Ben (University of carthage)
Schep, Anton (University of South Carolina)
Szczepanski, Tomasz (University of Alberta)
Taylor, Mitchell (UC Berkeley)
Tcaciuc, Adi (MacEwan University)
Thorn, Page (University of Mississippi)
Tradacete, Pedro (Consejo Superior de Investigaciones Cientificas)
Troitsky, Vladimir (University of Alberta)
van Amstel, Sarel (None)
van der Walt, Jan Harm (University of Pretoria)
Wickstead, Anthony (Queens University Belfast)
Zabeti, Omid (University of Sistan and Baluchestan)

Extremal Graphs arising from Designs and Configurations
May 14 - 19, 2023

Organizers:

Gabriela Araujo (UNAM)
Marien Abreu (Università degli Studi della Basilicata)

Robert Jajcay (Comenius University)
Alejandra Ramos (University of Ljubljana)
Jean Paul Zerafa (Comenius University)

The main impact of this workshop will be the setting for joint work among research groups in different areas and to unite us as a community while approaching different problems.

We want to emphasize that one of the principal objectives is to consolidate our research group and do School worldwide, and specifically in México, by working together on this topic also with students.

The influence of networks in our daily life is swiftly increasing. Examples of physical networks are those that involve passenger transfers or simply the connections between different computers to send information. On the other hand, virtually, we find social networks, such as Facebook, Instagram and so on, which are widely used and known by a high percentage of the world's population. Currently, the construction of networks that optimize certain real hypotheses, is a vast area that provides mathematical problems whose answers solve real situations.

The proposal of this workshop, counting on a conspicuous number of female participants, will be an occasion for mathematical experts in the area to meet and collaborate on many problems regarding networks, share their previous results and set ground for new discoveries. One of the main interests will likely be the Degree/Diameter Problem which requires to find networks (graphs) with the maximum number of elements (vertices) and all of them at a prescribed maximum distance, which is, a beautiful and natural optimization problem that is applied to construct further varieties of networks such as Bluetooth scatternets. The extremal graphs we intend to construct from designs and configurations will have special properties as the mentioned networks too.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5125

Participants:

Abreu, Marien (Università degli Studi della Basilicata)
Araujo, Gabriela (UNAM)
Balbuena, Camino (Universitat Politècnica de Catalunya)
Berikkyzy, Zhanar (Fairfield University)
Bona, Miklos (University of Florida)
Bonacini, Paola (Università degli Studi di Catania)
Bong, Novi (University of Delaware)
Bonvicini, Simona (Università degli Studi di Modena e Reggio Emilia)
Buratti, Marco (University "La Sapienza" of Rome)
Buset, Dominique (Université Libre de Bruxelles (ULB))
Conder, Marston (Un iversity of Auckland)
Costa, Simone (Università degli Studi di Brescia)
Dalfó, Cristina (Universitat de Lleida)
Dawkins, Aleyah (George Mason University)
De la Cruz, Claudia Marlene (Universidad Autónoma Metropolitana - Iztapalapa)
Díaz Calderón, Julio César (Universidad Nacional Autónoma de México)
Erskine, Grahame (Open University - UK)
Exoo, Geoffrey (Indiana state university)
Figueroa, Ana Paulina (ITAM)
Fiol, Miguel Àngel (Universitat Politècnica de Catalunya)
Fresan, Julian (Universidad Autónoma Metropolitana Unidad Cuajimalpa)
García-Colín, Natalia (Université Libre de Bruxelles)
Gauci, John Baptist (University of Malta)
Goedgebeur, Jan (KU Leuven)
Gonzalez, Estefania (CCM UNAM-Morelia)
González, Diego (Universidad Autónoma Metropolitana)
Guardo, Elena (Universita di Catania)
Guevara, Mucuy-Kak (Universidad Nacional Autónoma de México)
Héger, Tamás (Eötvös Loránd Research Network)
Jajcay, Robert (Comenius University)
Jajcayovna, Tatiana (Comenius University)
Jooken, Jorik (KU Leuven)
Kirsch, Rachel (George Mason University)
Kiss, Gyorgy (Eötvös Loránd University, Budapest, Hungary)
Lazebnik, Felix (University of Delaware)
Leemans, Dimitri (Université libre de Bruxelles)
Lesniak, Linda (Western Michigan University)
López, Nacho (Universitat de Lleida)
Macajova, Edita (Comenius University, Bratislava)
Matamala, Martin (Universidad de Chile)
Mattiolo, Davide (KU Leuven)
Mazzuoccolo, Giuseppe (University of Verona)
Mendoza Cadena, Lydia Mirabel (Eötvös Lórand University)
Merola, Francesca (Università Roma Tre)
Miclavic, Stefko * (University of Primorska)
Milanic, Martin (University of Primorska)

Miret, Josep (Universitat de Lleida, Spain)
Nakic, Anamari (University of Zagreb)
Napolitano, Vito (NAPOLITANO)
O'Reilly, Eugenia (UNAM)
Olsen, Mika (Universidad Autónoma Metropolitana)
Pasotti, Anita (Università degli Studi di Brescia)
Pellicer, Daniel (Universidad Nacional Autonoma de Mexico)
Pizaña, Miguel Ángel (Universidad Autónoma Metropolitana)
Porupsánszki, István (Eötvös Lorand University.)
Ramos, Alejandra (University of Ljubljana)
Renders, Jarne (KU Leuven)
Reyes, Mónica (Universitat de Lleida)
Romaniello, Federico (University of Basilicata)
Rubio-Montiel, Christian (National Autonomous University of Mexico)
Siagiova, Jana (Slovak University of Technology)
Skoviera, Martin (Comenius University)
Taranchuk, Vladislav (University of Delaware)
Traetta, Tommaso (Università degli Studi di Brescia)
Tuite, James (Open University)
Zerafa, Jean Paul (Comenius University)
Zhou, Samning (The University of Melbourne)

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Mathematical Methods in Cancer Biology, Evolution and Therapy
May 14 - 19, 2023

Organizers:

Quaid Morris (Memorial Sloan Kettering Cancer Center)
Ronglai Shen (Memorial Sloan-Kettering Cancer Center)

Peter Van Loo (The University of Texas MD Anderson Cancer Center)
Wenyi Wang (University of Texas MD Anderson Cancer Center)

Present day biology generates a wealth of data from which tumor biology and tumor evolution can be inferred, and therapeutic strategies can be developed. Most clinical (and research) samples are comprised of a mixture of different cells, including multiple different populations of cancer cells ('subclones') and a variety of normal cell types. Effective use of these data thus requires data from individual cell types to be deconvolved. A number of subfields are independently developing mathematical and statistical deconvolution techniques. While at first glance these subfields are largely disparate, there are clear opportunities for synergies to be developed. This workshop will fill this gap by bringing together researchers from several of these fragmented subfields across a wide range of backgrounds (computational biology, mathematics, statistics, computer science, biomedicine, etc.) to provide a synergistic forum for cross-disciplinary learning, discussion and collaboration.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5084

Participants:

Boutros, Paul (University of California Los Angeles)
Castignani, Carla (The Francis Crick Institute)
Coleman, Kyle (University of Pennsylvania)
Dai, Yaoyi (The University of Texas MD Anderson Cancer Center)
Dannenfelser, Ruth (Rice University)
Demeulemeester, Jonas (VIB – KU Leuven)
Edrisi, Mohammadamin (Rice University)
El-Kebir, Mohammed (University of Illinois at Urbana-Champaign)
Grigoriadis, Kristiana (The Francis Crick Institute)
Gundem, Gunes (Memorial Sloan Kettering Cancer Center)

Hari, Ananth (NIH)
Harrigan, Cait (University of Toronto)
Hernando, Barbara (CNIO - Spanish National Cancer Research Center)
Hovens, Christopher (UNIVERSITY OF MELBOURNE)
Huang, Xiru (Rice University)
Jiang, Yuchao (University of North Carolina at Chapel Hill)
Kulman, Ethan (University of Minnesota)
Kumar, Sanjeev (Dr. Bhimrao Ambedkar University)
Lai, Siqi (The University of Texas MD Anderson Cancer Center)
Lee, Wei-Hao (Rice University)

Lesluyes, Tom (The Francis Crick Institute)
Li, Mingyao (University of Pennsylvania)
Liu, Yushu (Rice University)
Liu, Yuelin (University of Maryland)
Ma, Cong (Princeton University)
Macintyre, Geoff (Spanish National Cancer Research Center)
Malikic, Salem (NIH)
McGranahan, Nicholas (UCL Cancer Institute)
Mensah, Nana (The Francis Crick Institute)
Morris, Quaid (Memorial Sloan Kettering Cancer Center)
Nakhleh, Luay (Rice University)
Newman, Aaron (Stanford University)
Ogilvie, Huw (Rice University)
Olshen, Adam (University of California, San Francisco)
Pan, Yidan (Merck)
Papenfuss, Tony (Walter and Eliza Hall Institute of Medical Research)
Parmentier, Mathieu (Université Libre de Bruxelles)
Paterson, Chay (Manchester University)
Peng, Xiyu (MSKCC)
Persad, Sitara (Columbia University)
Petralia, Francesca (Icahn School of Medicine at Mount Sinai)
Przytycka, Teresa (NIH)
Raphael, Ben (Princeton University)
Rozen, Steven (Duke-NUS)
Sahinalp, Cenk (NIH)
Sashittal, Palash (Princeton University)
Satas, Gryte (Memorial Sloan Kettering)
Schmidt, Henri (Princeton)
Seshan, Venkatraman (Memorial Sloan Kettering Cancer Center)
Shah, Sohrab (Memorial Sloan Kettering Cancer Center)
Shen, Ronglai (Memorial Sloan-Kettering Cancer Center)
Sun, Wei (Fred Hutchinson Cancer Research Center)
Taher, Dalil (Université Libre de Bruxelles)
Tarabichi, Maxime (IRIBHM)
Van Loo, Peter (The University of Texas MD Anderson Cancer Center)
Wang, Wenyi (University of Texas MD Anderson Cancer Center)
Weber, Leah (University of Illinois at Urbana-Champaign)
Yao, Vicky (Rice University)
Zhu, Bin (National Cancer Institute)

Formalization of Cohomology Theories
May 21 - 26, 2023

Organizers:

Adam Topaz (University of Alberta)
Anne Baanen (Vrije Universiteit Amsterdam)

Matthew Ballard (University of South Carolina)
Johan Commelin (Freiburg University)
Heather Macbeth (Fordham University)

Mathematicians and computer scientists have been collaborating for years to build libraries of mathematical definitions and proofs that can be understood and checked by computers. These formalization efforts have now progressed to cover a substantial portion of an undergraduate and graduate-level mathematics education, with the aspiration to one day include all the ingredients that a modern mathematician needs for their research.

Homology and cohomology are two related sets of theories that are essential to several branches of modern mathematics including algebraic geometry, algebraic topology, etc. The first formalizations of (co)homology have recently been completed, and the time is ripe to add the full spectrum of (co)homology theories to the formal libraries. This workshop aims to bring together experts in formalization and experts in various mathematical areas to advance the state of formalization closer to the leading edge of mathematical research.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5124

Participants:

Angdinata, David Kurniadi (London School of Geometry and Number Theory)
Ásgeirsson, Dagur (University of Copenhagen)
Baanen, Anne (Vrije Universiteit Amsterdam)
Balakrishnan, Jennifer (Boston University)
Ballard, Matthew (University of South Carolina)

Balodis, Kristaps (University of Calgary)
Barton, Reid (University of Freiburg)
Bellovin, Rebecca (University of Glasgow)
Best, Alexander (Vrije Universiteit Amsterdam / Kings College London)
Birkbeck, Chris (University of East Anglia)

Bordg, Anthony (University of Cambridge)
Brasca, Riccardo (Université Paris Cité)
Buzzard, Kevin (Imperial College London)
Chambert-Loir, Antoine (Université Paris-Diderot)
Commelin, Johan (Freiburg University)
de Frutos Fernández, María Inés (Universidad Autónoma de Madrid)
Doll, Moritz (University of Melbourne)
Gouezel, Sebastien (Universite de Rennes 1)
Hazratpour, Sina (Johns Hopkins University)
Hernandez, Daniel (University of Kansas)
Hernando, Isaac (University of Alberta)
Kontorovich, Alex (Rutgers)
Kotch, Coleton (University of Alberta)
Kudriashov, Iurii (Texas A&M)
Lamiaux, Thomas (Université Paris-Saclay)
Lang, Jaclyn (Temple University)
Levinson, Jake (Simon Fraser University)
Li, Wenda (Cambridge)
Livingston, Amelia (London School of Geometry and Number Theory)
Ljungström, Axel (Stockholm University)
Loeffler, David * (University of Warwick)
Macbeth, Heather (Fordham University)
Mahboubi, Assia (INRIA)
Mayer, Leopold (University of Washington)
McGuinness, Oisin (Retired)
McKoen, Jack (University of Alberta)
Morrison, Scott ()
Mörtberg, Anders (Stockholm University)
Murphy, Brendan (University of Utah)
Nash, Oliver (Imperial College London)
Nelson, Peter (University of Waterloo)
Nuccio Mortarino Majno di Capriglio, Filippo A. E. (Univ Lyon, UJM Saint-Étienne)
Piquerez, Matthieu (Nantes Université / INRIA)
Riou, Joël (Université Paris-Saclay)
Scull, Laura (Fort Lewis College)
Testa, Damiano (Warwick University)
Topaz, Adam (University of Alberta)
van Doorn, Floris (University of Paris-Saclay)
van Gool, Sam (Université Paris Cité)
Vooys, Geoff (Dalhousie University)
Witt, Emily (University of Kansas)
Xu, Junyan (National Cancer Institute (as of Jan 23))

Joint Spectra and related Topics in Complex Dynamics and Representation Theory
May 21 - 26, 2023

Organizers:

Raul Curto (University of Iowa)
Nguyen-Bac Dang (Université Paris Saclay)

Rostislav Grigorchuk (Texas A & M University)
Rongwei Yang (University at Albany, the State University of New York)

Mathematics has a wide range of different disciplines, from algebra to geometry and from analysis to topology, etc. Some discoveries, however, are able to link several disciplines together and open a field of interplay. Two of such recent discoveries are self-similar group representations and projective spectrum of linear operators. The goal of this workshop is bring together scholars in spectral theory, representation theory, complex dynamics and other related fields to exchange and examine some recent discoveries on self-similarity and projective spectrum.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5033

Participants:

Abakoumov, Evgueni (Gustave Eiffel University)
Anshelevich, Michael (Texas A & M University)
Bannon, Jon (Siena College)
Bleher, Frauke * (University of Iowa)
Clouâtre, Raphaël (University of Manitoba)
Curto, Raul (University of Iowa)
Dang, Nguyen-Bac (Université Paris Saclay)
De Graaf, Willem (University of Trento)
Dudko, Artem (Institute of Mathematics of Polish

Academy of Sciences)
Ejder, Özlem (Bogazici University)
Ghasemi, Mehdi (University of Saskatchewan)
Goel, Charu (Indian Institute of Information Technology (IIIT) Nagpur, India)
Grigorchuk, Rostislav (Texas A & M University)
Hartz, Michael (Saarland University)
Hlushchanka, Misha (Utrecht University)
Infusino, Maria (University of Cagliari)

Juul, Jamie (Colorado State University)
Kaimanovich, Vadim (University of Ottawa)
Kinser, Ryan (University of Iowa)
Klep, Igor (Univerza v Ljubljani)
Kuhlmann, Salma (Universität Konstanz)
Kwon, Hyunkyoung (SUNY Albany)
Lehner, Franz (TU Graz)
Li, Chen (Fudan University)
Liaw, Constanze (University of Delaware)
Mau, Alex (Texas A&M University)
Medynets, Constantine (United States Naval
Academy)
Misra, Gadadhar (Indian Statistical Institute)
Nagnibeda, Tatiana (University of Geneva)
Nekrashevych, Volodymyr (Texas A & M
University)
Owens, Josiah (Texas A&M University)
Peters, Han (University of Amsterdam)
Putinar, Mihai (University of California at Santa
Barbara)
Radi, Santiago (Texas A&M University)
Raissy, Jasmin (Université de Bordeaux)
Reinke, Bernhard (Jussieu (Paris-Sorbonne))
Reznikoff, Sarah (Kansas State University)
Roeder, Roland (Indiana University Purdue
University Indianapolis)
Sabot, Christophe * (University Lyon1)
Samarakoon, Supun (Stony Brook University)
Savchuk, Dmytro (University of South Florida)
Schiffler, Ralf (University of Connecticut)
Snobl, Libor (Czech Technical University)
Sottile, Frank (Texas A&M University)
Steinberg, Benjamin (The City College of New
York)
Stessin, Michael (University at Albany)
Stursberg, Rutwig Campoamor (Universidad
Complutense)
Sunic, Zoran (Hofstra University)
Tchernev, Alex (University at Albany)
Teplyaev, Alexander (University of Connecticut)
Trachana, Matina (Cardiff University)
Vdovina, Alina (The City College of New York and
Graduate Center, CUNY)
Volcic, Jurij (Drexel University)
Wang, Yi (Chongqin University)
Yang, Rongwei (University at Albany, the State
University of New York)
Zhu, Kehe (University at Albany)

Spinorial and Octonionic Aspects of G2 and Spin(7) Geometry
May 28 - June 2, 2023

Organizers:

Spiro Karigiannis (University of Waterloo)
Ilka Agricola (Philipps-Universitat Marburg)
Shubham Dwivedi (Humboldt University of Berlin)

Sergey Grigorian (University of Texas Rio Grande Valley)
Jason Lotay (University of Oxford)

There exists a mysterious algebraic structure in 8-dimensional space that does not behave in the same way as the ordinary arithmetic that we all learn as children. Somewhat surprisingly, this strange algebra, called the octonions, shows up naturally in the study of certain higher dimensional geometric spaces, called manifolds, that are of importance in physics and in the study of the equations introduced by Einstein in general relativity. Geometers have been studying such spaces for a number of years, mostly using tools from calculus and differential equations. The proposed workshops intends to introduce these researchers to experts in the special octonion algebra, as well as in related special algebraic structures called spinors, to facilitate a cross-pollination of ideas, methods, and techniques. Some of these groups have never before been brought together in this way.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5006

Participants:

Agricola, Ilka (Philipps-Universitat Marburg)
Albanese, Michael (University of Waterloo)
Alonso Lorenzo, Izar (University of Oxford)
Artacho, Diego (Imperial College London)
Ball, Gavin (University of Wisconsin, Madison)
Bazzoni, Giovanni (University of Insubria)
Bera, Gorapada (Humboldt-Universität zu Berlin)
Bhoja, Niren (University of Nottingham)
Cheng, Da Rong (University of Miami)
Chiossi, Simon (Fluminense Federal University (UFF))
Chrysikos, Ioannis (Masaryk University)
Dileo, Giulia (University of Bari)
Draper, Cristina (University of Malaga)
Dwivedi, Shubham (Humboldt University of Berlin)
Fino, Anna (Università di Torino)
Fowdar, Udhav (Unicamp)
Garcia-Fernandez, Mario (Instituto de Ciencias Matemáticas)
Ghosh, Tathagata (University of Leeds)
Grigorian, Sergey (University of Texas Rio Grande Valley)
Harland, Derek (University of Leeds)
Henkel, Jonas (University of Marburg)
Holmes, Alfred (University of Oxford)
Huerta, John (University of Lisbon)
Iliashenko, Anton (University of Waterloo)
Karigiannis, Spiro (University of Waterloo)
Kotrbaty, Jan (Goethe University Frankfurt)
Krasnov, Kirill (Univ. of Nottingham)
Langlais, Thibault (University of Oxford)
Lehmann, Fabian (Simons Center for Geometry and Physics)
Leung, Conan (Chinese University of Hong Kong)
Liu, Hongyi (University of California at Berkeley)
Lotay, Jason (University of Oxford)
Madnick, Jesse (University of Oregon)
Martin-Merchan, Lucia (University of Waterloo)
Moroianu, Andrei (CNRS - Université Paris-Saclay)
Naujoks, Henrik (University of Marburg)
Oliveira, Goncalo (IST Austria)
Petcu, Amanda (University of Waterloo)
Platt, Daniel (King's College London)
Russo, Giovanni (Florida International University)
Sa Earp, Henrique (Unicamp)
Saavedra, Julieth (Universidade Federal do Ceara)
Salamon, Simon (King's College London)
Salvai, Marcos (University of Cordoba)
Semmelmann, Uwe (University of Stuttgart)
Singhal, Ragini (University of Humboldt-Berlin)
Stecker, Leander (University of Hamburg)
Suan, Caleb (University of British Columbia)
Tonnesen-Friedman, Christina (Union College - Schenectady)
Trinca, Federico (University of Oxford)
Upmeier, Markus (University of Aberdeen)
Wang, Yuanqi (University of Kansas)
Windes, Emily (University of Oregon)
Yan, Dashen (Stony Brook University)

Random Growth Models and KPZ Universality
May 28 - June 2, 2023

Organizers:

Ivan Corwin (Columbia University)
Jessica Lin (McGill University)
Jeremy Quastel (University of Toronto)

Firas Rassoul-Agha (University of Utah)
Benedek Valko (University of Wisconsin - Madison)

Irregular growth is a ubiquitous phenomenon in nature, from the growth of tumors, crystals, and bacterial colonies to the propagation of forest fires and the spread of water through a porous medium. Mathematical models of random growth have been a driving force in probability theory over the last sixty years and a rich source of important ideas. The analysis of random growth models began in the early 1960s with the introduction of the Eden model by Eden and first-passage percolation by Hammersley and Welsh. The field witnessed several breakthroughs in the 1980s and 1990s, from the introduction of more random growth models, including the Kardar, Parisi, and Zhang (KPZ) equation and the KPZ universality class, to the ground-breaking works of Tracy and Widom and of Baik, Deift, and Johansson, and the seminal works of Newman and coauthors. These results caused a flurry of activity and more analytical and geometrical tools were developed.

The study of random growth models connects to a large number of areas in probability theory such as integrable probability, homogenization, percolation, disordered systems, interacting particle systems, random matrices, SPDEs, random polymer measures, random dynamical systems, and random walk in random environment. The last two decades have seen rapid advances in all these directions, with a significant acceleration in progress in several of these subfields recently, including solutions of several long-open problems. This is an exciting time for the subject, with new possibilities in extending universality, new geometric approaches, and more. The main objective of this workshop will be to bring together a number of top experts on these various subfields to disseminate these recent developments and exchange ideas that will fertilize the ground for yet another leap forward. This opportunity will also be used to celebrate the work of Timo Seppalainen in the field.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5075

Participants:

Alberts, Thomas (University of Utah)
Assiotis, Theo (University of Edinburgh)
Bakhtin, Yuri (New York University)
Balazs, Marton (University of Bristol)
Bates, Erik (University of Wisconsin - Madison)
Busani, Ofer (Universität Bonn)
Cator, Eric (Radboud University, Nijmegen)
Corwin, Ivan (Columbia University)
Dauvergne, Duncan (University of Toronto)
Dow, Douglas (New York University)
Emrah, Elnur (University of Bristol)
Ferrari, Pablo (Universidad de Buenos Aires)
Georgiou, Nicos (University of Sussex)
Gorin, Vadim (UC Berkeley)
Groathouse, Sean (University of Utah)
Hammond, Alan (University of California - Berkeley)
Hegde, Milind (Columbia University)
Hoffman, Christopher (University of Washington)
Janjigian, Christopher (Purdue University)
Khoshnevisan, Davar (University of Utah)
Kosygina, Elena (Baruch College and the CUNY Graduate Center)
Krishnan, Arjun (University of Rochester)
Kumar, Rohini (Wayne State University)
Lin, Jessica (McGill University)
O'Connell, Neil (University College Dublin)
Quastel, Jeremy (University of Toronto)
Rassoul-Agha, Firas (University of Utah)
Rezakhanlou, Fraydoun (University of California - Berkeley)
Rider, Brian (Temple University)
Seppalainen, Timo (University of Wisconsin)
Sethuraman, Sunder (University of Arizona)
Shcherbina, Tatyana (University of Wisconsin - Madison)
Shen, Hao (University of Wisconsin - Madison)
Shen, Xiao (University of Utah)
Sorensen, Evan (University of Wisconsin-Madison)
Sosoe, Philippe (Cornell University)
Sweeney, Mikhail (University of Utah)
Toth, Balint (University of Bristol & Renyi Institute of Mathematics Budapest)
Tsai, Li-Cheng (University of Utah)
Valko, Benedek (University of Wisconsin - Madison)
Virag, Balint (University of Toronto)
Wu, Xuan (University of Chicago)
Yilmaz, Atilla (Temple University)
Yukich, Joseph (Lehigh University)
Zeitouni, Ofer (Weizmann Institute)
Zygouras, Nikos (University of Warwick)

Quantum Information Theory in Quantum Field Theory and Cosmology
June 4 - 9, 2023

Organizers:

Arpan Bhattacharyya (Indian Institute of Technology Gandhinagar)

Shajid Haque (University of Cape Town)

Saurya Das (University of Lethbridge)

Quantum information theory is the foundation of quantum computers. Participants including leading physicists from Canada and across the globe will discuss the role of quantum information theory to tackle fundamental questions in Physics about our Universe.

This five day workshop will hold morning and afternoon sessions with ample time for discussions with leading physicists in the field. The workshop will feature an evening public lecture by an internationally renowned physicist, to be attended by members of the local community, high school students and anyone interested in getting an insider's overview of the current state of theoretical physics at the forefront. It will also feature two panel discussions focused on Equity, Diversity and Inclusion in the academia.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5092

Participants:

Adil, Arsalan (University of California at Davis)
Ali, Tibra (BRAC University)
Alishahiha, Mohsen (Institute for Research in Fundamental Sciences)
Alserwy, Shady (Ankara University)
Amin, Mustafa (University of Lethbridge)
Angelinos, Nikolaos (University of Kentucky)
Beetar, Cameron (University of Cape Town)
Bernardo, Heliudson (McGill University)
Bhattacharyya, Arpan (Indian Institute of Technology Gandhinagar)
Bhattarai, Rohit (Tri-Chandra Multiple Campus, Tribhuvan University)
Bonifacio, Glenda (University of Lethbridge)
Brandenberger, Robert (McGill)
Burgess, Cliff (McMaster University & Perimeter Institute)
C, Vishnulal (IISER-Thiruvananthapuram India)
Caceres, Elena (University of Texas at Austin)
Czech, Bartlomiej (Tsinghua University)
Das, Saurya (University of Lethbridge)
Dasgupta, Keshav (McGill University)
de Mello Koch, Robert (Huzhou University)
Dixit, Khushboo (Center for Astro-Particle Physics)
Dymarsky, Anatoly (University of Kentucky)
Fragomeno, Federica (University of Alberta)
Fridman, Mitja (University of Lethbridge)
Gomez, Cesar (Universidad Autonoma de Madrid)
Haque, Shajid (University of Cape Town)
Hung, Ling-Yan (Janet) (Tsinghua University)
Hunter-Jones, Nick (UT Austin/Stanford)
Kar, Arjun (University of British Columbia)
Kemp, Garreth (University of Johannesburg)
Kim, Keun-Young (Gwangju Institute of Science and Technology)
Kim, Isaac H (University of California at Davis)
Kumar, Prem S (Swansea University)
Laliberte, Samuel (McGill University)
Liu, Sinong (University of Warsaw)
Lund, Jacob (University of Cape Town)
Magan, Javier (Instituto Balseiro)
Mahapatra, Anubhav (IISER Pune - India)
Mathurin-Moe, Martha (University of Lethbridge)
Meyer, Rene (University of Wuerzburg)
Munson, Anthony (U. of Maryland)
Nandi, Poulami (Indian Institute of Technology Gandhinagar)
Nieuwenhuis, Sean (University of Lethbridge)
Paul, Arpon (University of Minnesota Twin-Cities)
Penington, Geoff (UC Berkeley)
Poulose, Poulose (Indian Institute of Technology Guwa)
Rajagopal, Srivishnu (Indian Institute of Technology Kanpur)
Rastgoo, Saeed (University of Alberta)
Roberts, Jorden (University of Alberta)
Roy, Shubho R. (Indian Institute of Technology)
Saad, Mohammad (Indian Institute of Technology Kanpur)
Sasieta, Martin (Brandeis University)

Shiu, Gary (University of Wisonsin at Madison)
Sur, Sourav (University of Delhi)
Tema, Seturamane (University of Cape Town)
Todorinov, Vasil (University of Lethbridge)
Underwood, Bret (Pacific Lutheran University)
Vagenas, Elias (Kuwait University)
Vennin, Vincent (Ecole Normale Superieure Paris)
Watanabe, Ryota (Kyoto University)
Zukowski, Claire (University of Minnesota - Duluth)

Geometry, Topology and Control System Design
June 11 - 16, 2023

Organizers:

Mohamed Ali Belabbas (University of Illinois, Urbana-Champaign)
Anthony Bloch (University of Michigan)

Xudong Chen (University of Colorado at Boulder)
Monique Chyba (University of Hawaii)
Angelia Nedich (Arizona State University)

This workshop will focus on geometry, topology and their applications to control systems. Control theory deals with the problem of shaping the behavior of "systems", which can mean an engineered object, such as a robotic arm used for remote surgery, or a natural one, such as a flock of birds or even the brain. The basic driving questions are how to control or design a system which performs as desired.

Geometric and topological ideas have led to technological breakthroughs throughout the years, but geometric thinking in engineering has not yet permeated the mainstream. The goal of this workshop is to bring together a diverse group of engineers and scientists working in geometry, topology and their intersection, in order to open new frontiers of research and applications.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5139

Participants:

Agrachev, Andrei (International School for Advanced Studies)
Baillieul, John (Boston University)
Baryshnikov, Yuliy (University of Illinois at Urbana-Champaign)

Belabbas, Mohamed Ali (University of Illinois, Urbana-Champaign)
Bloch, Anthony (University of Michigan)
boscain, ugo (CNRS)
Carruth, Jacob (Princeton)

Chen, Xudong (University of Colorado at Boulder)
Chen, Yongxin (Georgia Tech)
Chiri, Maria Teresa (Queens University)
Chyba, Monique (University of Hawaii)
Chyba Rabeendran, Amandin (NYU Courant)
Coron, Jean-Michel (Laboratoire Jacques-Louis Lions)
Dirr, Gunther (University of Wuerzburg)
Ebenbauer, Christian (RWTH Aachen University)
Fefferman, Charles (Princeton University)
Georgiou, Tryphon (University of California, Irvine)
Ghaffari, Maani (University of Michigan)
Gharesifard, Bahman (UCLA)
Goebel, Rafal (Loyola University Chicago)
Grushkovskaya, Victoria (Alpen-Adria University of Klagenfurt)
Hemler, Martin (North Carolina State University)
Howell, Kathleen * (Purdue University)
Huraka, Sophia (University of Alberta)
Jafarpour, Saber (Georgia Tech)
Kjuchukova, Alexandra (University of Notre Dame)
Klotz, Taylor (U Hawaii)
Krener, Arthur (Naval Postgraduate School)
Krishnaprasad, PS (University of Maryland)
Kvalheim, Matthew (University of Michigan)
Leve, Frederick (AFOSR)
Lewis, Andrew (Queens University)
Li, Jr-Shin (Washington University in St. Louis)
Liberzon, Daniel (University of Illinois)
Martin de Diego, David (ICMAT)
Martins, Nuno (University of Maryland)
MEHTA, Prashant (University of Illinois)
Mileyko, Yuriy (University of Hawaii)
Ohsawa, Tomoki (University of Texas at Dallas)
Putkaradze, Vakhtang (Vakhtang Putkaradze)
Raginsky, Maxim * (University of Illinois, Urbana Champaign)
Schönlein, Michael (Bauhaus University Weimar)
Sontag, Eduardo (Northeastern University)
Sussmann, Hector (Rutgers)
Tabuada, Paulo (UCLA)
Taghvaei, Amirhossein (University of Washington Seattle)
van der Schaft, Arjan (U Groningen)
Woollands, Robyn (University of Illinois)
Zuyev, Alexander (Max Planck Institute for Dynamics of Complex Technical Systems)

Scientific Machine Learning
June 18 - 23, 2023

Organizers:

Brendan Keith (Brown University)
Lu Lu (University of Pennsylvania)
Zhiping Mao (Xiamen University)

Siddhartha Mishra (ETH Zürich)
Tom O'Leary-Roseberry (University of Texas at Austin)

Machine learning is undergoing a renaissance that has revolutionized the ability to process and extract information from data. Along the way, it has created new technology and influenced almost all areas of computation, leading to game-changing advancements in language processing, advertising, cyber-security, computer vision, automated decision-making, and more.

Scientific computing techniques allow us to use computers to rigorously simulate, quantify, and predict environmental responses, make informed decisions, and test scientific hypotheses. Like other disciplines centered on the use of computers, scientific computing is evolving rapidly via the rise of machine learning. However, unlike many other enterprises, scientific computing requires testable explanations, predictions, reproducibility, speed, and quantification of uncertainties that push the limits of modern machine learning methods, many of which are only beginning to be rigorously understood.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5129

Participants:

Anandkumar, Animashree (Caltech and NVIDIA)
Anderson, Bob (Lawrence Livermore National Laboratory)

Antil, Harbir (George Mason University)
Arora, Shivam (Memorial University of Newfoundland)

Bacho, Aras (LMU)
Bartuska, Arved (RWTH Aachen University)
Ben Hammouda, Chiheb (RWTH Aachen University)
Boullé, Nicolas (University of Cambridge)
Brennan, Michael (MIT)
Carrasquilla, Juan (Vector Institute)
Cartis, Coralia (University of Oxford)
Chen, Peng (Georgia Tech)
Chen, Caroline (University of Pennsylvania)
Chen, Chao (The University of Texas at Austin)
Christierson, Blake (UT Austin)
Cyr, Eric (Sandia National Laboratories)
Dasgupta, Sabyasachi (Microsoft)
Despres, Bruno (Sorbonne University)
Dong, Ruobing (University of Victoria)
Dzanic, Tarik (Texas A&M University)
Fatoumata, Sanogo (Bates College)
Field, Scott (university of massachusetts dartmouth)
Ghattas, Omar (University of Texas at Austin)
Gillette, Andrew (Lawrence Livermore National Laboratory)
Go, Jinwoo (Georgia Tech)
Goldberg, Matt (UT Austin)
Günther, Stefanie (Lawrence Livermore National Laboratory)
Haber, Eldad (The University of British Columbia)
Harish, Harshavardhan (University of Texas at Austin)
Hayford, Joel (University of Pennsylvania)
Howard, Amanda (Pacific Northwest National Laboratory)
Keith, Brendan (Brown University)
Kirchhoff, Joseph (UT Austin)
Kolev, Tzanio (Lawrence Livermore National laboratory)
Koumoutsakos, Petros (Harvard University)
Law, Kody * (University of Manchester)
Lee, Jonathan (University of Pennsylvania)
Leong, Oscar (Caltech)
Lin, Guang (Purdue University)
Lorin, Emmanuel (Carleton University)
Luo, Dingcheng (Oden Institute, UT Austin)
Mao, Shunyuan (University of Victoria)
Marzouk, Youssef (Massachusetts Institute of Technology)
Masthay, Tyler (Oden Institute, UT Austin)
Maulik, Romit (Pennsylvania State University & Argonne National Laboratory)
Morrison, Rebecca (University of Colorado Boulder)
Nair, Prasanth (University of Toronto)
Nelsen, Nicholas (California Institute of Technology)
Newman, Elizabeth (Emory)
Nica, Mihai (University of Guelph)
Nicholson, Ruanui (Ru) (University of Auckland)
O'Leary-Roseberry, Tom (University of Texas at Austin)
Oeschger, Jan Malte (University Medical Center Hamburg-Eppendorf)
Pachalieva, Aleksandra (Los Alamos National Laboratory)
Pandey, Anamika (RWTH Aachen University)

Pash, Graham (UT Austin)
Petrides, Socratis (Lawrence Livermore National Laboratory)
Puel, Simone (UT Austin)
Python Ndekou Tandong, Ndekou (Cheikh Anta Diop University)
Qian, Elizabeth (Caltech)
Rodriguez Delherbe, Andrea (Oxford University)
Saleh, Bassel (UT Austin Oden Institute)
Sanderse, Benjamin (CWI Amsterdam)
Scheichl, Robert (Heidelberg University)
Schwab, Christoph (ETHZ)
Sentz, Peter (Brown University)
Singh, Jaskirat Pal (Central University of Punjab)
Stadler, Georg (New York University)
Stinis, Panos (Pacific Northwest National Laboratory)
Sukumar, N. (UC Davis)
Sun, Hao (Renmin University of China)
Trask, Nathaniel (Sandia National Laboratories)
Trautner, Margaret (California Institute of Technology)
Turkson, Michael Emmanuel Ebo (mPharma Data Inc.)
Udell, Madeleine (Stanford)
van Bloemen Waanders, Bart (Sandia National Laboratories)
Verma, Deepanshu (Emory University)
Visyn, Valentyn (University of Texas at Austin)
Wang, Jianxun (University of Notre Dame)
Wolff, Daniel * (RWTH Aachen University)
Xu, Jinchao * (Pennsylvania State University)
Yang, Yunan (ETH Zurich Institute for Theoretical Studies)
Yang, Xiu (Lehigh University)
Yesypenko, Anna (University of Texas at Austin)
Zech, Jakob (Universität Heidelberg)
Zhang, Handi (University of Pennsylvania)
Zhang, Ziheng (UT Austin)
Zunino, Paolo (Politecnico di Milano)

Women in Operator Algebras III
June 25 - 30, 2023

Organizers:

Astrid an Huef (Victoria University of Wellington)
Therese Basa Landry (University of California, Santa Barbara)

Sarah Plosker (Brandon University)
Sarah Reznikoff (Kansas State University)
Maria Grazia Viola (Lakehead University)

The field of Operator Algebras has its origins in the 1930s with the work of Gelfand, Neumark, von Neumann, and others. Since then, it has rapidly evolved due to major breakthroughs in the classifications of simple amenable von Neumann algebras and C*-algebras, the introduction of free probability, and recent developments in quantum information theory. The area has connections with almost every branch of mathematics and a few areas of physics, including number theory, ring theory, algebraic topology, differential geometry, ergodic theory, quantum field theory, mathematical physics, and even quantum computing.

The area of Operator Algebras is overwhelmingly male-dominated: less than 17\% of researchers in Operator Algebras are women. The workshop aims at having women scholars work on collaborative, innovative, cutting-edge research in a supportive and focused environment, and to produce significant scientific results to be published in highly-ranked journals. The proposed projects will have the potential to become fruitful long-term collaborations, to have a profound influence on participants' careers, and to greatly impact the research landscape in Operator Algebras. Following the model of successful previous workshops, the scholars will work on projects of current interest in small groups of 4--6 led by one or two leaders.

The workshop also intends to strengthen the network of women in Operator Algebras by furthering connections and mentoring opportunities between the participants. In particular, there will be formal and informal opportunities for Q\&A, career advice and mentoring.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5089

Participants:

an Huef, Astrid (Victoria University of Wellington)
Anshu, Anshu (National Institute of Science Education and Research)
Archey, Dawn (University of Detroit Mercy)
Armstrong, Becky (University of Münster)
Azzali, Sara (Università degli Studi di Bari Aldo Moro)
Browne, Sarah (University of Kansas)
Courtney, Kristin (University of Southern Denmark)
de Wolf, Lydia (Kansas State University)
Duwenig, Anna (KU Leuven)
Forough, Marzieh (Czech Technical University in Prague)
Ganesan, Priyanga (University of California San Diego)
Georgescu, Magdalena (Independent)
Ghandehari, Mahya (University of Delaware)
Gomez-Aparicio, Maria Paula (University Paris Saclay)
Gong, Sherry (Texas A&M University)
Hasanpour Yakhdani, Zahra (University of Tehran)
Hua, Shanshan (University of Oxford)
Jeong, Ja A (Seoul National University)
Krishnan, Arundhathi (Mary Immaculate College, Ireland)
Kroell, Larissa (University of Waterloo)
Kuznetsova, Yulia (Université de Franche-Comté)
Landry, Therese Basa (University of California, Santa Barbara)
Luthra, Preeti (University of Delhi)
McCormick, Kathryn (California State University Long Beach)
Molander, Melody (UC Santa Barbara)
Norton, Rachael (Macalester College)
Plosker, Sarah (Brandon University)
Pooya, Sanaz (Stockholm university)
Reznikoff, Sarah (Kansas State University)
Ruth, Lauren (Mercy College)
Sasso, Emanuela (Genova University)
Sehnem, Camila (University of Waterloo)
Srivastava, Sachi (University of Delhi)
Strung, Karen (Institute of Mathematics, Czech Academy of Sciences)
Viola, Maria Grazia (Lakehead University)
Wang, Hang (East China Normal University)
Wang, Kun (Texas A&M University)

Yang, Dilian (University of Windsor)

Single-Cell Plus – Data Science Challenges in Single-Cell Research
July 2 - 7, 2023

Organizers:

Jean Yee Hwa Yang (The University of Sydney)
Joshua Ho (University of Hong Kong)
Sunduz Keles (University of Wisconsin, Madison)

Sara Mostafavi (University of Washington)
Hongyu Zhao (Yale University)

Cells are the fundamental building blocks of life. Recent advancement in biotechnology has allowed us to peek inside this every cell for better understanding of biology and human disease. Single-cell technology also generates big and complex data and brings about new data science challenges for computational and life scientists. The objective of this workshop is to bring together international leaders in diverse disciplines including mathematical, statistical, computational, biological and medical in a collaborative atmosphere to develop the collaborative capacity that will tackle various underlying data science challenges in single-cell research.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5090

Participants:

Agrawal, Divya (The University of Queensland)
Banerjee, Kalins (University of Michigan)
Boran, Gao (University of Michigan)
Cakmakci, Doruk (McGill University)
Cao, Yue (The University of Sydney)
Cao, Dandan (HKU-SZH)
Chen, Carissa (University of Sydney)
Chen, Wanlu (Johns Hopkins University)
Cheng, Jiaqi (Johns Hopkins University)
Chun, Hyonho (KAIST)
Davis, Mellisa (Adeliade)
Ding, Yang (Peking University)
Ding, Wenze (University of Sydney)
Duren, Zhana (Clemson University)
Feng, Zhanying (Chinese Academy of Sciences, Academy of Mathematics and Systems Science)
Fu, Helen (University of Sydney)
Gavarro, Lena Morrill (University of Oxford)
Ghazanfar, Shila (University of Sydney)
Ghosh, Adhideb (ETH Zurich)
GUAN, GUI (The University of Sydney)
Guo, Yin (Xi'an Jiaotong University)
Hakamuwa Lekamlage, Dulari (University of Melbourne)
Ho, Joshua (University of Hong Kong)
Hou, Ruiyan (The University of Hong Kong)
Huang, Yuanhua (University of Hong Kong)
Huang, Haiyan (University of California, Berkeley)
Huang, Rongting (The University of Hong Kong)
Irizarry, Rafael (Dana-Farber)
Ji, Hongkai (Johns Hopkins Bloomberg School of Public Health)
Ji, Peiwen (Peking University)
JIANG, MINZHI (JHU)
Keles, Sunduz (University of Wisconsin, Madison)
Kim, Daniel (University of Sydney)
Kim, Sam (University of Sydney)
Kim, Hani (The University of Sydney)
Kim, Gwangwoo (KAIST)
Korthauer, Keegan (University of British Columbia)
Lan, Tian (university of sydney)
Li, Yue (McGill University)
Li, Jingyi Jessica (University of California Los Angeles)
Li, Yu (Chinese University of Hong Kong)
Li, Zheng (University of Michigan)
Liao, Hsiao-Chi (The University of Melbourne)
Lin, Yingxin (Yale University)
Liu, Yijun (Jilin university)
Liu, Meitong (University of Hong Kong)
Lu, Shan (UW Madison)
Lu, Chenyue * (MIT)
Luo, Siyuan (ETH Zurich)
Lyu, Hao (UESTC)
Ma, Ying (Brown University)
Ma, Kun (The University of Hong Kong)
Ma, Wenjing (University of Michigan)
Mann-Krzisnik, Dylan (McGill University)
Mar, Jessica (University of Queensland)

Mechtersheimer, Daniel (University of Sydney)
Mingze, Gao (HKU)
Mostafavi, Sara (University of Washington)
Namuhan, Namuhan (The University of Queensland)
Osakwe, Adrien (McGill University)
Pape, Constantin (EMBL)
Pape, Constantin (University Goettingen)
Park, Kwangmoon (University of Wisconsin-Madison)
Park, Ji-Eun (UNC Chapel Hill)
Patrick, Ellis (The University of Sydney)
Quon, Gerald (UC Davis)
Ritchie, Matthew (The Walter and Eliza Hall Institute of Medical Research)
Robinson, Mark (University of Zurich)
Rodriguez Delherbe, Andrea (Oxford University)
Salim, Agus (University of Melbourne)
Salzman, Julia (Stanford)
Shang, Lulu (University of Michigan)
Shen, Ning (University of British Columbia)
Shih, David (Hong Kong University)
Shin, Sunyoung (POSTECH)
Speed, Terry (Walter & Eliza Hall Institute of Medical Research)
Street, Kelly (University of Southern California)
Tan, Yuqi (Stanford University)
Tran, Andy (University of Sydney)
Wang, Yong (Chinese Academy of Sciences)
Wang, Rachel (University of Sydney)
Wang, Zuoheng (Yale University)
Wang, Jade (University of Michigan)
Wang, Zixiao (Johns Hopkins)
Wang, Yi (Johns Hopkins University)
WANG, YIXUAN (The Chinese University of Hong Kong)
Wang, Qingyang (UCLA)
Wang, Zhijun (Shanghai Jiao Tong University)
Wei, Huanhuan (Yale School of Public Health)
Wei, Lin (Peking University)
Wu, Angela (Hong Kong University of Science and Technology)
Wu, Di (UNC)
Wu, Peijun (University of Michigan)
Xianyi, Lian (Peking University)
Xiao, Di (The University of Sydney)
Xiaoying, Liao (USYD)
Xu, Gang (Yale University)
Xuesong, Wang (The Chinese University of Hong Kong)
Yan, Xiting (Yale University School of Medicine)
Yang, Jean Yee Hwa (The University of Sydney)
Yang, Pengyi (The University of Sydney)
Yang, Can (The Hong Kong University of Science and Technology)
Ye, Zheng (Fred Hutchinson Cancer Center)
Yeung, Jake (Institute of Science and Technology Austria)
Yu, Tingyang (The Chinese University of Hong

Kong)
Yu, Lijia (The University of Sydney)
Yuan, Xinyu (Mila)
Zhai, Zhiqian (UCLA)
Zhang, Nancy * (University of Pennsylvania)
Zhang, Emma (Emory University)
Zhang, Yishu (UNC Chapel Hill)
Zhao, Hongyu (Yale University)
Zhao, Peiyao (University of Michigan)
Zhou, Xiang (University of Michigan)
Zhou, Manqi (Cornell University)
Zyner, Katie (Children's Medical Research Institute)

3D Generative Models
July 9 - 14, 2023

Organizers:

Michael Bronstein (Oxford University)
Ke Li (Simon Fraser University)
Lingjie Liu (The University of Pennsylvania)

Steve Seitz (University of Washington)
Andrea Tagliasacchi (SFU, Google Deepmind)
Graham Taylor (University of Guelph)

Learning from large collections of images, generative models implemented by neural networks are currently able to synthesize photo-realistic images with some degree of control over different aspects of style.

Simultaneously, enormous progress has also been made in the representation of 3D information with neural networks: current technology allows us to encode multiple images of a 3D scene within the parameters of an artificial neural network and then artificially observe the 3D scene from a new point of view.

These two research thread have evolved mostly independently within their own sub-community, hence in this workshop we will attempt to bridge the gap in these developments by asking two core questions:

1. How can we leverage generative models to handle the inherent uncertainty in the 3D structure estimated from only 2D images?

2. How should generative models be improved to meet the requirements induced by the estimation of 3D structure?

In this workshop, we will explore how the research realms of generative modelling and 3D neural representations can benefit from each other, as well as explore novel applications in different areas of science and technology.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5153

Participants:

Aigerman, Noam (Adobe Research)
Bahmani, Sherwin (TU Darmstadt)
Bansal, Aayush (Meta)
Bokhovkin, Alexey (TUM)
Bronstein, Michael (Oxford University)
Cao, Jiguo (Simon Fraser University)
Chen, Zhiqin (Adobe Research)
Chen, Xu (ETH Zurich)
Cieslak, Mik (University of Calgary)
Dai, Angela (Technical University of Munich)
DeVries, Terrance (LumaAI)
Fleet, David (University of Toronto)
Gao, Jun (University of Toronto / NVIDIA)
Gilitschenski, Igor (University of Toronto)
Gu, Jiatao (Apple)
Guibas, Leonidas (Stanford University)
Hanocka, Rana (University of Chicago)
Huang, Qixing (UT Austin)
Kaza, Srinivas (Google)
Kim, Jungtaek (University of Pittsburgh)
Kundu, Abhijit (Google Perception)
Li, Ke (Simon Fraser University)
Lindell, David (University of Toronto)
Liu, Lingjie (The University of Pennsylvania)
Luo, Xuan (University of Washington)
Mahdavi-Amiri, Ali (Monsters Aliens Robots Zombies)
Mildenhall, Ben (Google)
Nakayama, George (Stanford University)
Nguyen, Thu (Meta)
Park, Jeong Joon (University of Michigan)
Peng, Shichong (Simon Fraser University)
Poole, Ben (Google DeepMind)
Rampini, Arianna (Autodesk)
Ranjan, Anurag (Apple)
Rebain, Daniel (University of British Columbia)
Rhodin, Helge (University of British Columbia)
Rombach, Robin (LMU Munich)
Rotstein, Noam (Technion)
Saito, Shunsuke (Meta Reality Labs Research)
Schulz, Adriana (University of Washington)
Schwarz, Katja (Tuebingen University)
Seitz, Steve (University of Washington)
Sellán, Silvia (University of Toronto)
Shabanov, Akhmedkhan (SFU)
Sitzmann, Vincent (MIT)
Snavely, Noah (Cornell University)
Sridhar, Srinath (Brown University)
Tagliasacchi, Andrea (SFU, Google Deepmind)
Takikawa, Towaki (University of Toronto / NVIDIA)
Tang, Siyu (ETH Zurich)
Taylor, Graham (University of Guelph)
Tewari, Ayush (Massachusetts Institute of Technology)
Tulyakov, Sergey (Snap Inc)
Uy, Mikaela Angelina (Stanford University)
Wang, Ruisheng (University of Calgary)
Williams, Francis (NVIDIA)
Wu, Shangzhe (Stanford University)

Yu, Alex (LumaAI)
Zhou, Bolei (UCLA)

Inverse Problems and Nonlinearity
July 16 - 21, 2023

Organizers:

Tracey Balehowsky (University of Calgary)
Lauri Oksanen (University of Helsinki)

Leo Tzou (University of Amsterdam)
Gunther Uhlmann (University of Washington)

We will use nonlinearity naturally arising in many equations in mathematical physics to facilitate the imaging image reconstruction. This breaks with the traditional doctrine that the presence of nonlinearity is an obstacle rather than a tool for understanding differential equations.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5036

Participants:

Balehowsky, Tracey (University of Calgary)
Blair, Hamish (Stanford University)
Busch, Leonard (University of Amsterdam)
Chien, Chun-Kai Kevin (University of Washington)
Feizmohammadi, Ali (University of Toronto)
Golubnichiy, Kirill (University of Calgary)
Gomes, Sean (University of Helsinki)
Grebnev, Haim (University of Washington)
Ilmavirta, Joonas (University of Jyväskylä)

Kian, Yavar (Université d'Aix-Marseille)
Knapik, David (University of Toronto)
Krupchyk, Katya (University of California, Irvine)
Lai, Ru-Yu (University of Minnesota)
Lefeuvre, Thibault (Sorbonne Université)
Monard, Francois (UC Santa Cruz)
Oksanen, Lauri (University of Helsinki)
Paternain, Gabriel (University of Cambridge)
Quan, Hadrian (University of Washington)

Ruirui, Wu (University of Washington)
Rüland, Angkana (University of Bonn)
Saksala, Teemu (North Carolina State University)
Salo, Mikko (University of Jyväskylä)
Schlue, Volker (Melbourne University)
Schotland, John (Yale University)
St-Amant, Simon (University of Cambridge)
Tacy, Melissa (University of Auckland)
Tzou, Leo (University of Amsterdam)
Vasy, Andras (Stanford University)
Wang, Yiran (Emory University)
Yan, Lili (University of Minnesota)
Zhang, Yang (University of Washington)
Zhou, Hanming (UC Santa Barbara)
Zou, Joey (University of California, Santa Cruz)

New Trends in Fluids and Collective Dynamics
July 23 - 28, 2023

Organizers:

Roman Shvydkoy (University of Illinois at Chicago)
Nancy Rodriguez (University of Colorado at Boulder)

Theodore Drivas (Stony Brook University)
Eitan Tadmor (University of Maryland)

Mathematics of collective behavior and the subject of fluid dynamics undergo a rapid merger where most fascinating breakthroughs have been discovered in recent years. These breakthroughs are based on our novel understanding of collective phenomena from the viewpoint of the laws of fluid motion. Pattern formations in animal swarms or clustering in social networks or even technological applications to decentralized control of unmanned vehicles are just a few examples that can be studied with the new techniques.

This workshop will bring together a diversified group of researches from both fields to share the knowledge and promote collaboration in this emerging and fascinating area.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5002

Participants:

Choi, Young-Pil (Yonsei University)
Craig, Katy (University of California, Santa Barbara)
Drivas, Theodore (Stony Brook University)
Garcia Trillos, Nicolas (University of Wisconsin-Madison)

He, Siming (University of South Carolina)
Ibdah, Hussain (University of Maryland)
Jabin, Pierre-Emmanuel (Pennsylvania State University)
Ji, Hangjie (North Carolina State University)

Kiselev, Alexander (Duke University)
La, Joonhyun (Imperial College London)
Lear, Daniel (University of Cantabria)
Lee, Yongki (Georgia Southern University)
Leslie, Trevor (Illinois Institute of Technology)
Perepelitsa, Mikhail (University of Houston)
Peszek, Jan (University of Warsaw)
Rodriguez, Nancy (University of Colorado at Boulder)
Shu, Ruiwen (University of Georgia)
Shvydkoy, Roman (University of Illinois at Chicago)
Tadmor, Eitan (University of Maryland)
Tan, Changhui (University of South Carolina)
Weber, Franziska (Carnegie Mellon University)
Wroblewska-Kaminska, Aneta (Institute of Mathematics, Polish Academy of Sciences)
Yao, Yao (National University of Singapore)
Zatorska, Ewelina (Imperial College London)

Putting Together Resources to Support Current and Future Elementary School Teachers
July 23 - 28, 2023

Organizers:

Melania Alvarez Adem (University of British Columbia)
Shawn Desaulniers (University of Alberta)
Frédéric Gourdeau (Université Laval)

John McLoughlin (University of New Brunswick)
Pamela Britain (Fields Institute)

The Pacific Institute for the Mathematical Sciences, the Centre de recherches mathématiques, The Fields Institute and the Atlantic Association for Research in the Mathematical Sciences are joining forces to develop a series of educational modules with the intent of inspiring pre-service and in-service elementary school teachers to further develop their mathematical thinking. The goal is to support their future and current practice with activities, and the development and connection of ideas that will help them tackle the ever-changing provincial curricula. We want to tease out the mathematician in them.

An inspiring teacher is the most valuable school asset. We remember those teachers who motivated and "fired us up", for they played a vital role in shaping who we are today. Our plan is to bring together a group of mathematicians, math educators, teachers and people with Indigenous knowledge together to develop methodologies to inspire teachers to strive for and expect success for students from diverse backgrounds.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5150

Participants:

Alvarez Adem, Melania (University of British Columbia)

Barrett, Liz (JUMP Math)
Britain, Pamela (Fields Institute)

Causley, Broderick (Montreal)
Corriveau, Claudia (Université Laval)
Desaulniers, Shawn (University of Alberta)
Dubiel, Maria M (Simon Fraser University)
Fitzpatrick, Sean (University of Lethbridge)
Forrest, Barbara (University of Waterloo)
Forrest, Brian (University of Waterloo)
Franzova, Nora (Langara College)
Freiman, Viktor (Université de Moncton)
Gauthier, Justine (University of New Brunswick)
Gourdeau, Frédéric (Université Laval)
Iwabuchi, Donna Rae (Kumsheen ShchEma-meet
School)
Jeannotte, Doris (UQAM)
McLoughlin, John (University of New Brunswick)
Morland, Cameron (University of Waterloo)
Pasanen, Trevor (University of Alberta)
Reid, Kris (Elk Island Public Schools)
Rouleau, Annette (Julia Robinson Mathematics
Festival)
Taylor, Peter (Queen's)

Applied and Computational Differential Geometry and Geometric PDEs
July 30 - August 4, 2023

Organizers:

David Glickenstein (University of Arizona)
Joel Hass (UC - Davis)
Yanyan Li (Rutgers University)

Jacob Posacki (BIRS)
Yunan Yang (ETH Zurich Institute for Theoretical Studies)
Haomin Zhou (Georgia Institute of Technology)

This workshop will bring together mathematicians with expertise spanning the theoretical, numerical, discrete and computational geometry and partial differential equations (PDEs) and computer scientists with related interests to identify and discuss some of the most promising areas for advances in the understanding and application in geometric data analysis.

The explosion of digital data being produced today urgently calls for the creation of new mathematical and computational processing tools. The classical theory of differential geometry and PDEs have produced mathematical results of exceptional depth and beauty which have potential applications to geometric data analysis. However, the process of translating these deep results from geometry and PDEs into algorithms and applying them to real world problems is still in its infancy. This important task asks for collaborations of pure and applied mathematicians and computer scientists to identify the key issues. The workshop will serve as a forum to facilitate the interactions among mathematicians and scientists working in applied areas, bearing fruit at the interface of mathematics, engineering, and computer science.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5015

Participants:

Banks, Emily (University of Arizona)
Dym, Nadav (Technion)

Engquist, Bjorn (University of Texas at Austin)
Gao, Yuan (Purdue University)

Garcia Trillos, Nicolas (University of Wisconsin Madison)
Gaster, Jonah (University of Wisconsin at Milwaukee)
Glickenstein, David (University of Arizona)
Guan, Pengfei (McGill University)
Gui, Changfeng (University of Texas at San Antonio)
Hass, Joel (UC - Davis)
Izmestiev, Ivan (TU Wien)
Koehl, Patrice (University of California, Davis)
Lam, Wai Yeung (University of Luxembourg)
Li, Yanyan (Rutgers University)
Li, Wuchen (University of South Carolina)
Li, Chao (New York University)
Liu, Siting (UCLA)
Liu, Jiakun (University of Wollongong)
Liu, Shu (University of California, Los Angeles)
Liu, Jian-Guo (Duke University)
Lu, Siyuan (McMaster University)
Lui, Ronald (Chinese University of Hongkong)
Luo, Feng (Rutgers University)
Luo, Yanwen (Rutgers University)
Lutz, Carl (Technische Universität Berlin (TU Berlin))
Osher, Stanley (University of California, Los Angeles)
Rankin, Cale (University of Toronto)
Wan, Justin (University of Waterloo)
Yang, Yunan (ETH Zurich Institute for Theoretical Studies)
Ye, Xiaojing (Georgia State University)
Zhao, Zihui (University of Chicago)
Zhou, Haomin (Georgia Institute of Technology)

Curves: Algebraic, Tropical, and Logarithmic
August 6 - 11, 2023

Organizers:

Yoav Len (University of St Andrews)
Hannah Markwig (Eberhard Karls Universität Tübingen)

Dhruv Ranganathan (University of Cambridge)

The workshop is concerned with geometric objects arising from polynomial equations known as algebraic curves. Such curves have been studied extensively since the 19th century, but recent developments in combinatorics have led to a plethora of new techniques and solutions to major problems in the field. Bringing together experts from classical algebraic geometry and the adjacent combinatorial areas, the workshop aims to bridge the different points of views, identify key open problems in the field, and to examine how progress can be achieved via a combination of old and new tools.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5101

Participants:

Abramovich, Dan (Brown University)
Abreu, Alex (Federal Fluminense University)
Álvarez González, Ernesto (Universidad Complutense de Madrid)
Baker, Matthew (Georgia Tech)

Bozlee, Sebastian (Tufts University)
Cavalieri, Renzo (Colorado State University)
Chan, Melody (Brown University)
Christ, Karl (Leibnitz University)
Coles, Desmond (University of Texas)

Farkas, Gavril (Humboldt Universität zu Berlin)
Geiger, Alheydis (Max Planck Institute for Mathematics in the Sciences)
Grushevsky, Samuel * (Stony Brook University)
Harada, Megumi (McMaster University)
Holmes, David (University of Leiden)
Ilten, Nathan (Simon Fraser University)
Jensen, Dave (University of Kentucky)
Kannan, Siddarth (UCLA)
Katz, Eric (The Ohio State University)
Kennedy-Hunt, Patrick (University of Cambridge)
Larson, Eric (Brown University)
Len, Yoav (University of St Andrews)
Levinson, Jake (Simon Fraser University)
Li, Shiyue (Institute for Advanced Study)
Li, Amy (UT Austin)
Maclagan, Diane (University of Warwick)
Markwig, Hannah (Eberhard Karls Universität Tübingen)
Melo, Margarida (Università Roma Tre)
Molcho, Samouil (ETH Zurich)
Nabijou, Navid (Queen Mary University of London)
Ortega, Angela * (Humboldt University)
Pacini, Marco (Universidade Federal Fluminense)
Pagani, Nicola Tito (University of Liverpool)
Payne, Sam (UT Austin)
Pflueger, Nathan (Amherst College)
Poiret, Thibault (University of St Andrews)
Ranganathan, Dhruv (University of Cambridge)
Ritter, Caelan (University of Washington)
Röhrle, Felix (Frankfurt University)
Satriano, Matthew (University of Waterloo)
Schwarz, Rosa (University of Leiden)
Shaw, Kris (University of Oslo)
Shokrieh, Farbod (University of Washington)
Smith, Gregory G. (Queen's University)
Srinivasan, Padmavathi (ICERM)
Ulirsch, Martin (Goethe University Frankfurt am Main)
Viviani, Filippo (Roma Tre University)
Vogt, Isabel (Brown University)
Wise, Jonathan (University of Colorado)
Zakharov, Dmitry (Central Michigan University)

Women in Mathematical Physics II
August 13 - 18, 2023

Organizers:

Nezhla Aghaei (South Denmark University and University of Geneva)

Ana Ros Camacho (Cardiff University)

Jacob Posacki (BIRS)

Mathematical Physics is an interdisciplinary topic at the crossroads of pure mathematics and theoretical physics. Theoretical physics (in particular string and gauge theories in various dimensions and their duality relations) has been a constant source of inspiration for mathematics over the last decades. Women are underrepresented on the most of the STEM areas, and this field is no different. It is most crucial to improve the networks of female mathematical physicists, with an emphasis on the younger generations.

Due to the pandemic, the first WoMaP workshop consisted only of a very short and limited online version hosted by BIRS in September 2020. This workshop aims to organise the first in-person "Women in Mathematical Physics" workshop. We follow the successful format of other "Women in..." workshops: Several teams of 5 to 7 members will work together on a particular problem in a specific topic in mathematics and their connection with theoretical physics - proposed by the senior leaders. Projects include topics in algebra, geometry, number theory, and topology.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5073

Participants:

Adamo, Maria Stella (The University of Tokyo)
Aghaei, Nezhla (South Denmark University and University of Geneva)
An, Zhongshan (University of Michigan)
Barron, Katrina (University of Notre Dame)
Batistelli, Karina (Universidad de Chile)
Borji, Majdouline (Ecole Polytechnique)
Budzik, Kasia (Perimeter Institute)
Cadamuro, Daniela (Universität Leipzig)
Caraci, Cristina (University of Zurich)
Carrance, Ariane (Ecole Polytechnique)
Cederbaum, Carla (Universitat Tubingen)
Cogo, Albachiara (Tuebingen)
Desiraju, Harini (University of Sydney)
Dutta, Yajnaseni (Universitaet Bonn)
Fasquel, Justine (University of Melbourne)
Garcia Failde, Elba (Institut de Mathématiques de Jussieu - Paris Rive Gauche)
Graf, Melanie (University of Hamburg)
Gunasekaran, Sharmila (The Fields Institute for Research in Mathematical Sciences)
Harris, Stacey (Saint Louis University)
Holden, Nina (Courant Institute, New York University)
Iseppi, Roberta (Universitaet Goettingen)
Izadi, Elham (University of California San Diego)
Kamenova, Ljudmilla (Stony Brook University)
Kirk, Samantha (Bradley University)
Kontrec, Ana (RIMS Kyoto)
Korzhenkova, Aleksandra (EPFL)
Marquand, Lisa (Stony Brook University)
Mejía Castaño, Adriana (Universidad del Norte)
Neira Jimenez, Carolina (Universidad Nacional de Colombia)
Orosz Hunziker, Florencia (University of Denver)
Paycha, Sylvie (Potsdam University)
Pedic Tomic, Veronika (University of Zagreb)
Peltola, Eveliina (Aalto University and University of Bonn)
Plavnik, Julia (Indiana University)
Rojas Molina, Constanza (CY Cergy Paris Universite)
Ros Camacho, Ana (Cardiff University)
Sancassani, Anna (University of Tübingen)
Sasada, Makiko (University of Tokyo)
Senthil Velu, Saradha (Universities Tuebingen)
Surya, Sumati (Raman Research Institute, Bangalore)
Taormina, Anne (Durham University)
Taylor, Marika (University of Southampton)
Torzewska, Fiona (University of Bristol)
Valcu, Caterina (Universite Paris 13)
Vičánek Martínez, Olivia (Universitaet Tuebingen)
Wendland, Katrin (Trinity College Dublin)
Yamskulna, Gaywalee (Illinois State University)
Zadeh, Ida (Mainz Institute for Theoretical Physics)

Isogeny Graphs in Cryptography
August 20 - 25, 2023

Organizers:

Victoria de Quehen (InfoSec Global)
Chloe Martindale (University of Bristol)

Christophe Petit (Université libre de Bruxelles and University of Birmingham)
Jacob Posacki (BIRS)

Despite the enormous commercial potential that quantum computing presents, the existence of large-scale quantum computers also has the potential to destroy current security infrastructures. Post-quantum cryptography aims to develop new security protocols that will remain secure even after powerful quantum computers are built. This workshop focuses on isogeny-based cryptography, one of the most promising areas in post-quantum cryptography. In particular, we will examine the security, feasibility and development of new protocols in isogeny-based cryptography, as well as the intricate and beautiful pure mathematics of the related isogeny graphs and elliptic curve endomorphism rings. To address the goals of both training and research, the program will be comprised of keynote speakers and working group sessions.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5132

Participants:

Basso, Andrea (University of Bristol)
Bernstein, Daniel J. (University of Illinois at Chicago)
Biasse, Jean-Francois (University of South Florida)
Corte-Real Santos, Maria (University College London)
Days-Merrill, Sarah (University of Vermont)
de Quehen, Victoria (InfoSec Global)
Eriksen, Jonathan Komada (Norwegian University of Science and Technology - NTNU)
Galbraith, Steven (University of Auckland)
Ghantous, Wissam (University of Oxford)
Jao, David (University of Waterloo)
Jaques, Samuel (University of Waterloo)
Jeanne, Laflamme (University of Waterloo)
Kutas, Peter (University of Birmingham and Eotvos Lorand University)
Lange, Tanja (Eindhoven University of Technology)
Lau, Jun Bo (University of California San Diego / Boston University)
LeGrow, Jason (Virginia Tech)
Leonardi, Chris (ISARA Corporation)
M., Subramani (Indian Institute of Information Technology D&M, Chennai)
Macula, Joseph (University of Colorado Boulder)
Martindale, Chloe (University of Bristol)
Maughan, Krystal (University of Vermont)
Meyer, Michael (University of Regensburg, Germany)
Morrison, Travis (Virginia Tech)
Oh, Gyujin (Columbia University)
Orvis, Eli (University of Colorado Boulder)
Petit, Christophe (Université libre de Bruxelles and University of Birmingham)
Rickards, James (University of Colorado Boulder)
Sabitova, Maria (CUNY Queens College)
Scheidler, Renate (University of Calgary)
Scullard, Gabrielle (Penn State)
Sharma, Jaya (IIT Delhi)
Sotakova, Jana (University of Amsterdam/QuSoft)
Stange, Katherine (University of Colorado, Boulder)
Tomoki, Moriya (University of Birmingham)
Tran, Ha (Concordia University of Edmonton)
Youcef, Mokrani (University of Waterloo)

New Directions in Applied Linear Algebra
August 27 - September 1, 2023

Organizers:

Jon Cockayne (University of Southampton)
John Pearson (University of Edinburgh)
Jennifer Pestana (University of Strathclyde)

David Silvester (University of Manchester)
Valeria Simoncini (Universita' di Bologna)

Linear algebra is a fundamental component of pure and applied mathematics. Further, it is now well established that bespoke numerical linear algebra techniques, including the design of direct and iterative methods, are a vital component of solvers for huge-scale problems arising from a wide range of scientific, engineering, and industrial applications. Research and development in numerical linear algebra includes theoretical studies, algorithmic implementations on advanced computer architectures, and applications to various disciplines, with the landscape undergoing substantial change of late as a result of new challenges from data science.

This workshop focuses on addressing general theoretical problems that underpin cutting-edge applications of linear algebra, including low-rank approximation and tensor decomposition, optimization, machine learning, nonlocal network dynamics, and uncertainty quantification. By bringing together experts from these different communities at a BIRS workshop, new insights in applied linear algebra will be brought to these challenging problems, which we expect to generate significant advances to state-of-the-art computational algorithms in the next decade.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5004

Participants:

Benner, Peter (Max Planck Institute for Dynamics of Complex Technical Systems)
Bindel, David (Cornell University)
Bujanovic, Zvonimir (University of Zagreb)

Carson, Erin (Charles University)
Cockayne, Jon (University of Southampton)
De Sterck, Hans (University of Waterloo)
Drineas, Petros (Purdue University)

Elman, Howard (University of Maryland at College Park)
Facca, Enrico (University of Bergen)
Freitag, Melina (University of Potsdam)
Gondzio, Jacek (University of Edinburgh)
Grasedyck, Lars (RWTH Aachen University)
Greif, Chen (University of British Columbia)
Grigori, Laura (EPFL)
Hao, Yue (Laboratory of Computational Physics, Institute of Applied Physics and Computational Mathematics)
Hartland, Tucker (Lawrence Livermore National Laboratory)
Iannacito, Martina (KU Leuven)
Ipsen, Ilse (North Carolina State University)
Kilmer, Misha (Tufts)
Kressner, Daniel (Ecole Polytechnique Federale de Lausanne)
Kwok, Felix (Université Laval)
Langou, Julien (University of Colorado Denver)
Larson, Andrew (University of Michigan)
Madden, Niall (University of Galway)
Mahoney, Michael (Berkeley)
Martinsson, Per-Gunnar (University of Texas Austin)
Müller, Christopher (TU Darmstadt)
Needell, Deanna (UCLA)
Palitta, Davide (U Bologna)
Pearson, John (University of Edinburgh)
Pestana, Jennifer (University of Strathclyde)
Saibaba, Arvind (North Carolina State University)
Scalone, Carmen (Università degli Studi dell'Aquila)
Seabrook, Eddie (Ruhr University Bochum)
Silvester, David (University of Manchester)
Simoncini, Valeria (Universita' di Bologna)
Simunec, Igor (SNS di Pisa)
Tabeart, Jemima (University of Oxford)
Teckentrup, Aretha (University of Edinburgh)
Tran, Giang (University of Waterloo)
Udell, Madeleine (Stanford)
Ullmann, Elisabeth (Technical University of Munich)

Mathematical Methods for Exploring and Analyzing Morphological Shapes across Biological Scales
September 3 - 8, 2023

Organizers:

Khanh Dao Duc (University of British Columbia)
Nina Miolane (UC Santa Barbara)

Ashok Prasad (Colorado State University)
Padmini Rangamani (UCSD)

The advances in imaging techniques have enabled the access to 3D shapes present in a variety of biological structures: organs, cells, organelles, and proteins. Since biological shapes are related to physiological functions, biomedical analyses are poised to incorporate more morphological data. For example, at the macroscopic scale, characterizing brain morphologies allows clinicians to quantify the progression of Alzheimer's disease. At the microscopic scale, the characterization of protein morphologies allows biologists to understand how these biomolecules react to chemical variations of their environment and helps detect promising pharmacological targets for the treatment of conditions ranging from neurological disorders to several cancers.

Therefore, different biological scales ask a common statistical question: how can we build mathematical and statistical descriptions of biological morphologies and their variations? This workshop invites participants from different application fields to exchange mathematical and statistical methods for the study of biological shapes.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5142

Participants:

Alizadeh, Elaheh (Jackson Lab)
Amitai, Assaf (Genentech)

Bauer, Martin (Florida State University)
Charon, Nicolas (University of Houston)

Choi, Gary (The Chinese University of Hong Kong)
Dao Duc, Khanh (University of British Columbia)
Donnat, Claire (University of Chicago)
Eskandarian, Haig Alexander (University of California San Francisco)
Faigenbaum-Golovin, Shira (Duke University)
Ferrante, Alexandra (Allen Institute)
Francis, Emmet (UCSD)
Ghosh, Kingshuk (Univ of Denver)
Hanson, Sonya (Flatiron Institute)
Houston, Lilianna (Denver University)
Khan, Amil (UCSB)
Kileel, Joe (UT Austin)
King, Emily (Colorado State University)
Koo, Bongjin (UCSB)
Lederman, Roy (Yale University)
Li, Wanxin (University of British Columbia)
Madzwamuse, Anotida (University of British Columbia)
Miolane, Nina (UC Santa Barbara)
Moscovich, Amit (Tel Aviv University)
Nahmad, Marcos (Center for Research and Advanced Studies)
Newby, Jay (University of Alberta)
Prasad, Ashok (Colorado State University)
Rangamani, Padmini (UCSD)
Ravier, Robert (Duke University)
Singer, Amit (Princeton University)
Soubrier, Clément (University of British Columbia)
Sun, Huangqingbo (Carnegie Mellon University)
Tajmir Riahi, Aryan (University of British Columbia)
Viana, Matheus (Allen Institute for Cell Science)
Wang, Yuhang (DP Technology)
Woollard, Geoffrey (University of British Columbia)
Xing, Jianhua (University of Pittsburg)
Younes, Laurent (John Hopkins University)
Zhang, Chenwei (University of British Columbia)
Zhou, Felix (UT Southwestern Medical Center)

Mechanics of Cells and Polymer Networks: Bridging Theory, Simulation and Experiment
September 10 - 15, 2023

Organizers:

Moumita Das (Rochester Institute of Technology)
Adriana Dawes (The Ohio State University)
Paul Janmey (University of Pennsylvania)

Fred MacKintosh (Rice University)
David Sept (University of Michigan)

The interface between biology and quantitative disciplines including physics, mathematics and engineering is rapidly expanding. This is the result of many factors, but is largely driven by higher resolution spatial and temporal data from cutting edge imaging techniques, and increasing success in applying physical modeling techniques to biological problems. Mechanobiology is an especially rapidly developing field at the quantitative biology interface. This field describes how force is generated in biological systems, how force impacts chemistry, and how force generation is controlled by intracellular signaling pathways. Numerous feedforward and feedback interactions connect forces in cells to the dynamics of proteins and gene expression, resulting in highly nonlinear systems with complex and often non-intuitive behaviours.

Using what we know and understand about forces in biological systems, there has been a new class of materials developed by linking together large stiff polymers at minimal junction sites that just ensure that they make a continuous network in two or three dimensions. The responses of these fibrous networks to deforming forces are very different from the deformations of conventional soft materials that are made by much more flexible polymers. Inspired by biological systems that determine cell and soft tissue mechanics, these fibrous networks can be made synthetically and tailored to many new applications such as sensors, and active materials that self-heal or conform to complex contours. This workshop will bring together theorists, mathematicians, and experimentalists working with fibrous networks to facilitate collaborations between experiment and theory, test new theoretical models, and integrate efforts to understand existing fibrous networks and develop new ones with properties tailored for specific purposes.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5120

Participants:

Berezney, John (Brandeis University)
Bershadsky, Alexander (National University of Singapore)
Ciocanel, Veronica (Duke University)
Cohen, Itai (Cornell University)
Das, Moumita (Rochester Institute of Technology)
Dawes, Adriana (The Ohio State University)
Del Gado, Emannuela (Georgetown University)
Fletcher, Dan (University of California Berkeley)
Forde, Nancy (Simon Fraser University)
Galie, Pete (Rowan University)
Gardel, Margaret (University of Chicago)
Guo, Ming (MIT)
Janmey, Paul (University of Pennsylvania)
Joanny, Jean-Francois (Collège de France and Institut Curie)
Keren, Kinneret (Technion University)
Liu, Jian (Johns Hopkins University)
MacKintosh, Fred (Rice University)
Mao, Xiaoming (University of Michigan)
Michel, Jonathan (Rochester Institute of Technology)
Mizuno, Daisuke (Kyushu University)
Murrell, Michael (Yale University)
Needleman, Daniel (Harvard University and Flatiron Institute)
Patteson, Alison (Syracuse University)
Portet, Stéphanie (University of Manitoba)
Robertson-Anderson, Rae (USD)
Rocklin, Zeb (Georgia Tech)
Ross, Jennifer (Syracuse University)
Saleh, Omar (UCSB)
Schmidt, Christoph (Duke University)
Sept, David (University of Michigan)
Shenoy, Vivek (University of Pennsylvania)
Shivers, Jordan (University of Chicago)
Upadhyaya, Arpita (University of Maryland)

Approximation Algorithms and the Hardness of Approximation
September 17 - 22, 2023

Organizers:

Zachary Friggstad (University of Alberta)
Jochen Koenemann (University of Waterloo)

Jochen Koenemann (University of Waterloo)
Euiwoong Lee (University of Michigan)
Britta Peis (RWTH Aachen University)

Most of the many discrete optimization problems arising in the sciences, engineering, and mathematics are NP-hard, that is, there exist no efficient algorithms to solve them to optimality, assuming the conjecture that P does not equal NP. The area of approximation algorithms focuses on the design and analysis of efficient algorithms that find solutions that are within a guaranteed factor of the optimal one. Loosely speaking, in the context of studying algorithmic problems, an approximation guarantee captures the quality of an algorithm -- for every possible set of input data for the problem, the algorithm finds a solution whose cost is within this factor of the optimal cost. A hardness threshold indicates the difficulty of the algorithmic problem -- no efficient algorithm can achieve an approximation guarantee better than the hardness threshold assuming that P does not equal NP. Over the last two decades, there have been major advances on the design and analysis of approximation algorithms, and on the complementary topic of the hardness of approximation.

The goal of the workshop is to focus on a few key topics that could lead to deep new results in the areas of approximation algorithms, combinatorial optimization, hardness of approximation, and proof complexity. Some of the focus topics are:

- the Traveling Salesman Problem (TSP),
- the Unique Games Conjecture,
- and Clustering and Facility Location Problems.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5140

Participants:

Bansal, Nikhil (University of Michigan)
Bansal, Ishan (Cornell University)
Bhangale, Amey (University of California, Riverside)
Brakensiek, Joshua (Stanford University)
Byrka, Jaroslaw (University of Wrocław)
Chakrabarty, Deeparnab (Dartmouth College)
Chalermsook, Parinya (Aalto University)
Chandrasekaran, Karthekeyan (University of Illinois, Urbana-Champaign)
Chen, Qingyun (UC Merced)
Cheriyan, Joseph (University of Waterloo)
Davies, Sami (Northwestern University)
Friggstad, Zachary (University of Alberta)
Gálvez, Waldo (Universidad de O'Higgins)
Ghoshal, Suprovat (Northwestern University & TTIC)
Gupta, Anupam (Carnegie Mellon University)
Guruswami, Venkatesan (UC Berkeley)
Hathcock, Daniel (Carnegie Mellon University)
Im, Sungjin (University of California at Merced)
Jain, Rhea (University of Illinois at Urbana Champaign)
Jamshidian, Mahya (University of Alberta)
Koenemann, Jochen (University of Waterloo)
Kulkarni, Shubhang (University of Illinois at Urbana Champaign)
Kumar, Nikhil (University of Waterloo)
Laekhanukit, Bundit (Shanghai University of Finance and Economics)
Lau, Lap Chi (University of Waterloo)
Lee, Euiwoong (University of Michigan)
Li, Shi (Nanjing University)
Makarychev, Konstantin (Northwestern University)
Megow, Nicole (University of Bremen)
Minzer, Dor (Massachusetts Institute of Technology)
Moshkovitz, Dana (University of Texas at Austin)
Mousavi, Ramin (University of Alberta)
Naor, Seffi (Technion)
Olver, Neil (London School of Economics and Political Science)
Pashkovich, Kanstantsin (University of Waterloo)
Peis, Britta (RWTH Aachen University)
Ren, Xuandi (University of California, Berkeley)
Rothvoss, Thomas (University of Washington)
Shmoys, David (Cornell University)
Sun, Hao (University of Alberta)
Swamy, Chaitanya (University of Waterloo)
Tarnawski, Jakub (Microsoft Research)
Traub, Vera (University of Bonn)
Van Dyk, Madison (University of Waterloo)
Vygen, Jens (University of Bonn)
Williamson, David (Cornell University)
Zhou, Rudy (Carnegie Mellon University)
Zhu, Weihao (University of Illinois Urbana-Champaign)

Women in Geometry 3
September 24 - 29, 2023

Organizers:

Ghazal Geshnizjani (University of Waterloo)
Tracy Payne (Idaho State University)

Raquel Perales (CONACyT-UNAM)
Catherine Searle (Wichita State University)

Modern geometry has grown far beyond Euclid's Elements to include abstract objects that help us understand phenomena ranging from the possible shape of our universe, to how the brain interprets images, to the circulation of air in our atmosphere. Workshop participants join a long tradition of creating original research about the measurement of shapes and the nature of space in a field of mathematics that is thousands of years old. As in many other fields of mathematical research, women continue to be seriously underrepresented in geometry. Following upon the success of the first two Women in Geometry workshops held in 2015 and 2019, where new research networks have already led to ongoing, productive collaborations and novel results, this third Women in Geometry workshop seeks to facilitate the collaboration and mentorship that will further increase the strength and visibility of women who are actively pursuing research in geometry.

This workshop is partially supported by the Perimeter Institute to help with participants' travel.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5062

Participants:

Agricola, Ilka (Philipps-Universitat Marburg)
Arroyo, Romina M. (University of Cordoba)

Beach, Isabel (University of Toronto)
Bourni, Theodora (University of Tennessee

Knoxville)
Butt, Karen (University of Michigan)
Chen, Min (McGill University)
Clutterbuck, Julie (Monash University)
Contreras Peruyero, Adriana Haydee (Centro de **Ciencias Matematicas** UNAM)
del Barco, Viviana (Universidade Estadual de Campinas)
Ferreira, Ana Cristina (University of Minho)
Garcia, Ana Karla (Universidad Nacional Autonoma de Mexico)
Geshnizjani, Ghazal (University of Waterloo)
Gornet, Ruth (University of Texas - Arlington)
Graf, Melanie (University of Hamburg)
Gregory, Ruth (Kings College London)
Griffin, Erin (Seattle Pacific University)
Gunasekaran, Sharmila (The Fields Institute for Research in Mathematical Sciences)
Hofmann, Jordan (King's College London)
Kath, Ines (University of Greifswald)
Kerr, Megan (Wellesley College)
Lai, Yi (Stanford University)
Lawn, Marie-Amelie (Imperial College London)
Mader-Baumdicker, Elena (TU Darmstadt)
Mainkar, Meera (Central Michigan University)
Marinkovic, Aleksandra (Belgrade University)
Nelson, Jo (Rice University)
Neumayer, Robin (Carnegie Mellon University)
Park, Jiewon (Yale)
Payne, Tracy (Idaho State University)
Perales, Raquel (CONACyT-UNAM)
Rechtman Bulajich, Ana (Université Grenoble Alpes)
Rotman, Regina (University of Toronto)
Rupflin, Melanie (University of Oxford)
Saez, Mariel (Pontificia Universidad Catolica de Chile)
Searle, Catherine (Wichita State University)
Sormani, Christina (Lehman College and CUNYGC)
Stancu, Alina (Concordia University)
Starkston, Laura (University of California-Davis)
Tanny, Shira (Institute for Advanced Study)
Wang, Luya (Stanford University)
Wheeler, Valentina-Mira (University of Wollongong)
Zavala, Ivonne (Swansea University)

Fluid Equations, A Paradigm for Complexity: Regularity vs Blow-up, Deterministic vs Stochastic
October 1- 6, 2023

Organizers:

Yao Yao (National University of Singapore)
Anna Mazzucato (Penn State University)

Tai-Peng Tsai (University of British Columbia)
Kazuo Yamazaki (University of Nebraska, Lincoln

Fluids are ubiquitous in the nature, but equations of fluid mechanics are among the most difficult PDEs to analyze. The question of global regularity v.s. finite time blow-up remains open for many fundamental fluid equations, and there are also many other interesting open questions on other aspects of properties. Recently, the study of fluid equations has witnessed multiple breakthrough results, such as non-existence of type-one singularity, rigorous proofs for small scale formation and finite-time blow-up for various equations, non-uniqueness of weak solutions to the Euler and Navier-Stokes equation via convex integration, as well as the non-uniqueness of the law of the 3D stochastic Navier-Stokes equations. With these exciting developments in the last decade, this workshop is a timely event to capitalize on this momentum.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5040

Participants:

Barker, Tobias (University of Bath)
Bowman, John (University of Alberta)

Carlson, Elizabeth (California Institute of Technology)

Chae, Dongho (Chung-Ang University)
Chernobai, Misha (University of British Columbia)
Cordoba, Diego (Instituto de Ciencias Matematicas-CSIC)
Crippa, Gianluca (University of Basel)
Dai, Mimi (University of Illinois at Chicago)
Dong, Hongjie (Brown University)
Duguin, Mathis (École Polytechnique Fédérale de Lausanne)
Elgindi, Tarek (Duke University)
Enlow, Matthew (University of Nebraska-Lincoln)
Eyink, Gregory (JHU)
Faraco, Daniel (Universidad Autonoma de Madrid)
Farhat, Aseel (Florida State University)
Feng, Yuanyuan (East China Normal University)
Gie, Gung-Min (University of Louisville)
Gomez Serrano, Javier (Brown University)
Hou, Thomas (California Institute of Technology)
Ignatova, Mihaela (Temple University)
Iyer, Gautam (Carnegie Mellon University)
Iyer, Sameer (University of California, Davis)
Jeong, In-Jee (Seoul National University)
Jia, Hao (University of Minnesota)
Kelliher, James (University of California, Riverside)
Kiselev, Alexander (Duke University)
Kong, Fanze (University of British Columbia)
Lacave, Christophe (Universite Grenoble Alpes)
Liang, Su (University of British Columbia)
Lindberg, Sauli (University of Helsinki)
Looi, Shi-Zhuo (Caltech)
Luo, Tianwen (Tsinghua University)
Mattingly, Jonathan (Duke University)
Mazzone, Giusy (Queen's university)
Mazzucato, Anna (Penn State University)
Miura, Hideyuki (Tokyo Institute of Technology)
Nguyen, Quoc-Hung (Chinese Academy of Sciences)
Nussenzveig Lopes, Helena (Universidade Federal do Rio de Janeiro)
Pasqualotto, Federico (University of California Berkeley)
Razafimandimby, Paul (Dublin City University)
Röckner, Michael (Bielefeld University)
Rosati, Tommaso (University of Warwick)
Safarik, Isabel (University of Nebraska-Lincoln)
Seregin, Grigory (Oxford University)
Tice, Ian (Carnegie Mellon University)
Trinh, Nguyen (University of Wisconsin-Madison)
Tsai, Tai-Peng (University of British Columbia)
Wu, Jiahong (Oklahoma State University)
Wu, Sijue (University of Michigan, Ann Arbor)
Yamazaki, Kazuo (University of Nebraska, Lincoln)
Yao, Yao (National University of Singapore)
Yu, Xinwei (University of Alberta)
Zhu, Rongchan (Beijing Institute of Technology)
Zhu, Xiangchan (Academy of Mathematics and Systems Science, Chinese Academy of Sciences)
Zlatos, Andrej (UC San Diego)

Motives and Invariants: Theory and Applications to Algebraic Groups and their Torsors
October 8 - 13, 2023

Organizers:

Stephen Scully (University of Victoria)
Stefan Gille (University of Alberta)

Detlev Hoffmann (TU Dortmund)
Anne Quéguiner-Mathieu (Université Sorbonne Paris Nord)

Algebraic groups, both classical and exceptional, play a central role in many parts of modern algebra and number theory. For instance, the celebrated Langlands program, a vast web of unifying conjectures driving much of contemporary number theory, concerns the investigation of the complex representations of reductive algebraic groups over local and global fields. Over general fields, it was discovered some 60 years ago by Andre Weil that reductive algebraic groups of classical type can be described concretely in terms of algebras with involution, solidifying long-known connections to quadratic forms and division algebras. Today, these objects and their associated algebraic groups are investigated using an array of methods that draw from many areas of mathematics, ranging from the classical theory of Galois cohomology to recent developments in abstract algebraic geometry related to the theory of motives and motivic homotopy theory. In turn, some of the central problems in the study of quadratic forms and related algebraic structures have also directly inspired major developments in these areas, the most striking example being given by Voevodsky's spectacular proof of the Milnor Conjecture in the mid-1990s.

In this workshop, we want to bring together researchers from both sides of this development: those mathematicians specializing in the application of modern algebraic and algebro-geometric methods to the study of algebraic groups and their torsors, as well as those working on relevant aspects of the motivic and cohomological approaches from a more abstract viewpoint. We hope that bringing this mix of researchers together will have a synergistic impact, leading to concrete new applications of the abstract machinery to outstanding problems on quadratic forms, algebras with involution and algebraic groups, but also inspiring progress on the general development of the motivic and cohomological methods.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5146

Participants:

Alsaody, Seidon (Uppsala University)
Baek, Sanghoon (KAIST)
Barry, Demba (Université des Sciences des Techniques et des Technologies de Bamako)
Bayer-Fluckiger, Eva (Ecole Polytechnique Federale de Lausanne (EPFL))
Bingöl, Fatma Kader (Galatasaray University)
Blanks, Tamar (Fordham University)
Calmes, Baptiste (Université d'Artois)
Chapman, Adam (Tel-Aviv-Yaffo Academic College)
Chernousov, Vladimir (University of Alberta)
Colliot-Thélène, Jean-Louis (Université Paris-Saclay)
De Clercq, Charles (Université Sorbonne Paris Nord)
Edens, Oakley (University of British Columbia)
First, Uriya (University of Haifa)
Florence, Mathieu (Sorbonne Université)
Garibaldi, Skip (Center for Communications Research La Jolla)
Garrel, Nicolas (Université de Tours)
Geldhauser, Nikita (LMU Munich)
Gille, Stefan (University of Alberta)
Gille, Philippe (Université Claude Bernard Lyon 1)
Gosavi, Saurabh (Technion-Israel Institute of Technology)
Grimm, David (Universidad de Santiago de Chile)
Hartmann, Julia (University of Pennsylvania)
Haution, Olivier (University of Milano-Bicocca)
Hoffmann, Detlev (TU Dortmund)
Izquierdo, Diego (Ecole Polytechnique)
Karpenko, Nikita (University of Alberta)
Krashen, Daniel (University of Pennsylvania)
Laghribi, Ahmed (Artois University)
Lee, Ting-Yu (National Taiwan University)
Lorenz, Nico (Ruhr-Universität Bochum)
Lucchini Arteche, Giancarlo (Universidad de Chile)
Mackall, Eoin (University of California, San Diego)
Medhi, Abhigyan (Université Sorbonne paris Nord)
Merkurjev, Alexander (UCLA)
Mishra, Sumit Chandra (Indian Institute of Science Education and Research (IISER) Mohali)
Morel, Fabien (Ludwig-Maximilians-Universität Munich)
Mukhija, Diksha (University of Alberta)
Neher, Erhard (University of Ottawa)
Nguyen, Xuan Bach (Université Sorbonne Paris Nord)
Ofek, Danny (University of British Columbia)
Panin, Ivan (Steklov Math Institute at St. Petersburg - Russia)
Parimala, Raman (Emory University)
Pianzola, Arturo (University of Alberta)
Quéguiner-Mathieu, Anne (Université Sorbonne Paris Nord)

Reichstein, Zinovy (University of British Columbia)
Ruether, Cameron (Memorial University of Newfoundland)
Scavia, Federico (University of California Los Angeles)
Scully, Stephen (University of Victoria)
Sechin, Pavel (Universität Regensburg)
Sobiech, Marco (TU Dortmund)
Srinivasan, Srimathy (Tata Institute of Fundamental Research)
Suresh, Venapally (Emory university)
Unger, Thomas (University College Dublin)
Vishik, Alexander (University of Nottingham)
Zaninelli, Marco (University of Antwerp)
Zaynullin, Kirill (University of Ottawa)
Zemkova, Kristyna (University of Alberta)
Zhykhovich, Maksim (Ludwig Maximilian University of Munich)

Complex Lagrangians, Mirror Symmetry, and Quantization
October 15 - 20, 2023

Organizers:

John Alexander Cruz Morales (Universidad Nacional de Colombia)
Olivia Dumitrescu (University of North Carolina at Chapel Hill)

Elba Garcia Failde (Sorbonne Université)
Motohico Mulase (University of California, Davis)
Laura Schaposnik (UIC)

In 1987, Hitchin discovered a set of simple nonlinear partial differential equations on a Riemann surface, that arises as the reduction} of the 4-dimensional physical equations known as the self-duality equations of Yang-Mills fields. The workshop is concerned with the geometric nature of the space of solutions, the moduli space, of Hitchin's equations. Since Yang-Mills fields represent forces in high-energy physics, they are naturally associated with a group of internal symmetries. Thus a Hitchin moduli space also depends on this group. Three and a half decades later, the interest in Hitchin's equations and moduli spaces is still exponentially growing. This is due to the following reasons. One is its deep connection to the Langlands duality of groups, a representation theoretic concept discovered by Langlands in 1967. The original context of Langlands can be translated into geometry, which then takes a form of questions about Hitchin moduli spaces and subvarieties in them. The other one is the discovery from physics, identifying the Langlands duality with electromagnetic duality, leading to the physical relevance of quantization of Hitchin moduli spaces.

The workshop is conceived in response to recent breakthroughs in physics and mathematics. One is the \ emph{real} quantization of Hitchin moduli spaces due to Gaiotto and Witten, and the other is a deformation quantization theory of Kontsevich and Soibelman that has achieved a vast mathematical foundation and generalization of topological recursion of Eynard and Orantin in random matrix theory. The vision of the organizers is that these two theories should be related through mirror symmetry. The workshop is organized to test this vision, and to explore its mathematical consequences.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5068

Participants:

Aghaei, Nezhla (South Denmark University and University of Geneva)
Arguz, Hulya (University of Georgia Athens)
Banerjee, Sibasish (IHES)
Bimmermann, Johanna (Ruhr-Universität Bochum)
Bouchard, Vincent (University of Alberta)
Boulter, Eric (University of Saskatchewan)
Bousseau, Pierrick (University of Georgia)
Brown, Jennifer (University of Edinburgh)
Capovilla-Searle, Orsola (UC Davis)
Cornea, Robert (University of Waterloo)
Cruz Morales, John Alexander (Universidad Nacional de Colombia)
Donagi, Ron (University of Pennsylvania)
Dumitrescu, Olivia (University of North Carolina at Chapel Hill)
Erickson, Jonathan (UC Davis)
Fock, Vladimir (IRMA Univ. of Strasbourg)
Fredrickson, Laura (University of Oregon)
Fukaya, Kenji (Simons Center for Geometry and Physics)
Garcia Failde, Elba (Sorbonne Université)
González Prieto, Ángel (Universidad Complutense Madrid)
Hollands, Lotte * (Heriot-Watt University)
Hsiao, Enya (University of Heidelberg)
Iritani, Hiroshi (Kyoto Universiy)
Iwaki, Kohei (University of Tokyo)
Kamenova, Ljudmilla (Stony Brook University)
Kamnitzer, Joel (McGill University)
Kang, Monica (Caltech)
Kaufman, Dani (Københavns Universitet)
Kramer, Reinier (University of Alberta)
Kwong, Sze Hong (University of Maryland)
Liu, Beibei (Massachusetts Institute of Technology)
Logares, Marina (Universidad Complutense de Madrid)
Mahadeo, Christopher (University of Saskatchewan / UIC)
Mochizuki, Takuro (Kyoto University)
Moraru, Ruxandra (University of Waterloo)
Mulase, Motohico (University of California, Davis)
Neitzke, Andrew (Yale University)
Norbury, Paul (University of Melbourne)
Osuga, Kento (University of Tokyo)
Peters, Jeremy (University of Toronto)
Rayan, Steven (quanTA / University of Saskatchewan)
Rembado, Gabriele (Hausdorff Centre for Mathematics (Bonn))
Rimanyi, Richard (UNC Chapel Hill)
Sa Earp, Henrique (Unicamp)
Sawon, Justin (University of North Carolina)
Schaposnik, Laura (UIC)
Sikora, Adam (State University of New York - Buffalo)
Smirnov, Andrey (UNC)
Soibelman, Yan (Kansas State University)

Szabó, Szilárd (University of Budapest)
Teschner, Joerg (University of Hamburg)
Weng, Daping (UC Davis)
Yamazaki, Masahito (Kavli IPMU)
Yang, Mengxue (Heidelberg)
Zikidis, Menelaos (University of Sheffield)

The Mathematics and Physics of Moire Superlattices
October 22 - 27, 2023

Organizers:

Mitchell Luskin (University of Minnesota)
Svetlana Jitomirskyaya (UC Berkeley)
Eunah Kim (Cornell University)

Lin Lin (University of California, Berkeley)
Allan MacDonald (University of Texas)

Motivated by theoretical work that pointed to new opportunities, tremendous progress has been made over the past several years in using moire superlattices formed from two-dimensional materials as a laboratory for the study of quantum materials. This development has opened up an exciting new scientific opening, one in which mathematics and theoretical physics have a very large role to play by identifying moire systems that are likely to exhibit new or poorly understood electronic phenomena, by inventing mathematical methods that enable testable predictions of physical properties, and by unravelling the meaning of experimental observations.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5058

Participants:

Bal, Guillaume (University of Chicago)
Bascones, Leni (ICMM, Madrid)
Becker, Simon (ETHZ)
Bennett, Daniel (Harvard University)
Calugaru, Dumitru (Princeton)
Cances, Eric (Ecole des Ponts and Inria Paris)

Cano, Jennifer (Stony Brook University)
Cazeaux, Paul (Virginia Tech)
Chen, Huajie (Beijing Normal University)
Clark, Drake (University of Minnesota)
Faulstich, Fabian (Rensselaer Polytechnic Institute)
Fu, Liang (Massachusetts Institute of Technology)

Guerci, Daniele (Flatiron Institute)
Guinea, Francisco (IMDEA, Madrid)
Hitrik, Michael (University of California, Los Angeles)
Hott, Michael (Minnesota)
Jitomirskyaya, Svetlana (UC Berkeley)
Kaxiras, Efthimios (Harvard University)
Khalaf, Eslam (University of Texas at Austin)
Kim, Eunah (Cornell University)
Kim, Raehyun (University of California)
Kirsch, Alfred (École des Ponts ParisTech)
Kong, Tianyu (University of Minnesota)
Koshino, Mikito (Osaka)
Ledwith, Patrick (Harvard University)
Levitt, Antoine (Université Paris-Saclay)
Lin, Lin (University of California, Berkeley)
Liu, Diyi (University of Minnesota, Twin Cities)
Liu, Wencai (Texas A&M University)
Luskin, Mitchell (University of Minnesota)
MacDonald, Allan (University of Texas)
Mahon, Perry (University of Texas)
Mak, Kin Fai (Cornell University)
Margetis, Dionisios (University of Maryland, College Park)
Massatt, Daniel (LSU)
Mazhar, Anna (Columbia)
Meng, Long (ParisTech)
Morales Duran, Nicolas (University of Texas at Austin)
Oltman, Izak (UC Bekeley)
Queiroz, Raquel (Columbia)
Quinn, Solomon (University of Minnesota)
Shan, Jie (Cornell)
Stubbs, Kevin (Berkeley)
Tarnopolsky, Grigory (CMU)
Todadri, Senthil (Massachusetts Institute of Technology)
Vafek, Oskar (Florida State University)
Watson, Alexander (University of Minnesota)
Williams, Jeremiah (University of Minnesota)
Xu, Xiaodong (University of Washington)
Zhang, Shiwei (Flatiron Institute)
Zhu, Xiaowen (University of Washington)
Zhu, Ziyan (Stanford University)

Astrostatistics in Canada and Beyond
October 29 - November 3, 2023

Organizers:

Pauline Barmby (Western University)
Gwendolyn Eadie (University of Toronto)

Gregory Sivakoff (University of Alberta)
David Stenning (Simon Fraser University)

What could be a bigger source of "big data" than the entire Universe? Researchers in statistics and computer science are developing new methods to analyse the "big data" that companies and governments want to understand. To test out these methods they need big datasets that everyone can share --- and new astronomical telescopes just happen to be gearing up to generate observations of billions of stars and galaxies that fit the bill. Insights from statistics will help astrophysicists to get the most out of these observations. The Astrostatistics 2023 workshop will bring together statisticians and astrophysicists to learn the technical languages of the two fields and identify how to work together to combine the excitement of space with big data.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5094

Participants:

Algeri, Sara (University of Minnesota)
Autenrieth, Maximilian (Imperial College London)

Barmby, Pauline (Western University)
Berek, Sam (University of Toronto)

Bingham, Derek (Simon Fraser University)
Broekgaarden, Floor (Columbia University / CCA / Simons Foundation)
Chen, Yang (University of Michigan)
Chen, Huanqing (Canadian Institute for Theoretical Astrophysics)
Ciesewski-Kehe, Jessi (University of Wisconsin - Madison)
Cook, Amanda (University of Toronto)
Craiu, Radu (University of Toronto)
de Souza, Camila (Western University)
Eadie, Gwendolyn (University of Toronto)
Gutti, Jogesh Babu (Penn state university)
Herrera-Martin, Antonio (University of Toronto)
Hlozek, Renée (University of Toronto)
Hu, Pingbo (Western University)
Kashyap, Vinay (Center for Astrophysics | Harvard & Smithsonian)
Lailey, Bryan (Western University)
Li, Dayi (University of Toronto)
Liu, Adrian (McGill University)
Mahabal, Ashish (California Institute of Technology)
Mandel, Kaisey (University of Cambridge)
McIver, Jess (The University of British Columbia)
Patil, Aarya (University of Toronto)
Portillo, Stephen (Concordia University of Edmonton)
Potter, Ky (Simon Fraser University)
Rao, Suhasini (University of Alberta)
Rhea, Carter (L'Université de Montréal)
Siemiginowska, Aneta (Harvard & Smithsonian)
Sivakoff, Gregory (University of Alberta)
Slawinska, Joanna (Dartmouth College)
Speagle, Josh (University of Toronto)
Stenning, David (Simon Fraser University)
Stone, Connor (Universite de Montreal)
Stringer, Alexander (University of Waterloo)
Tak, Hyungsuk (Pennsylvania State University)
Thompson, Solveig (University of Calgary)
van Dyk, David (Imperial College London)
von Hippel, Ted (Embry-Riddle Aeronautical University)
Wang, Xu (Wilfrid Laurier University)

Infinite Dimensional Geometry and Fluids
November 5 - 10, 2023

Organizers:

Martin Bauer (Florida State University)
Boris Khesin (University of Toronto)
Klas Modin (Chalmers University of Technology / University of Gothenburg)

Stephen Preston (Brooklyn College/CUNY Graduate Center)
Cornelia Vizman (West University of Timisoara)

The Banff International Research Station will host a diverse, international group of mathematicians in 2023 to study geometric approaches to fluids and optimal transport. The ideas of geodesic settings for fluids have been circulating since the late 1960s, but received a strong surge lately, in the last 5-10 years, with the development of new techniques in infinite-dimensional geometry and group theory. The original idea is that the particles in an ideal liquid or gas move in a curved infinite-dimensional space, in the same way as an airplane flying around the earth: along the shortest path. Properties of the fluid, such as how well it can be predicted in the future, how well it mixes together, and how extreme the speed can be, can all be related to how curved this infinite-dimensional space is, which helps us understand features of the weather and climate geometrically. More recently similar ideas have been used to understand solids as well, for example when a pile of rocks are transported from one place to another at the optimal cost.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5020

Participants:

Adorjan Dyhr, Soren Istvan (Universitat Politecnica de Catalunya)

Barham, William (University of Texas)
Bauer, Martin (Florida State University)

Calini, Annalisa (College of Charleston)
Chen, Jiajie (Courant Institute)
Chern, Albert (UCSD)
Ciuclea, Ioana (West University of Timisoara)
Diez, Tobias (Shanghai Jiaotong University)
Drivas, Theodore (Stony brook University)
Fontana McNally, Josep (Barcelona Tech)
Gay-Balmaz, François (Ecole Normale Supérieure de Paris)
Glukhovskiy, Daniil (Stony Brook University)
Gomez Serrano, Javier (Brown University)
Heslin, Patrick (National University of Ireland)
Hohloch, Sonja (University of Antwerp)
Ishida, Sadashige (IST Austria)
Izosimov, Anton (University of Arizona)
Khesin, Boris (University of Toronto)
Lichtenfelz, Leandro (Wake Forest)
Maier, Levin (University of Heidelberg)
Michor, Peter (University of Vienna)
Miranda, Eva (Universitat Politecnica de Catalunya)
Misiolek, Gerard (University of Notre Dame)
Modin, Klas (Chalmers University of Technology / University of Gothenburg)
Morrison, Philip (University of Texas at Austin)
Peralta-Salas, Daniel (Instituto de Ciencias Matemáticas - Madrid)
Preston, Stephen (Brooklyn College/CUNY Graduate Center)
Saha, Archishman (University of Ottawa)
Schmah, Tanya (University of Ottawa)
Schönlieb, Carola (University of Cambridge)
Shi, Jia (MIT)
Shnirelman, Alexander (Concordia University)
Staffilani, Gigliola (MIT)
Topalov, Peter (Northeastern University)
Torres de Lizaur, Francisco Javier (University of Seville)
Tumpach, Alice (University of Lille)
Vialard, Francois Xavier (Univ. Gustave Eiffel)
Viviani, Milo (Scuola Normale Superiore Pisa)
Vizman, Cornelia (West University of Timisoara)
Volk, Luke (University of Toronto)
von Renesse, Max (Leipzig University)
Yoneda, Tsuyoshi (Hitotsubashi University)

The Canadian Network for Modelling Infectious Diseases: Progress and Next Steps
November 12 - 17, 2023

Organizers:

David Earn (McMaster University)

Irena Papst (Public Health Agency of Canada)

Caroline Colijn (Simon Fraser University)

What have we learned from the COVID-19 pandemic, and how can we be better prepared for the next global outbreak? This workshop brings together collaborative teams of modellers, statisticians, epidemiologists, genomics experts, public health decision-makers, and those implementing and delivering interventions who have been working together in a research network, aiming to increase Canada's capacity for data-driven emerging infectious disease modelling to directly support future public health decisions. This BIRS meeting is an important opportunity for network members and collaborators to share the outcomes of their research over the two years since the network was launched with funding from the federal government. The questions being tackled at this workshop are grounded in public health needs and generated in partnership between research investigators and knowledge users – public health leaders, health administrators and policy-makers.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5151

Participants:

Aghaeeyan, Azadeh (Brock University)

Alim, Usman (University of Calgary)

Anokye, Francis (Memorial University)

Are, Elisha (Simon Fraser University)

Arino, Julien (University of Manitoba)

Ashby, Ben (SFU)

Avneet, Kaur (UBC)

Berthiaume, Philippe (Public Health Agency of

Canada)
Betti, Matthew (Mount Allison University)
Bolker, Benjamin (McMaster University)
Brown, Kevin (Public Health Ontario)
Brown, Patrick (University of Toronto)
Buckeridge, David (McGill University)
Butt, Zahid (University of Waterloo)
Castonguay, François (University of Montreal)
Champredon, David (Public Health Agency of Canada)
Charpentier, Arthur (UQAM)
Chauve, Cedric * (Simon Fraser University)
Chen, Dongmei * (Queen's University)
Coates, Emma (McMaster University)
Colijn, Caroline (Simon Fraser University)
Cowen, Laura (University of Victoria)
Craig, Morgan (Sainte-Justine University Hospital Research Centre/Université de Montréal)
Cygu, Bicko (McMaster University)
Day, Troy (Queen's University)
Deardon, Rob (University of Calgary)
Diener, Alan (Health Canada)
Doig, Renny (SFU)
Drouin, Pierre-Luc (Defence Research and Development Canada)
Dushoff, Jonathan (McMaster U)
Earn, David (McMaster University)
Elliott, Lloyd (Simon Fraser University)
Estep, Don (Simon Fraser University/CANSSI)
Foxall, Eric (UBC Okanagan)
Gaas, Brian (Government of Yukon)
Grasselli, Matheus (McMaster University)
Greenwood, Priscilla (University of British Colombia)
Guillouzic, Steve (Defence Research and Development Canada)
Healey, Bonnie (Blackfoot Confederacy)
Heffernan, Jane (York University)
Hempel, Karsten (Institute of Health Economics)
Ho, Lam (Dalhousie University)
Hoi, Amber Gigi (University of Ottawa)
Hongoh, Valerie * (Public Health Agency of Canada)
Hu, Joan (Simon Fraser University)
Hurford, Amy (Memorial University)
Ivanek, Renata (Cornell University)
Jagan, Mikael (McMaster University)
Jankowski, Hanna (York University)
Jha, Prabhat (University of Toronto)
Jolly, Gordon (Public Health Agency of Canada)
Kanary, Lisa (Yukon University)
Kassen, Rees (McGill University)
Kolokolnikov, Theodore (Dalhousie University)
Kong, Jude (York University)
Li, Michael (Public Health Agency of Canada)
Liu, Juxin (University of Saskatchewan)
Ludwig, Antoinette (Public Health Agency of Canada)
Ma, Junling (University of Victoria)
MacLeod, Matthew (Defence Research and Development Canada)
Magpantay, Felicia (Queen's University)
Maheu-Giroux, Mathieu (McGill University)
McCluskey, Connell (Wilfrid Laurier University)

Mee, Jenna (University of Saskatchewan)
Mitchell, Evan (McMaster University)
Mohar, Bojan (Simon Fraser University)
Molan, Shabnam (Simon Fraser University)
Moodie, Erica * (McGill University)
Moyles, Iain (York University)
Muise, Christian * (Queen's University)
Munther, Daniel (Cleveland State University)
Naderi, Sana (McGill University)
Nasri, Bouchra (U. Montréal)
Ng, Victoria (Public Health Agency of Canada)
Osgood, Nathaniel (University of Saskatchewan)
Papst, Irena (Public Health Agency of Canada)
Parsons, Todd (CNRS & Sorbonne Université)
Poisot, Timothee (Université de Montréal)
Price, David (DebateGraph)
Racine, Étienne (Institut national de santé publique du Québec)
Rahman, Md Mijanur (University of British Columbia Okanagan)
Ramazi, Pouria * (Brock University)
Roswell, Michael (University of Maryland)
Sander, Beate (University Health Network)
Shapiro, Jesse (McGill University)
Shin, Hwashin * (Health Canada)
Smith, Ben (Public Health Agency of Canada)
Song, Yexuan (Simon Fraser University)
Soteros, Chris (University of Saskatchewan)
Stockdale, Jessica (Simon Fraser University)
Susko, Edward (Dalhousie University)
Thakur, Krishna (UPEI)
Torabi, Mahmoud (University of Manitoba)
Tovissode, Chenangnon (University of Idaho)
Tuite, Ashleigh (Public Health Agency of Canada)
Tyson, Rebecca Claire (University of British Columbia Okanagan)
Varughese, Marie (Betsy) (Institute of Health Economics)
von Domselaar, Gary (Public Health Agency of Canada)
Vrbova, Linda * (Public Health Agency of Canada)
Wagner, Caroline (McGill University)
Waldner, Cheryl (University of Saskatchewan)
Walker, Steve (McMaster University)
Wang, Liangliang (Simon Fraser University)
Wang, Hao (University of Alberta)
Wang, Mea (University of Calgary)
Ward, Madeline (University of Calgary)
Watmough, James (University of New Brunswick)
Wolfson, Michael (University of Ottawa)
Yusuf, Warsame (Public Health Agency of Canada)
Zhao, Xiaoqiang (Memorial University of Newfoundland)
Zhao, Kevin (University of Ottawa)

Harmonic Analysis and Convexity
November 19 - 24, 2023

Organizers:

Vladyslav Yaskin (University of Alberta)
Alexander Koldobsky (University of Missouri)
Dmitry Ryabogin (Kent State University)

Kateryna Tatarko (University of Waterloo)
Artem Zvavitch (Kent State Univeristy)

Many important questions in convex geometry are related to the study of sections and projections of convex bodies. For example, can convex bodies be uniquely determined by the size of their sections or projections? What are the largest and smallest sections of the cube? Do convex bodies with smaller sections have smaller volume? A common feature of all these problems is that they are solved with the help of harmonic analysis. The aim of the proposed workshop is to bring together leading experts and young researchers to discuss recent progress in applications of harmonic analysis to convex geometry.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5053

Participants:

Alfonseca-Cubero, Maria de los Angeles (North Dakota State University)

Arman, Andrii (University of Manitoba)
Artstein, Shiri (Tel-Aviv University)

Boroczky, Karoly (Alfréd Rényi Institute of Mathematics)
Chasapis, Giorgos (University of Crete)
Chasioti, Effrosyni Maria (Case Western Reserve University)
Dann, Susanna (Universidad de los Andes)
Eskenazis, Alexandros (CNRS, Sorbonne Université)
Florentin, Dan (Bar-Ilan University)
Haddad, Julián (Universidad de Sevilla)
Hernandez Cifre, Maria A. (University of Murcia)
Herscovici, Orli (St. John's University)
Hosle, Johannes (MIT)
Huang, Han (Georgia Institute of Technology)
Jimenez, Carlos Hugo (University of Sevilla)
Koenig, Hermann (Universitaet Kiel)
Koldobsky, Alexander (University of Missouri)
Langharst, Dylan (l'institut de Mathématiques de Jussieu Paris rive gaucheu)
Letwin, Brayden (University of Alberta)
Li, Dongbin (University of Alberta)
Litvak, Alexander (University of Alberta)
Livshyts, Galyna (Georgia Institute of Technology)
Manui, Auttawich (Kent)
Milman, Emanuel (Technion)
Mui, Stephanie (New York University)
Myroshnychenko, Sergii (Lakehead University)
Nayar, Piotr (University of Warsaw)
Ortega Moreno, Oscar Adrian (Technische Universität Wien)
Paouris, Grigoris (Texas A&M University)
Pivovarov, Peter (University of Missouri)
Polavarapu, Achintya (University of Alberta)
Putterman, Eli (Tel Aviv University)
Reuter, Chase (NDSU)
Rotem, Liran (Technion)
Roysdon, Michael (Brown University)
Rudelson, Mark (University of Michigan, Ann Arbor)
Ryabogin, Dmitry (Kent State University)
Schütt, Carsten (Christian-Albrechts-Universitaet)
Semenov, Vadim (New York University)
Shaw, Vincent (Kent State University)
Simanjuntak, Paul (Texas A&M University)
Slomka, Boaz (The Open University of Israel)
Stancu, Alina (Concordia University)
Sun, Wen Rui (University of Alberta)
Szczepanski, Tomasz (University of Alberta)
Szusterman, Maud (Tel Aviv University)
Tatarko, Kateryna (University of Waterloo)
Tikhomirov, Konstantin (Carnegie Mellon University)
Tkocz, Tomasz (Carnegie Mellon University)
Valettas, Petros (University of Missouri)
Vritsiou, Beatrice-Helen (University of Alberta)
Werner, Elisabeth (Case Western Reserve University)
Wyczesany, Katarzyna (Carnegie Mellon University)
Xing, Sudan (University of Arkansas at Little Rock.)
Yaskin, Vladyslav (University of Alberta)
Ye, Deping (Memorial University)
Zawalski, Bartłomiej (Polish Academy of Sciences)
Zhang, Ning (Huazhong University of Science and Technology)

Zhang, Gaoyong (New York University)

Spaces of Manifolds: Algebraic and Geometric Approaches
November 26 - December 1, 2023

Organizers:

Alexander Kupers (University of Toronto)
Manuel Krannich (Karlsruhe Institute of Technology)

Mona Merling (University of Pennsylvania)
Tom Goodwillie (Brown University)

The concept of a manifold in mathematics corresponds approximately to the everyday idea of a smooth surface --- think of soap bubbles or sheets of fabric --- except that it can have any number of dimensions. A question that lies at the origin of topology, the mathematics of shape, is: can we write down a list of all manifolds? At first, such a classification was attempted through numerical invariants. Over time, the focus of algebraic topology has shifted from using numerical invariants to the algebraic objects underlying them, and then ascended further to studying moduli spaces. This workshop concerns recent breakthroughs in this philosophy for studying of manifolds, combining higher-algebraic methods with novel geometric techniques.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5017

Participants:

Abouzaid, Mohammed (Stanford University)
Albert, Yang (University of Pennsylvania)
Ankney, Noah (Northwestern)
Arone, Gregory (Stockholm University)
Aumonier, Alexis (University of Cambridge)

Bahayou, Amine (Kasdi Merbah University)
Bartulovic, Ivan (TU Dresden)
Basualdo Bonatto, Luciana (Max Planck Institute for Mathematics)
Berglund, Alexander (Stockholm University)

Bhattacharyya, Reebhu (University of Michigan)
Biswas, Sagnik (IIT Madras)
Boavida de Brito, Pedro (Universidade de Lisboa)
Boyd, Rachael (University of Glasgow)
Burklund, Robert (University of Copenhagen)
Bustamante, Mauricio (Universidad Católica de Chile)
Calle, Maxine (The University of Pennsylvania)
Carmona, Victor (MPI-MiS Leipzig)
Chaudhary, Abhay (Ohio State University)
Chenery, Sebastian (University of Southampton)
Davis, James (Indiana University)
De, Subham (IIT, Delhi)
Ebert, Johannes (Universität Münster)
Frankland, Martin * (University of Regina)
Galatius, Soren (University of Copenhagen)
Garkusha, Grigory (Swansea University)
Goldman, Sacha (University of Toronto)
Gomes, Rafael (Universidad de Málaga)
Goodwillie, Tom (Brown University)
Grady, Connor (UIUC)
Hambleton, Ian (McMaster University)
Han, Lou (University of Georgia)
Hartman, Daniel (University of Georgia)
Hebestreit, Fabian (University of Aberdeen)
Hertl, Thorsten (University of Freiburg)
Himes, Zach (University of Michigan)
Hoang, Anh (University of Minnesota)
Hu, Yang (New Mexico State University)
Huang, Ruizhi (Chinese Academy of Sciences)
Huber, Andreas (Uni Augsburg)
Jin, Hyeonhee (MPIM Bonn)
Kandel, Santosh (California State University)
Karmakar, Aparajita (Indian statistical institute)
Kasprowski, Daniel (University of Southampton)
Kenigsberg, Lea (University of California Davis)
Kjuchukova, Alexandra (University of Notre Dame)
Klein, John (Wayne State University)
Konovalov, Andrei (University of Duisburg-Essen)
Kranhold, Florian (Karlsruhe Institute of Technology)
Krannich, Manuel (Karlsruhe Institute of Technology)
Kundu, Arnab (Harish-Chandra Research Institute)
Kundu, Bikramjit (Indian Institute of Technology, Roorkee)
Kupers, Alexander (University of Toronto)
Kurlin, Vitaliy (University of Liverpool)
Kycia, Radoslaw (Masaryk University)
LAMINE, ZAKARIA (university ibn tofail math department kenitra)
Land, Markus (LMU München)
Lehner, Georg (Free University of Berlin)
Li, Guchuan (Peking University)
Liu, Fangji (University of Pennsylvania)
Lobo Fernandes, João (Karlsruhe Institute of Technology)
Macko, Tibor (Comenius University and Slovak Academy of Sciences)
Malin, Connor (University of Notre Dame)
Malkiewich, Cary (Binghamton University)
McGarry Furriol, Jan (Stockholms Universitet)
Mejia, Andres (University of Pennsylvania)
Merling, Mona (University of Pennsylvania)

Muñoz-Echániz, Samuel (University of Cambridge)
Naef, Florian (Trinity College Dublin)
Nass, Felix (University of Hamburg and University of Copenhagen)
Ng Kwing King, Wayne (Universidad de Zaragoza & Université de Pau)
Nikolaus, Thomas (Universitat Munster)
Niu, Nelson (University of Washington)
Oldervoll, Trygve Poppe (Norwegian University of Science and Technology)
Oliver, Wang (University of Chicago)
Pacheco-Tallaj, Natalia (Massachusetts Institute of Technology)
Pal, Urshita (University of Michigan)
Palmer-Anghel, Martin (Mathematical Institute of the Romanian Academy)
Pedersen, Jonathan (University of Toronto)
Picot, Azélie (University of Copenhagen)
Pistalo, Damjan (University of Luxembourg)
Ponto, Kate (University of Kentucky)
Powell, Mark (University of Glsagow)
Prasad, Sachchidanand (ICTS-TIFR Bengaluru)
Prigge, Nils (Stockholm University)
Raj, Ajay (Comenius University)
Randal-Williams, Oscar (University of Cambridge)
Rao, Ashwani (Banaras Hindu University, Varanasi, India)
Raptis, George (University of Regensburg)
Rivera, Manuel (Purdue University)
Rocha, Juan Carlos (UFSCar)
Rognes, John (University of Oslo)
Rolf, Alice (University of Toronto)
Romo, Jack (University of Leeds)
Rovi, Carmen (Loyola University Chicago)
Santhanam, Rekha (IIT Bombay)
São João, José (Stockholm University)
Scheimbauer, Claudia (TU Munich)
Semikina, Julia (University of Muenster)
Sendón Blanco, Alba (VU Amsterdam)
Senger, Andrew (Harvard University)
Sierra, Ismael (University of Cambridge)
Sozer, Kursat (McMaster University)
Sroka, Robin J. (University of Münster)
Stark, Christopher (NSF)
Steimle, Wolfgang (University of Augsburg)
Steinebrunner, Jan (University of Copenhagen)
Stoll, Robin (Stockholm University)
sutrave, vaibhav * (university of western ontario)
Taggart, Niall (Utrecht University)
Tawfeek, Andrew (University of Washington)
Tshishiku, Bena (Brown University)
Turchin, Victor (Kansas State University)
Varisco, Marco (University at Albany)
Volpe, Marco (Max Planck Institute for Mathematics)
Watanabe, Tadayuki (Kyoto University)
Weinberger, Shmuel (University of Chicago)
Weiss, Michael (University of Münster)
Willwacher, Thomas (ETH Zürich)
Yamauti, Fernando (Universidade de São Paulo)
Zhang, Sunny (Cornell University)

Subfactors and Fusion (2-)Categories
December 3 - 8, 2023

Organizers:

David Penneys (The Ohio State University)
Terry Gannon (University of Alberta)

Theo Johnson-Freyd (Dalhousie University)
Julia Plavnik (Indiana University)

The symmetries of classical mathematical objects form a group. In the past several decades, we have seen new quantum mathematical objects like von Neumann algebras and quantum field theories whose symmetries are best described by tensor categories. One reason for this is that these mathematical objects naturally form higher categories, and thus their endomorphisms naturally form higher monoidal categories. In this sense, we view fusion categories as objects which encode quantum symmetries. Subfactors are a rich source of examples of exotic unitary fusion categories, and conversely, every unitary fusion category arises from a subfactor. This correspondence leads to deep mathematical connections between these fields. These mathematical objects are also intimately related to conformal field theory and topological phases of matter, which give topological quantum field theories, in which higher categories play an important role. The purpose of this workshop is built on the 2014 and 2018 BIRS workshops on subfactors and fusion categories, with the goal of studying these objects through a higher categorical lens. To do so, we will bring together world experts from subfactors, fusion categories, higher categories, and mathematical physics to further develop the deep and rich connections between these fields.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5091

Participants:

Abigail, Watkins (Indiana University)
Bisch, Dietmar (Vanderbilt University)

Brannan, Michael (University of Waterloo)
Chen, Hank (University of Waterloo)

Creutzig, Thomas (University of Alberta)
Czenky, Agustina (University of Oregon)
Décoppet, Thibault (Harvard University)
Delaney, Colleen (UC Berkeley)
Douglas, Christopher (University of Oxford)
Edie-Michell, Cain (University of New Hampshire)
Etingof, Pavel (MIT)
Galindo, Cesar (Universidad de los Andes)
Gannon, Terry (University of Alberta)
Green, David (The Ohio State University)
Grossman, Pinhas (University of New South Wales)
Henriques, Andre (University of Oxford)
Hernandez Palomares, Roberto (University of Waterloo)
Hungar, Brett (The Ohio State University)
Johnson-Freyd, Theo (Dalhousie University)
Jones, Corey (North Carolina State University)
Kawahigashi, Yasuyuki (The University of Tokyo)
Kong, Liang (Southern University of Science and Technology)
McGovern, Emily (North Carolina State University)
McRae, Robert (Tsinghua University)
Meusburger, Catherine (Friedrich-Alexander-Universität)
Moser, Lyne (Universität Regensburg)
Naaijkens, Pieter (Cardiff University)
Ng, Siu-Hung (Louisiana State University)
NIKSHYCH, Dmitri (University of New Hampshire)
Ogata, Yoshiko (The University of Tokyo)
Orosz Hunziker, Florencia (University of Colorado Boulder)
Ostrik, Victor (University of Oregon)
Pena Pollastri, Hector Martin (Indiana University)
Penneys, David (The Ohio State University)
Plavnik, Julia (Indiana University)
Reutter, David (University of Hamburg)
Riesen, Andrew (MIT)
Ros Camacho, Ana (Cardiff University)
Rowell, Eric (Texas A&M University)
Sanford, Sean (Ohio State University)
Schafer-Nameki, Sakura (University of Oxford)
Schopieray, Andrew (University of Alberta)
Schweigert, Christoph (University of Hamburg)
Snyder, Noah (Indiana University)
Walker, Kevin (MMI)
Walton, Chelsea (Rice University)
Wang, Yilong (Beijing Institute of Mathematical Sciences and Applications (BIMSA))
Wolf, Ramona (ETH Zürich)
Yadav, Harshit (University of Alberta)

Banff International Research Station

2023

2-Day Workshops

2-Day Workshops 2023

Jan 19   Jan 22   Charting a Future for Emerging Infectious Disease Modelling in Canada
Mar 31   Apr 2   Alberta Number Theory Days XIV
Apr 28   Apr 30   Ted Lewis SNAP Math Fair Workshop
May 19   May 21   Stochastic Modelling of Big Data in Finance, Insurance and Energy Markets
Jun 23   Jun 25   Alberta-Montana Combinatorics and Algorithms Day
Jul 28   Jul 30   Open-Source Tools to Enable Geophysical Data Processing and Inversion
Aug 18   Aug 20   2023 Math Attack Summer Camp for Girls
Aug 25   Aug 27   Emerging Mathematical Challenges in Synthetic Biological Network Design
Sep 1   Sep 3   Mathematical Challenges in Adaptation of Quantum Chemistry to Quantum Computers

Charting a Future for Emerging Infectious Disease Modelling in Canada
January 19 - 22, 2023

Organizers:

Mark Lewis (University of Victoria)
Patrick Brown (University of Toronto)
Caroline Colijn (Simon Fraser University)

Kumar Murty (The Fields Institute for Research in Mathematical Sciences)
Nick Ogden (Public Health Agency of Canada)

This is a two-day summit involving public health modellers and academics who currently lead network groups that model emerging infectious diseases using mathematics and statistics. It's goal is to chart a path forward for the modelling of emerging infectious diseases in Canada and strengthen the potential for public health gain.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w7101

Participants:

Brown, Patrick (University of Toronto)
Colijn, Caroline (Simon Fraser University)
Cotton, Christopher (Queen's University/One Society Network)
Cowen, Laura (University of Victoria)
Day, Troy (Queen's University)
Deardon, Rob (University of Calgary)
Earn, David (McMaster University)
Haskell, Deirdre (Fields Institute)

Heffernan, Jane (York University)
Leighton, Patrick A. (University of Montreal)
Lewis, Mark (University of Victoria)
Murty, Kumar (The Fields Institute for Research in Mathematical Sciences)
Ogden, Nick (Public Health Agency of Canada)
Otto, Sally (University of British Columbia)
Rafferty, Ellen (Institute of Health Economics)
Tuohy, Caroline (University of Toronto)

Wu, Jianhong (York University)
Zhu, Huaiping (York University)

Alberta Number Theory Days XIV
March 31 - April 2, 2023

Organizers:

Erik Holmes (University of Calgary)
Kübra Benli (University of Lethbridge)

Brandon Gill (University of Alberta)

Understanding the relationship between structure, dynamics, and function in the brain is a crucial step toward innovative solutions for brain-related diseases such as epilepsy, Parkinson's disease and Autism Spectrum Disorders, and hence, it is of immense importance to society. Complex network approaches have successfully provided new insights about the structure and function of the brain for two decades. With recent advances in data science for neuroscience, the increased complexity of the data such as neurosignals from multiple frequency bands, large-scale optical imaging of neuronal activity, and high-resolution Functional Magnetic Resonance Imaging, has led to the proposition that multilayer-network models are essential to model and understand brain dynamics. This workshop builds on early successes using this framework and brought together a diverse group of world-leading experts of various backgrounds to take the application of multiplex networks in neuroscience to the next level. Bridging the gap between complex network theory and neuroscience. We expect that this workshop and the transdisciplinary collaborations between the different fields and participants will stimulate significant advances in our understanding of the brain and indeed lead to new diagnostic methods and treatments of brain-related diseases in the future.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2006

Participants:

Akbary, Amir (University of Lethbridge)
Albayrak, Gulizar Sedanur (University of Calgary)
Alimirzaei, Shirin (University of Lethbridge)
Aygin, Selcuk (Northwestern Polytechnic)
Bajpai, Jitendra (University of Alberta)
Balodis, Kristaps (University of Calgary)

Baril Boudreau, Félix (University of Lethbridge)
Benesh, Joel (University of Lethbridge)
Benli, Kübra (University of Lethbridge)
Bhatttacharjee, Sreerupa (University of Lethbridge)
Bolvardizadeh, Solaleh (University of Lethbridge)
Bose, Arnab (University of Lethbridge)

Bucur, Alina (University of California San Diego)
Chapdelaine, Hugo (Laval)
Chaumont, Joseph (University of Alberta)
Chen, Yanze (University of Alberta)
Cicek, Fatma (University of Northern British Columbia)
Dijols, Sarah (University of Calgary)
Elma, Ertan (University of Lethbridge)
Farzanfard, Golnoush (University of Lethbridge)
Fiori, Andrew (University of Lethbridge)
Fujikawa, Shohei (University of Calgary)
Gheisari, Hiva (University of Lethbridge)
Gill, Brandon (University of Alberta)
Gill, Brandon (University of Alberta)
Holmes, Erik (University of Calgary)
Jacobson, Jr., Michael (University of Calgary)
Jalalvand, Fatemeh (University of Calgary)
Kadiri, Habiba (University of Lethbridge)
Kulkarni, Avinash (Dartmouth College)
Lalin, Matilde (Universite de Montreal)
Luo, Qinglong (University of Calgary)
Marquis, David (University of Calgary)
Morrill, Ryan (University of Calgary)
Nasserden, Brett (University of Waterloo)
Ng, Nathan (University of Lethbridge)
Nguyen, Dang Khoa (University of Calgary)
Pacheco Castan, Edgar (University of Calgary)
Ray, Mishty (University of Calgary)
Satpathy, Punya Plaban (Currently not working)
Saunders, J.C. (Middle Tennessee State University)
Scheidler, Renate (University of Calgary)
Schopieray, Andrew (University of Alberta)
Stockall, Devon (University of Alberta)
Tobin, Bella (Oregon State University)
Tran, Ha (Concordia University of Edmonton)
Voight, John (Dartmouth College)
Watson, Lori (Trinity College)
Xiao, Stanley (University of Northern British Columbia)

Ted Lewis SNAP Math Fair Workshop 2020
April 28 - 30, 2023

Organizers:

Sean Graves (University of Alberta)　　　　**Liane Solomon** (University of Alberta)

During this pivotal time of K-9 curriculum reform in our province it is important to find the correct balance between inquiry-based problem solving and practicing basic facts in the mathematics classroom. The purpose of a SNAP math fair is to provide a meaningful problem-solving experience for all students.

This would be the nineteenth annual Ted Lewis Math Fair Workshop at BIRS. The workshop is extremely popular with teachers in elementary and secondary schools, provides them with resources for lesson plans, and it is helping to to reshape the way mathematics is being approached in the schools. Problem solving and puzzles in the classroom is now a specific area of the K-9 curriculum and in-service teachers have had very little training in using these tools effectively. This is not limited to Alberta schools, and the SNAP math fair idea is now spreading around the world. This type of 2-day workshop is considered front line approach in the collaborative effort between mathematicians, more experienced teachers, and all teachers interested in professional development to improve the mathematics teaching in the elementary level and beyond. To have teachers share their valuable experiences with math fair in their own schools is the best and most useful information to others. Teachers in Alberta and participants from outside view the Ted Lewis Workshop as one of PIMS and BIRS most valuable education initiatives.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2012

Participants:

Dam, David (Edmonton Public Schools)
Davis, Megan (Livingstone Range School Division)
DeDieu, Lauren (University of Calgary)
Graves, Sean (University of Alberta)
Hoffman, Janice (Edmonton Public Schools)
Hohn, Tiina (MacEwan University)
Lorway, Geri (Thinking 101/University of Alberta)
Maciejewski, Wesley (Red Deer Polytechnic)
Mann, Glenna (Edmonton Public Schools)
May, Doreen (Calgary Catholic School District)
Mizera, Anne-Marie (St. Mary's University)

Mundt, Jolene (Guardian Angel School)
Northwest, Kyle (Maskwacis Cultural College)
Oswald-Osmanovic, Chantel (Edmonton Public Schools)
Rae, Kyla (Prairie River Jr. High)
Shaw, Dolph (Edmonton Public Schools)
Soar, Chelsea (Edmonton Public Schools)
Solomon, Liane (University of Alberta)
Wi, Dami (University of Alberta)
Yaro, Kwesi (University of Alberta)

Stochastic Modelling of Big Data in Finance, Insurance and Energy Markets
May 19 - 21, 2023

Organizers:

Anatoliy Swishchuk (University of Calgary)
Wenjun Jiang (University of Calgary)

Rudi Zagst (Technical University of Munich)

Big data has now become a driver of model building and analysis in a number of areas, including finance, insurance and energy markets. Since the 2008 global financial crisis, energy markets have become more closely linked with financial markets, and energy prices have exhibited more financial characteristics. As a result, there exists a need for highly trained professionals such as data specialists who can work with financial, insurance and energy markets data and who can model those data. In addition, big data and data analytics have become an essential part of the financial services industry. Data scientists and data analysts are therefore needed by banks, insurance and energy companies to analyze the voluminous and complex data generated every day in order to effectively plan future trading and transactions and manage their risk.

The 2-Day workshop "Stochastic Modelling of Big Data In Finance, Insurance and Energy markets" will bring together academics, industry people and graduate students to share their ideas, to share their research experience, and to learn more about big data and to know how to model those data.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2004

Participants:

Badescu, Alexandru (University of Calgary)
Brueck, Florian (Technical University of Munich)
Dalton, Scott (Ovintiv)
de Witte, Dominik (Technical University of Munich)
Jia, Tianxia (University of Calgary)
Jiang, Wenjun (University of Calgary)
Kiesel, Ruediger (University Duisburg-Essen)
Lalor, Luca (University of Calgary)
Malenfant, Kevin (Auspice Capital Advisors)
Min, Aleksey (Technical University of Munich)
Nawodh, Sudeesha (University of Calgary)
Qiu, Jinniao (University of Calgary)
Roldan Contreras, Ana (University of Calgary)

Safaian, Nima (Cenovus)
Scherer, Matthias (Technical University of Munich)
Sezer, Deniz (University of Calgary)
Sun, Zuming (University of Calgary)
Swishchuk, Anatoliy (University of Calgary)
Vithana, Shanukie (University of Calgary)
Wang, Ye (University of Calgary)
Ware, Tony (The University of Calgary)
Werner, Ralf (University of Augsburg)
Yang, Yang (University of Calgary)
Zagst, Rudi (Technical University of Munich)

Alberta-Montana Combinatorics and Algorithms Day
June 23 - 25, 2023

Organizers:

Hadi Kharaghani (University of Lethbridge)
Ryan Hayward (University of Alberta)

Mark Kayll (University of Montana)
Robert Woodrow (University of Calgary)

June 23 - 25, 2023 will see the first Alberta-Montana Combinatorics and Algorithms Day hosted at the Banff International Research Station (BIRS). The event brings together faculty and students from three Alberta universities (in Calgary, Lethbridge, and Edmonton) and the University of Montana (Missoula). Combinatorics is the branch of mathematics concerned with finite sets: their properties, structures, and number. Studying the classic Rubik's Cube reveals the number of possible positions (it's 43,252,003,274,489,856,000). Understanding the cube's structure leads to efficient algorithms for solving it (an Algorithm being a sequence of well-defined instructions for solving a problem, answering a question, or even playing a game). In 2010, a group of researchers working with Google proved that every one of that staggering number of positions could be solved in no more than 20 moves.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2008

Participants:

Abdi, Davoud (University of Calgary)
Friggstad, Zachary (University of Alberta)
Halfpap, Anna (University of Montana)
Hasham, Kamillah (University of Alberta)
Hayward, Ryan (University of Alberta)
Holzmann, Wolfgang (University of Lethbridge)
Huntemann, Svenja (Concordia University)
Jamshidian, Mahya (University of Alberta)
Johnston, Daniel (Trinity College)
Kayll, Mark (University of Montana)
Kharaghani, Hadi (University of Lethbridge)
Laflamme, Claude * (University of Calgary and

Lyryx Learning)
Magnan, Van (University of Montana)
Morris, Dave (University of Lethbridge)
Morris, Joy (University of Lethbridge)
Mousavi, Ramin (University of Alberta)
Müller, Martin (University of Alberta)
Palmer, Cory (University of Montana)
Rattan, Amarpreet (Simon Fraser University)
Safavi-Naini, Rei (University of Calgary)
Schultz, Luke (University of Alberta)
Shamsundar, Khobragade Yash (Indian Institute of

Science Education and Research Bhopal)
Van Willigenburg, Stephanie (UBC)
Van't Land, Caleb (University of Lethbridge)
Woodrow, Robert (University of Calgary)
Zaitsev, Vlad (University of Lethbridge)

Open-Source Tools to Enable Geophysical Data Processing and Inversion
July 28- 30, 2023

Organizers:

Santiago Soler (University of British Columbia)
Lindsey Heagy (University of British Columbia)

Craig Miller (GNS Science)
Leonardo Uieda (University of Liverpool)

Solving Earth science challenges like environmental remediation, carbon capture and storage, geothermal energy, critical mineral exploration, and groundwater assessment require top-notch mathematical and computational solutions that enable us to process geophysical data and build models of the subsurface that are in agreement with these data. The development of software tools that are freely available and easy to use accelerates research by enabling students, researchers, and industry professionals to apply them to solve relevant problems involving securing safe drinking water, providing renewable energy, and exploring critical minerals for a low carbon future.

Fatiando a Terra (http://www.fatiando.org) and SimPEG (http://www.simpeg.xyz) are two projects that provide open-source Python tools for processing and inverting geophysical data through a community-driven model of development. During this workshop, the two communities that develop and maintain these projects will join together to share the latest advances in their research and software packages. We will plan and design tools for solving common problems, explore new research avenues, design the software pieces needed to accelerate them, and nurture the growth of the two communities while increasing their diversity and fostering the active participation of early-career researchers.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2014

Participants:

Antunes, Vinicius (University of Western Australia)
Balza, Andrea (RWTH Aachen University)
Capriotti, Joseph (University of British Columbia)
Chakraborti, Prithwijit (University College Dublin)
Cockett, Rowan (University of British Columbia)
Cowan, Devin (University of British Columbia)
Ferreira de Souza Junior, Gelson (Universidade de São Paulo)
Fournier, Dominique (Mira Geoscience)
Furlani, Renzo (Geoservicios - University of San Juan)
Gomez, Mariana (Center for Scientific Research and Higher Education at Ensenada - Mexico)
Heagy, Lindsey (University of British Columbia)
Kang, Seogi (Stanford University)
Kuttai, Johnathan (Dias Geophysical)
Le Mével, Hélène (Carnegie Institution for Science)
Li, Lu (The University of Western Australia)
Lopez Alvis, Jorge (University of British Columbia)
MacLennan, Kris (University of North Dakota)
Martens, Kalen (SJ Geophysics)
Melo, Aline (University College Dublin)
Miller, Craig (GNS Science)
Nikolaidis, Prodromos (n/a)
Nzikou Mamboukou, Michel (University of Western Australia)
Odiegwu, Chukwukelu (Nnamdi Azikiwe University Awka Nigeria)
Peacock, Jared (US Geological Survey)
Pesce Lopez, Agustina (Fatiando a Terra)
Pokar, Parth (University of British Columbia)
Soler, Santiago (University of British Columbia)
Sun, Jiajia (University of Houston)
Tankersley, Matt (Victoria University of Wellington)
Toqeer, Muhammad (Quaid-I-Azam University)
Uieda, Leonardo (University of Liverpool)
Uppal, India (University of Liverpool)
Walker, Sean (Campbell & Walker Geophysics)
Weis, John (Zonge)
Williams, Helen (Auckland University of Technology)
Xu, Anran (University of British Columbia)
Zhang, Mengli (Colorado School of Mines)

2023 Math Attack Summer Camp for Girls
August 18 - 20, 2023

Organizers:

Lauren DeDieu (University of Calgary)   **Sean Graves** (University of Alberta)

In (STEM) fields such as mathematics, little progress has been made to increase the diversity of individuals in leadership positions. Furthermore, at co-ed camps often the young boys can be excitable and boisterous, creating a learning environment that is unsatisfactory for the female participants. In the past decade, there has only been one female student who has competed on the Canadian IMO team, and the underrepresentation of women is apparent in our undergraduate math classrooms. The 2023 Math Attack Summer Camp for Girls will provide a supportive environment for participants aged 13 to 16 who identify as female to meet peers with similar interests in STEM fields - particularly mathematics.

Commencing at the University of Calgary, participants will experience mini-courses in mathematics, data-science, and mathematical modeling. Pending a successful application, the eight-day camp will conclude with a weekend of presentations and problem-solving sessions at the Banff International Research Station led by women in STEM. Although the camp will be highly academic, there will also be a social program for the participants to establish strong bonds with similar-minded peers. Last year was the first time a summer camp of this kind was run in Alberta, exclusively for female participants.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2013

Participants:

Cao, April (Student)   **Hua, Jasmine** (K-12 Student)
DeDieu, Lauren (University of Calgary)   **Jiang, Ava** (Student)
Ding, Alice (Student)   **Josan, Saachee** (Student)
Falasinnu, Tomi (Student)   **Liu, Cassandra** (Student)

Mao, Catherine (Student)
Mutti, Amryn (Student)
Okunlola, Michelle (Student)
Plumb, Abby (Student)
Qiu, Sian (Student)
Rong, Cathy (Student)
Tian, Keren (Student)
Venkateshwaran, Vaishnavi (Student)
Wang, Heather (Chaperone)
Wi, Dami (University of Alberta)
Wu, Amy (Student)
Xie, Janice (Student)
Xu, Heather (Student)
Yu, Jeannie (Student)
Zhang, Sophia (Student)
Zhang, Lillian (Student)
Zheng, Fogil (Chaperone)

Emerging Mathematical Challenges in Synthetic Biological Network Design
August 25 - 27, 2023

Organizers:

Enoch Yeung (University of California - Santa Barbara)
Andras Gyorgy (New York University Abu Dhabi)

Mustafa Khammash (ETH Zurich)
Ophelia Venturelli (University of Wisconsin-Madison)

In 2000, researchers discovered it was possible to program the genetic code of living cells with genetic circuits. Since then, the field of synthetic biology has developed myriad methods for transforming living cells into micro-scale computers, living foundries for the production of useful chemicals, and sentinels for monitoring biochemical changes in the environment. More than 20 years after the inception of synthetic biology, the field is growing to realize novel opportunities that arise from inherent differences in how biology performs computation. These differences are categorically centered in four areas: 1) biology performs increasingly complex computation using distributed multi-cellular processes, 2) biology performs robust computation in the absence of modularity, a departure from Von-Neumann computing, 3) biology enacts genetic programs that are highly context-dependent, 4) biology, unlike engineered digital circuits, are more gray-box than white-box and ultimately require tools from data science to continue in scale. In this workshop, leading synthetic biologists, systems theorists, control theorists, and mathematicians will discuss the most recent challenges in synthetic biology from the perspective of robustness and scalability, as well as the recent advances in theoretical and computational methods to address these challenges.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2007

Participants:

Bashor, Caleb (Rice University)
Bennett, Matthew (Rice University)
Briat, Corentin (--)
Cheung, Kevin Pak Lun (University of Wisconsin Madison)
Clark, Harris (UCSB)
Giordano, Giulia (University of Trento, Italy)
Gomez, Marcella (University of California at Santa Cruz)
Gómez-Schiavon, Mariana (UNAM)

Guy-Bart, Stan (Imperial College London)
Gyorgy, Andras (New York University Abu Dhabi)
Hu, Chelsea (Texas A & M University)
Hwa, Terence (UC San Diego)
Ingalls, Brian (University of Waterloo)
Jaramillo, Alfonso (CSIC)
Jaron, Thompson (University of Wisconsin, Madison)
John, Marken (Caltech)
Johnson, Charles (BCCL UC Santa Barbara)

Khammash, Mustafa (ETH Zurich)
Kim, Jongmin (Pohang University of Science and Technology)
Marucci, Lucia (University of Bristol)
Mayalu, Michaelle (Stanford)
Munsky, Brian (Colorado State University)
Myers, Chris (University of Colorado Boulder)
Noireaux, Vincent (University of Minnesota)
Qian, Yili (University of Wisconsin-Madison)
Salis, Howard (Pennsylvania State University)
Sontag, Eduardo (Northeastern University)
Venturelli, Ophelia (University of Wisconsin-Madison)
Wang, Xiao (Arizona State University)
Yeung, Enoch (University of California - Santa Barbara)
You, Lingchong (Duke University)

Mathematical Challenges in Adaptation of Quantum Chemistry to Quantum Computers
September 1 - 3, 2023

Organizers:

Sergey Gusarov (National Research Council Canada)
James Brown (Good Chemistry Company)

Prashant Nair (UBC)
Valera Veryazov (Lund University)

Our workshop is dedicated to the current mathematical and computational problems of Quantum Chemistry, which can be addressed and resolved with the use of modern hardware architectures, in particular quantum computers. The main purpose of the meeting is to bring together experts actively involved in the development of mathematical tools and ideas for Quantum Chemistry. The idea of such an event is long overdue because the majority of the computational codes in quantum chemistry have been developed by chemists/physicists, rather than mathematicians and programmers. The implementations were made for old hardware with limitations, which are no longer critical. There is a need for a revision of these huge, dusty and amateur codes and approaches. We expect that this can be done by considering, planning and implementing the following:

1. Pointing problems in quantum chemistry which can benefit from quantum computers: eigenvalues and eigenvectors, basis set optimization, possible replacements for iterative solvers.
2. Analysis of existing algorithms for compatibility with architecture of quantum computers and deep mathematical revision of current methodologies used in quantum chemistry.
3. Adaptation of new computer technologies, new hardware and their use in quantum chemistry. Interaction with hardware and software developers and explaining to them our immediate needs.
4. Reconsidering resources, available on modern and coming hardware solutions. Efficient use of standard mathematical libraries for Linear Algebra, Fast Fourier Transformation, etc.
5. What do we expect to compute in 10 years?

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2015

Participants:

Alexandre, Foley (University Sherbrooke)
Azad, Utkarsh (Xanadu Quantum Technologies)
Brown, James (Good Chemistry Company)
Brown, Alex (University of Alberta)

Cooke, Logan (University of Alberta)
Das, Saurya (University of Lethbridge)
Di Matteo, Olivia (The University of British Columbia)

Feder, David (University of Calgary)
Gaur, Daya (University of Lethbridge)
Ghaemi, Sajjad (National Research Council Canada)
Guala, Diego (Xanadu Quantum Technologies)
Gusarov, Sergey (National Research Council Canada)
Hu, Hang (National Research Council Canada)
hu, Anguang (DRDC)
Izmaylov, Artur (University of Toronto)
Karabina, Koray (National research Council Canada)
Kaye, Phillip (National, Research Council Canada)
Kurita, Tomochika (Fujitsu)
Lyubimova, Olga (N/A)
Nair, Prashant (UBC)
Nakaji, Kouhei (University of Toronto)
Naseri, Mosayeb (University of Calgary)
Salahub, Dennis (University of Calgary)
Thomas, Baker (University of Victoria)
Veronika, Sharko (GlycoNet UofA)
Veryazov, Valera (Lund University)

Banff International Research Station

2023

Focussed Research Group

Focused Research Group

Aug 27   Sep 1   Conformal Geodesics

Conformal Geodesics
August 27 - September 1, 2023

Organizers:

Maciej Dunajski (Cambridge University)

It is interesting to ask what properties of space (in geometry), or space--time (in physics) are affected by introducing a stretching which varies between the points of space. It turns out that stretching the intervals through the space--time does not change the light cones, and stretching the space preserves the angles. The branch of mathematics which is concerned with the properties invariant under stretching is called conformal geometry.

It turns out (and came as a surprise) that although the notion of distance does not exist in geometry, there are nevertheless analogs of straight or shortest lines. These conformal curves will be the subject of the focused research.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/focussed-research-groups/23frg005

Participants:

Cameron, Peter (University of Edinburgh)
Dunajski, Maciej (Cambridge University)
Eastwood, Michael (University of Adelaide)
Gover, Rod (University of Auckland)
Krynski, Wojciech (Polish Academy of Sciences)
Sparling, George (University of Pittsburgh)
Valiente Kroon, Juan A. (Queen Mary, University of London)
Zadnik, Vojtech (Masaryk University)
Zalabova, Lenka (University of South Bohemia in Ceske Budejovice)

Banff International Research Station

2023

Research in Teams

Research in Teams

Mar 26   Apr 1   On Complex Notions of Convexity
Apr 7   Apr 14   Cohen-Macaulay Rings (Cancelled)
Apr 16   Apr 30   Spectral Synthesis and Weak Amenability of Uniform Algebras
May 21   May 28   Multidimensional Discrete-Time Systems, Algebraic Curves and Commuting Nonunitary
Operators
Jul 9   Jul 23   Elliptic Stable Envelopes and R-matrices for Superspin Chains from 3d N=2 Gauge Theories
Jul 16   Jul 23   Boundary Regularity of Degenerate Elliptic Operators
Jul 23   Jul 30   Optimal Transport for Next Generation
Aug 20   Sep 3   Basis Properties of the Eigensystem of non-self-adjoint Operators
Sep 24   Oct 1   Correlation Chains and Quantum Hierarchies
Oct 15   Oct 22   Mathematics Teaching & Learning in Rural Tanzania
Nov 5   Nov 12   Graph Fourier Transform for Samples of Structured Graphons
Nov 19   Nov 26   Quantum Damour Equation

On Complex Notions of Convexity
March 26 - April 1, 2023

Organizers:

Purvi Gupta (Indian Institute of Science) **Liz Vivas** (Ohio State University)
Anne-Katrin Gallagher (Gallagher Tool & Instrument, LLC)

The study of metrics invariant under biholomorphic mappings is of great importance in the field of Several Complex Variables as understanding any invariant notions provides tools for the biholomorphic equivalence problem. Two such metrics, the Kobayashi and the Carath{\'e}odory metrics, are known to be equal when certain geometric and regularity conditions are imposed on the boundary of the domain in consideration. This Research-in-Teams group will investigate how to weaken these conditions further.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit006

Participants:

Gallagher, Anne-Katrin (Gallagher Tool & Instrument, LLC)
Gupta, Purvi (Indian Institute of Science)
Vivas, Liz (Ohio State University)

Cohen-Macaulay Rings (Cancelled)
March 6 - 13, 2022

Organizers:

Sara Faridi (Dalhousie University)

The aim of our project is to interpret, via algebra, the shape of geometric objects. Empty areas, or holes, in geometric objects - for example the hollow area inside a ball or a doughnut - can be measured via a mathematical tool called homology. The computations to find homology are done via algebraic equations.

Our goal in this research is to find which algebraic equations produce predictable holes in geometric objects. Our particular focus is on the "Cohen-Macaulay" property, which ensures ideal geometric behaviour under certain algebraic conditions. We plan to investigate what those conditions imply for the relevant algebraic equations.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit008

Participants:

Bigdeli, Mina (Institute for Research in Fundamental Sciences)
Faridi, Sara (Dalhousie University)

Spectral Synthesis and Weak Amenability of Uniform Algebras
April 16 - 30, 2023

Organizers:

Alexander Izzo (Bowling Green State University)   **Joel Feinstein** (University of Nottingham)

This project will advance research at the interface of complex analysis and functional analysis, areas of mathematics that provide the mathematical tools used most in physics, engineering, and computational chemistry. Building on their successful solutions to related problems, the investigators will study two longstanding problems at this interface concerning a certain class of algebras called uniform algebras. These problems concern weak amenability and spectral synthesis. These two concepts have played an important role in the context of abstract harmonic analysis where they are well understood, but they are currently not understood at all in the context of uniform algebras. This project aims to fill this gap in our understanding. The results of this research project will be disseminated via talks in seminars and conferences and via publications in widely available journals.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit009

Participants:

Feinstein, Joel (University of Nottingham)
Izzo, Alexander (Bowling Green State University)

Multidimensional Discrete-Time Systems, Algebraic Curves and Commuting Nonunitary Operators
May 21 - 28, 2023

Organizers:

Joseph Ball (Virginia Tech)   **Victor Vinnikov** (Ben Gurion University of the Negev)

The interplay between unitary colligations / conservative input/state/output systems, realization theory for Schur-class functions, operator model theory, and Lax--Phillips scattering theory has been a major research direction in operator theory, function theory, system theory, and mathematical physics starting in the middle of the last century. During the last several decades this interplay has been generalized to a variety of multidimensional settings. One of the most challenging generalizations has been to the setting of operator model theory for several commuting operators, leading to overdetermined multidimensional systems and involving deep tools from the theory of compact Riemann surfaces and algebraic curves. While considerable progress has been achieved for the case of commuting dissipative operators and continuous-time systems, the case of commuting contractions and discrete-time systems remained so far out of reach. In order to to tackle it, we have to solve two outstanding open problems that we plan to attack during the proposed research in teams at BIRS: the multivariable Halmos dilation problem (embedding commuting contractions into a quasi-unitary commutative operator vessel), and an explicit treatment of the glueing data at the possible singularities of the disciminant curve. Even a partial progress will lead to a major new understanding of one of the central problems of multivariable operator theory --- commuting unitary dilations of commuting contractions, as well as progress in function theory on finite bordered Riemann surfaces (e.g., interpolation problems), multidimensional system theory, and multievolution scattering theory.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit010

Participants:

Vinnikov, Victor (Ben Gurion University of the Negev)   **Ball, Joseph** (Virginia Tech)

Elliptic Stable Envelopes and R-matrices for Superspin Chains from 3d N=2 Gauge Theories
July 9 - 23, 2023

Organizers:

Nafiz Ishtiaque (IHES) **Yehao Zhou** (University of Tokyo)
Seyed Faoogh Moosavian (McGill University)

Integrable spin chains are quantum mechanical models based on lattices that can be solved exactly. They play a crucial role in our understanding of how to model physical systems, such as magnets and other solid-state materials, using quantum mechanics. The Bethe/Gauge correspondence is a remarkable duality between such integrable spin chains and much more complicated quantum field theories (QFTs). This correspondence highlights that many QFTs with supersymmetry can be modeled by integrable spin chains at low energy. This provides valuable insight into the dynamics of QFTs.

The Bethe/Gauge correspondence has been studied extensively for many spin chains whose symmetry is given by classical bosonic Lie algebras. This has also inspired interesting new mathematics related to the representation theory of quantum groups. In our current project, we are trying to extend this correspondence for Lie superalgebras by computing certain observables in a 3d N =2 supersymmetric field theories inspired by a string theoretic explanation of the Bethe/Gauge correspondence.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit110

Participants:

Ishtiaque, Nafiz (IHES)
Moosavian, Seyed Faoogh (McGill University)
Zhou, Yehao (University of Tokyo)

Boundary Regularity of Degenerate Elliptic Operators
July 16 - 23, 2023

Organizers:

Cristian Rios (University of Calgary) **Scott Rodney** (McMaster University)
David Cruz-Uribe (University of Alabama)

This team of researchers will study mathematical problems which are derived from several physical applications such as electro-magnetism, gravity, and chemical diffusions. The research will concentrate on the study of problems which are not approachable by the existence theory because of the inclusion of singularities or discontinuities. The results of this research will expand the possible tools available for applications.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit005

Participants:

Cruz-Uribe, David (University of Alabama)
Rios, Cristian (University of Calgary)
Rodney, Scott (McMaster University)

Optimal Transport for Next Generation
July 23 - 30, 2023

Organizers:

Young-Heon Kim (University of British Columbia)   **Soumik Pal** (University of Washington Seattle)

Optimal transportation is one of the most rapidly developing areas in mathematics and its applications. The theory has gained prominent applications in multiple areas of mathe- matical sciences, such as analysis, probability, data science and economics. Certain parts of the field have emerged, and exploded in popular- ity, since the publica- tion of the excellent existing textbooks on the topic, including those by Villani (2003 and 2009) and Santambrogio (2015). As a consequence, areas such as entropic regularization, which have transformed applications in data science, have never been covered in depth in traditional textbooks. Books by Cuturi-Peyre (2018) and Galichon (2016) cover some of these topics, but are each geared towards particular areas of application – our goal is to write a general textbook covering the more recent theory, with an eye to its applications in a broad range of areas.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit011

Participants:

Kim, Young-Heon (University of British Columbia)
Pass, Brendan (University of Alberta)

Basis Properties of the Eigensystem of non-self-adjoint Operators
August 20 - September 3, 2023

Organizers:

Petr Siegl (Graz University of Technology)
Boris Mityagin (Ohio State University)

One aspect of non-self-adjoint spectral theory focuses on the properties of the eigensystem (eigenvectors and root vectors) of operators T with compact resolvent. In the classical case, when T is assumed to be self-adjoint or normal, the eigenvectors form an orthonormal basis. This fact is frequently used in further applications, for instance in the analysis of differential operators or in quantum theory. However, the basis properties of the eigensystem can be lost when a self-adjoint operator is perturbed by a non-symmetric term. Deciding whether a perturbation preserves the basis properties of the eigensystem or not appears to be a delicate issue, which requires careful and deep analysis of the problem. For instance, in applications in differential operators, precise asymptotic estimates of eigenfunctions of the unperturbed operator and of the size of the perturbation are needed.

This Research in Teams aims at exploring the new ideas in characterizing perturbations which preserve the basis properties and, on the other hand, at constructing perturbations of specific differential operators that break the basis property.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit099

Participants:

Siegl, Petr (Graz University of Technology)

Correlation Chains and Quantum Hierarchies
September 24 - October 1, 2023

Organizers:
Jason Crann (Carleton University)

The question about the genuine distinction between classical and quantum mechanics, notably raised by Einstein in the 1930's, was definitively settled in the 1960's through the celebrated Bell Theorem. Since then, other models of quantum physics, utilising seemingly larger resource classes, have appeared, with the prime example the commuting operator model. Its genuinely greater power, when compared to the more conventional tensor product model, has been formally proved only recently, simultaneously settling an over 40 year old open problem in pure mathematics, known as the Connes Embedding Problem.

In the current project, we aim to use techniques from operator theory to enrich the toolkit available to distinguish between these different quantum mechanical models. As a primary instrument, we will use non-local games, which have in the past couple of decades become prominent in quantum information theory. As a result of our research, we expect to strengthen the existing links between operator algebra theory and quantum computing, leading to new pure mathematical directions, and developing more mathematical tools for use in theoretical physics.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit012

Participants:

Crann, Jason (Carleton University)
Todorov, Ivan (University of Delaware)
Turowska, Lyudmila (Chalmers University)

Mathematics Teaching & Learning in Rural Tanzania
October 15 - 22, 2023

Organizers:
Florence Glanfield (University of Alberta)
Joyce Mgombelo (Brock University)

The purpose of the work being proposed for a one-week research team working session at BIRS is to make significant progress on a book manuscript that explores the ways in which a Global Affairs Canada development project was designed to build capacity for mathematics teaching and learning in rural areas in Tanzania. The book outlines the ways in which the project was designed and implemented, and reframes how sustainability of such international development projects can be re-conceptualized in terms of the ways in which participants continue to live and enhance their mathematical, professional, and personal learnings.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit013

Participants:

Glanfield, Florence (University of Alberta)
Mgombelo, Joyce (Brock University)
Simmt, Elaine (University of Alberta)
Swai, Calvin (University of Dodoma)

Graph Fourier Transform for Samples of Structured Graphons
November 5 - 12, 2023

Organizers:
Mahya Ghandehari (University of Delaware)
Jeannette Janssen (Dalhousie University)

The proliferation of networked data in the past few decades has been unprecedented. In this type of data, numerical measurements are attached to the nodes of a network, and for successful analysis of the data, the underlying network structure should be taken into account. Over the past two decades, significant progress has been made to generalize classical signal processing tools to analyze and process signals defined on networks. This topic attracted the attention of many data scientists (in mathematics and engineering), and turned into the fast-growing and vibrant field of Graph Signal Processing.

One of the most fundamental concepts in classical signal processing is the Fourier transform. This concept has been generalized to graph signals, but processing of a graph signal rigidly depends on the underlying network; this is a major drawback, as the underlying graph of a signal may sustain minor variations due to error or the natural evolution of the network. In this RIT, we plan to develop techniques for designing instance-independent graph signal processing methods.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit007

Participants:

Ghandehari, Mahya (University of Delaware)
Janssen, Jeannette (Dalhousie University)

Quantum Damour Equation
November 19 - 26, 2023

Organizers:
Luca Ciambelli (Perimeter Institute)
Rob Leigh (University of Illinois at Urbana-Champaign)

Obtaining an understanding of quantum gravity is a central goal in theoretical physics. While both general relativity and quantum mechanics are used extensively in our modern world, in situations where they have overlapping relevance they seem to often give rise to contradictory and puzzling results. This happens for example in black holes, very massive yet very small objects, where the gravitational force is strong at short distances. A basic feature of any physical theory is its symmetry and conservation laws. In theories like gravity, the conservation laws are dynamical equations involving the geometric data. Recent progress in understanding the relevance of these geometric structures could help us in unveiling a bottom-up approach to quantum gravity. While various top down approaches have been proposed, it is desirable to have a common point where to glue these ideas with classical gravity, and this is exactly what our proposal plans to investigate. This research meeting aims to deepen the new understanding of quantum gravity on null hypersurfaces such as black hole horizons.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit020

Participants:

Ciambelli, Luca (Perimeter Institute)
Freidel, Laurent (Perimeter Canada)
Leigh, Rob (University of Illinois at Urbana-Champaign)

CMO 2023 Program

5-Day Workshops 2023

Apr 23   Apr 28   Formation of Looping Networks - from Nature to Models (Cancelled)
Apr 30   May 5   Statistical Challenges for Complex Brain Signals and Images
May 7   May 12   Computational Biology meets Data Science
May 14   May 19   Computations and Data in Algebraic Statistics
May 21   May 26   New Trends in Stochastic Analysis
May 28   Jun 2   Interactions between Algebraic Topology and Geometric Group Theory
Jun 4   Jun 9   New trends from Classical Theorems in Geometry, Combinatorics, and Topology
Jun 11   Jun 16   Knots, Surfaces, and 3-Manifolds
Jun 18   Jun 23   Equivariant Bordism Theory and Applications
Jun 25   Jun 30   Interplay between Geometric Analysis and Discrete Geometry
Jul 30   Aug 4   Set-Theoretic Topology
Aug 6   Aug 11   Pathological Behavior of Solutions to Fluid Equations (Cancelled)
Aug 13   Aug 18   Multiparameter Persistence: Theory and Applications (Cancelled)
Aug 20   Aug 25   Gravity, Noncommutative Geometry, Cosmology
Aug 27   Sep 1   6th Brazil-Chile-Mexico Meeting on Singularities
Sep 3   Sep 8   Group Actions on Cantor Sets
Sep 10   Sep 15   Silting in Representation Theory, Singularities, and Noncommutative Geometry

Casa Matemática Oaxaca

2023

5-Day Workshops

Formation of Looping Networks - from Nature to Models (Cancelled)
April 23 - 28, 2023

Organizers:

Annemiek Cornelissen (CNRS & Université de Paris)
Eugenia Corvera (Universidad Nacional Autónoma de México)

Giulio Facchini (Université Libre de Bruxelles)
Eleni Katifori (University of Pennsylvania)
Sharon Lubkin (North Carolina State University)

Networks are all around us: there are river networks, streets, cracks patterns, veins of leaves, ants nests, social networks. But they are also within us, for instance our blood vessels. Appart of the social networks, the particularity of these networks is to be drawn in physical space. Some are branched like trees, rivers networks or lightning, but many, especially in living matter, form loops. These loops are very useful in case of a disturbance, for instance when a blood vessel blocks or a street jamms, the flow can turn around and keep circulating.

What is surprising is that these networks are not well described. We start to know pretty well how to describe trees, or social networks, but we are missing a lot of information by not using the presence of these loops and their position in space. There is also no understanding of how they grow and appear. This is why this meeting happens: to bring together experts of these up to now separated subjects, to form a new community and bring discoveries around this common object.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5113

Statistical Challenges for Complex Brain Signals and Images
April 30 - May 5, 2023

Organizers:

Carolina Euan (Lancaster University)
Mark Joseph Fiecas (University of Minnesota)

Hernando Ombao (King Abdullah University of Science and Technology)

This workshop will focus on developing novel statistical methodology to analyze brain signals, which is crucial to understanding normal brain function and alterations associated with neurological and mental diseases. Brain signals are complex and are a reflection of the complexity of the unobserved brain processes. Thus, the primary considerations for developing statistical models are flexibility, generalizability, and incorporation of known biology. In this workshop, we will discuss the most recent challenges in this area and how the current methods need to be improved to better describe the observed brain signals.

We will have three brainstorming sessions focused on the following tracks: Track 1: Challenges in developing high dimensional models for brain signals. Track 2: Computational challenges for pre-processing, model implementation, visualization, and software development. Track 3: Machine Learning algorithms and approaches to complement statistical techniques.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5030

Participants:

Ambriz, Emmanuel (CIMAT)
Ascencio Gorozpe, Luis Enrique (CIMAT)
B. El-Yaagoubi, Anass (King Abdullah University of Science and Technology)
Chen, Shuo (University of Maryland)

Chung, Moo (University of Wisconsin-Madison)
Cribben, Ivor (Alberta School of Business)
Euan, Carolina (Lancaster University)
Fiecas, Mark Joseph (University of Minnesota)
Fortin, Norbert (University of California Irvine)

Gibberd, Alex (Lancaster University)
Guindani, Michele (University of California Irvine)
Harezlak, Jaroslaw (Indiana University School of Public Health-Bloomington)
Johnson, Timothy D. (University of Michigan)
Kang, Jian (University of Michigan)
Killick, Rebecca (Lancaster University)
Kirch, Claudia (Otto-von-Guericke University of Magdeburg)
Kong, Linglong * (University of Alberta)
Kornak, John (University of California San Francisco)
Krafty, Robert (Emory University)
Lindquist, Martin (Johns Hopkins University)
Lund, Robert (The University of California, Santa Cruz)
Martinez Hernandez, Israel (Lancaster University)
Mejia, Amanda (Indiana University)
Nichols, Thomas (University of Oxford)
Ombao, Hernando (King Abdullah University of Science and Technology)
Park, Jun Young (University of Toronto)
Pinkney, Carla (Lancaster University)
Ramirez, Alonso (CIMAT A.C.)
Schwartzman, Armin (University of California, San Diego)
Senturk, Damla (University of California LA)
Ting, Chee Ming (Monach University Malaysia)
Tosun, Duygu (University of California - San Francisco)
Vannucci, Marina (Rice University)

Computational Biology meets Data Science
May 7 - 12, 2023

Organizers:

Gabriela Cohen Freue (University of British Columbia)
Robert Gentleman (Harvard Medical School)

Maribel Hernandez-Rosales (Center for Research and Advanced Studies)
Andrew McDavid (Ozette Technologies)

With the advances of high-throughput technologies, genomics and related fields are hitting the thick data era. Many problems in biology cannot be studied with traditional and exact methods, and the development and application of tailored methods to analyze rich and large-scale biological datasets are still lagging behind. In addition, diverse layers of knowledge in genomics, such as transcriptomics, epigenomics, proteomics and metabolomics need to be integrated and studied jointly with multi-omics approaches to unfold the complex mechanisms of biological systems and organisms. Sparked with creative solutions from data science, computational and data scientists can contribute to the development and implementation of innovative solutions to extract, wrangle, visualize, analyze and store complex data resulting from high-throughput technologies with efficient, transparent and reproducible analytical pipelines.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5152

Participants:

Aviña Padilla, Katia (CINVESTAV)
Barcelo, Diana (CINVESTAV)
Bermudez, Clara (National University of Colombia)
Bharthi, Kanika (McGill)

Bonneau, Richard (New York University & Genentech)
Castelan, Hugo * (CONACYT)
Checkervarty, Abhinav (UBC)

Chikina, Maria (University of Pittsburgh)
Christidis, Anthony-Alexander (UBC)
Clark, Kat (McMaster University)
Cohen-Freue, Gabriela (University of British Columbia)
Colmenares Celis, Carolina (National University of Colombia)
Contreras, Armando (National University of Colombia)
Corrada Bravo, Hector (Genentech, Inc.)
Cruz, Erika (CINVESTAV)
De Las Rivas, Javier (University of Salamanca)
Delaye, Luis * (CINVESTAV)
Dennis, Jessica (University of British Columbia)
Díaz, César (CCM)
Dudoit, Sandrine (University of California - Berkeley)
Edgar, Charlotte (UBC)
Gentleman, Robert (Harvard Medical School)
Greenwood, Celia (Lady Davis Institute for Medical Research)
Gysi, Deisy (Federal University of Paraná)
Hernandez, Luis (CINVESTAV)
Hernández Rosales, Maribel (CINVESTAV)
Huber, Wolfgang (EMBL)
Ionita-Laza, Iuliana (Columbia University)
Jimenez, Veronica (UNAM)
Kleinbrink, Erica (McGill)
Kong, Dehan * (University of Toronto)
Kwan, Karina * (McGill)
Lajoie, Mathieu (McGill University)
Liu, Maggie (UBC)
McDavid, Andrew (Ozette Technologies)
Meneses, Amilcar (CINVESTAV)
Navarro-Miranda, Marisol (CINVESTAV)
Ng, Raymond (University of British Columbia)
Parida, Laxmi (IBM)
Plisson, Fabien (CINVESTAV-IPN)
Pyneeandee, Jeyshinee (UBC)
Quon, Gerald (UC Davis)
Ramirez-Rafael, Jose Antonio (Cinvestav)
Rodriguez-Vazquez, Katya (IIMAS, UNAM)
Rojas Cruz, Alexis Felipe (National University of Colombia)
Ruczinski, Ingo (Johns Hopkins Bloomberg School of Public Health)
Selem, Nelly (UNAM)
Setubal, João * (University of São Paulo)
Sohail, Mashaal (UNAM)
Tagasovska, Natasa (Roche)
Tamvada, Nirupama * (UBC)
Wang, Pei (Icahn School of Medicine at Mount Sinai)
Xu, Jason (Duke University)
Yazbeck, Ali (University of Cologne)
Zambada Moreno, Octavio (CINVESTAV)

Computations and Data in Algebraic Statistics
May 14 - 19, 2023

Organizers:

Carlos Améndola (Technical University of Berlin)
Bernd Sturmfels (University of California Berkeley)

Anthea Monod (Imperial College London)
Elina Robeva (University of British Columbia)

This workshop brings together both theoreticians and practitioners from broadly different fields to advance algebraic statistical methodology to data science. While linear algebra underlies classical statistics, in algebraic statistics the aim is to explore the applicability of nonlinear algebra---which extends algebraic theory beyond linear algebra---to statistical theory. In particular, our goal is to advance the computational feasibility of algebraic statistics. Our focus is specifically on direct applicability of algebraic statistical theory to real datasets. Additionally, this workshop explores other statistical settings that are also algebraic in nature and that find practical applications in various different fields, where nonlinear algebra may also be applied.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5130

Participants:

Agrawal, Shishir (UCSD)
Alexandr, Yulia (UC Berkeley)
Almendra Hernández, Félix (UC Davis)
Álvarez González, Ernesto (Universidad Complutense de Madrid)
Améndola, Carlos (Technical University of Berlin)
Aoyagi, Miki (Nihon University)
Bernstein, Daniel (Tulane University)
Boege, Tobias (Aalto University)
Bossinger, Lara (UNAM)
Cao, Yueqi (Imperial College London)
Casanellas, Marta (Universitat Politècnica de Catalunya)
Deligeorgaki, Danai (KTH)
Drton, Mathias (Technische Universität München)
Duarte, Eliana (Centro de Matemática Universidade do Porto)
Echave-Sustaeta Rodríguez, Ignacio (Universidad Autónoma de Madrid)
Eiben, Raphael (TU Berlin)
Evans, Robin (Oxford University)
Ferry, Kamillo (TU Berlin)
García Puente, Luis David (Colorado College)
García-Redondo, Inés (London School of Geometry and Number Theory)
Garrote López, Marina (University of British Columbia)
Geiselmann, Zoe (TU Berlin)
Grosdos, Alex (University of Augsburg)
Gross, Elizabeth (University of Hawaii at Manoa)
Gustafsson, Lukas (KTH)
Henriksson, Oskar (University of Copenhagen)
Hollering, Benjamin (MPI MiS)
Homs Pons, Roser (CRM)
Hosten, Serkan (San Francisco State University)
Kahle, Thomas (Otto-von-Guericke University Magdeburg)
Kahle, David (Baylor University)
Kileel, Joe (UT Austin)
Kim, Minho (Colorado College)
Kohn, Kathlén (KTH Royal Institute of Technology)
Kubjas, Kaie (Aalto University)
Kuznetsova, Olga (Aalto University)
Larson, Paul (Miami University)
Lim, Lek-Heng (University of Chicago)
Lindberg, Julia (University of Texas at Austin)
Mano, Shuhei (Institute of Statistical Mathematics)
Maraj, Aida (University of Michigan - Ann Arbor)
Metya, Nilava (Rutgers University)
Misra, Pratik (KTH)
Mohammadi, Fatemeh (KU Leuven)
Monod, Anthea (Imperial College London)
Montúfar, Guido (UCLA and MPI MiS)
Motwani, Harshit (Ghent University)
Mukherjee, Sayan (University of Leipzig and MPI MiS)
Mushunje, Leonard (Columbia University in the city of New York)
Nowell, Francesco (TU Berlin)
Oldekop, Janike (TU Berlin)

Palaiopanos, Gerasimos (University of Pittsburgh)
Pereira, Alejandro (Universidad de Valparaiso)
Petrovic, Sonja (Illinois Institute of Technology)
Ponce Carrion, Francisco (NCSU)
Portakal, Irem (TU Munich)
Rapallo, Fabio (University of Genoa)
Robeva, Elina (University of British Columbia)
Rodriguez, José (University of Wisconsin --- madison)
Römer, Tim (University of Osnabrück)
Seigal, Anna (Harvard University)
Semnani, Pardis (University of British Columbia)
Skraba, Primoz (Queen Mary University of London)
Solus, Liam (KTH)
Sorea, Miruna-Stefana (SISSA)
Sturma, Nils (TU Munich)
Sturmfels, Bernd (University of California Berkeley)
Talbut, Roan (Imperial College London)
Torres Bustos, Angelica Marcela (CRM Barcelona)
Tramontano, Daniele (Technical University of Munich)
Velasco, Mauricio (Universidad de los Andes)
Veneziale, Sara (Imperial College London)
Vrapi, Loreta (TU Berlin)
Wang, Qiquan (Imperial College London)
Weis, Lena (TU Berlin)
Wolf, Arne (Imperial College London)
Yoshida, Ruriko (Naval Postgraduate School)
Zwiernik, Piotr (University of Toronto)

New Trends in Stochastic Analysis
May 21 - 26, 2023

Organizers:

Fabrice Baudoin (University of Connecticut)
Patricia Alonso Ruiz (Texas A&M)

Cheng Ouyang (University of Illinois at Chicago)
Samy Tindel (Purdue University)

Probability theory is the mathematical theory concerned with the analysis of random phenomena. Many of such phenomena that continuously evolve in time may mathematically be modeled by stochastic processes or random fields. Stochastic analysis is an active branch of probability theory that provides a wide range of tools to study those processes and fields.

The workshop \textit{New trends in stochastic analysis} intends to bring together worldwide renowned experts in stochastic analysis and junior researchers in order to identify fundamental future research directions and to facilitate inter-generational exchange.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5060

Participants:

Alonso Ruiz, Patricia (Texas A&M)
Balan, Raluca (University of Ottawa)
Bañuelos, Rodrigo (Purdue University)
Baudoin, Fabrice (University of Connecticut)
Bessaih, Hakima (Florida International University)
Camrud, Evan (Colorado State)
Candela, Julian (CIMAT)
Cass, Thomas (Imperial College London)
Cerrai, Sandra (University of Maryland)
Chen, Hongyi (UIC)
Chen, Li (Louisiana State Univerity)
Fan, Wai-Tong (Louis) (Indiana University)
Fatheddin, Parisa (Ohio State University, Marion)
Gassiat, Paul (Université Paris Dauphine)
Geng, Xi (University of Melbourne)
Gordina, Masha (University of Connecticut)
Grong, Erlend (University of Bergen)
Honnappa, Harsha (Purdue University)
Khoshnevisan, Davar (University of Utah)
Lacaux, Céline (University of Avignon)
León Vásquez, Jorge Alberto (CINVESTAV-IPN)
Lin, Jessica (McGill University)
Lozada Murguía, Jorge Alberto (CINVESTAV)
Luo, Liangbing (Lehigh University)
Marquez-Carreras, David (Universitat de Barcelona)
Matetski, Konstantin (Michigan State University)
Mueller, Carl (University of Rochester)
Nualart, Eulalia (University Pompeu Fabra)
Ouyang, Cheng (University of Illinois at Chicago)
Pacheco, Carlos (CINVESTAV, Mexico)
Salins, Mickey (Boston University)
Salkeld, William (Brown University)
Sarkar, Rohan (University of Connecticut)
Shen, Hao (University of Wisconsin)
Simon, Marielle (University Lyon 1)
Sturm, Karl-Theodor (University of Bonn)
Tindel, Samy (Purdue University)
Vickery, William (UIC)
Viens, Frederi (Rice University)
Wang, Jing (Purdue University)
Xu, Weijun (Peking University)

Interactions between Algebraic Topology and Geometric Group Theory
May 28 - June 2, 2023

Organizers:

Javier Aramayona (ICMAT)
Kenneth Bromberg (University of Utah)
Daniel Juan Pineda (UNAM - Campus Morelia)

Conchita Martinez-Perez (Universidad de Zaragoza)
Rachel Skipper (École Normale Supérieure)

The mathematical notion of a group encapsulates our common idea of symmetry. Groups play an important role in mathematics, and their structure has profound impact in the solution of a variety of problems in pure and applied mathematics. Groups are often studied from different perspectives, putting an emphasis on qualitatively different features of their structure, and therefore leading to the resolution of problems that tend to be different in nature. The aim of this workshop is to bring together some of the leading figures in two of these areas, so that each can learn new problems and techniques from the other. This will help open new avenues of research which will advance the current state of the art.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5034

Participants:

Abbott, Carolyn (Brandeis University)
Arenas, Macarena (Cambridge)
Balasubramanya, Sahana (SUNY Buffalo)
Bárcenas, Noé (UNAM)
Bestvina, Mladen (University of Utah)
Bridson, Martin (Oxford)
Bromberg, Kenneth (University of Utah)
Bux, Kai-Uwe (Bielefeld)
Cassella, Alberto (Milano-Bicocca / Zaragoza)
Colin Hernandez, Nestor (IM-UNAM)
Contreras Peruyero, Adriana Haydeé (CCM UNAM)
Jiménez Rolland, Rita (UNAM)
Juan Pineda, Daniel (UNAM - Campus Morelia)
Kent, Autumn (University of Wisconsin)
León Álvarez, Porfirio Leandro (UNAM)
Li, Kevin (Universität Regensburg)
Llosa Isenrich, Claudio (Karlsruhe Institute of Technology)
Morales Jiménez, Israel (UNAM)
Patel, Priyam (University of Utah)
Pérez, Carlos (UNAM)
Sanchez Saldaña, Luis Jorge (UNAM)
Skipper, Rachel (École Normale Supérieure)
Treviño Marroquín, Jonathan Emmanuel (CIMAT)
Tshishiku, Bena (Brown University)
Valdez, Ferrán (UNAM)
Wade, Ric (University of Oxford)
Wu, Xaiolei (Fudan University)
Zaremsky, Matthew (UAlbany)

New trends from Classical Theorems in Geometry, Combinatorics, and Topology
June 4 - 9, 2023

Organizers:

Imre Bárány (Alfred Renyi Institute of Mathematics)
Deborah Oliveros (UNAM)

Janos Pach (Renyi Institute of Mathematics)
Pablo Soberón (City University of New York)

Eduard Helly proved in 1913 one of the most celebrated results in geometry that gives conditions for the members of a family of convex objects (with convex boundary and without holes) to have a common point. Helly's theorem gives rise to numerous generalizations and variants, and is very close related with the classical theorems of Radon, Caratheodory and Tverberg, which is the r-partite version of Radon's theorem. All this theorems have a deep connection with many other areas in mathematics such as algebraic topology, discrete geometry, combinatorial geometry, and analysis and could be seen as a multidisciplinary area since it uses tools from, topology, geometry, computer sciences, probability etc. and, in resent years have been useful tool for applications to model problems in real life. The proposed workshop will assemble the key people senior and students working in this area, in order to explore recent progress and to help focus on future directions of research.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5023

Participants:

Ambrus, Gergely (University of Szeged)	**Carnero, Andres** (UNAM)
Bárány, Imre (Alfred Renyi Institute of Mathematics)	**Dumitrescu, Adrian** (Algoresearch L.L.C.)
Blagojevic, Pavle (Freie Universität)	**Frick, Florian** (Carnegie Mellon University)
Bracho, Javier (UNAM)	**Gros, Baptiste** (University of Montpellier)
Bukh, Boris (Carnegie Mellon University)	**López, Gyivan E** (UNAM)

Martínez Sandoval, Leonardo Ignacio (UNAM)
Montejano, Luis (UNAM)
Morales Amaya, Efren (Universidad Autónoma de Guerrero)
Musin, Oleg (University of Texas Rio Grande Valley)
Naszodi, Marton (Alfréd Rényi Inst. of Mathematics)
Newman, Andrew (Carnegie Mellon University)
Oliveros, Deborah (UNAM)
Pach, Janos (Renyi Institute of Mathematics)
Patak, Pavel (Charles Univerzity)
Patáková, Zuzana (Charles University)
Por, Attila (Western Kentucky University)
Ramirez Alfonsin, Jorge (Université de Montpellier)
Roldan-Pensado, Edgardo (UNAM)
Sadovek, Nikola (Freie Universität Berlin)
Schnider, Patrick (ETH Zürich)
Soberón, Pablo (City University of New York)
Solé, Oriol (UNAM)
Strausz, Ricardo (UNAM)
Tancer, Martin (Charles University in Prague)
Torres, Antonio de Jesús (UNAM)
Toth, Csaba (California State University Northridge)
Zerbib, Shira (Iowa State University)

Knots, Surfaces, and 3-manifolds
June 11 - 16, 2023

Organizers:

Mario Eudave Muñoz (UNAM) **Jennifer Schultens** (Univ Cal Davis)rino)
Puttipong Pongtanapaisan (Arizona State University)

A mathematical knot can be thought of as a piece of knotted string with ends attached. This knotted circle is allowed to move freely in space as long as it does not pass through itself. In recent years the study of knots has gained momentum through a series of applications, for instance in physics and in molecular biology. Such applications bring new urgency to certain classical questions pertaining to knots and how they sit inside 3-dimensional space.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5031

Participants:

Aranda Cuevas, José Román (SUNY Binghamton)
Armas-Sanabria, Lorena (CONACYT - Universidad
Autónoma del E>stado de Morelos)
Baba, Shinpei (Osaka University)

Baker, Kenneth (University of Miami)
Bell, Mark (Independent)
Belolipetsky, Mikhail (IMPA)
Bestvina, Mladen (University of Utah)

Boden, Hans (McMaster University)
Botvinnik, Boris (University of Oregon)
Boyer, Steven (Université du Québec à Montréal)
Brittenham, Mark (University of Nebraska)
Casals, Roger (UC Davis)
Chan Palomo, Luis Celso (Universidad Autónoma de Yucatán)
Cooper, Daryl (University of California Santa Barbara)
Dey, Subhadip (Yale University)
Diaz, Juan Pablo (Universidad Autónoma del Estado de Morelos)
Duchin, Moon (Tufts University)
Dunfield, Nathan (University of Illinois Urbana-Champaign)
Eudave Muñoz, Mario (UNAM)
Frias, Jose (Centro de Investigacion en Matematicas)
Frohman, Charles (University of Iowa)
Gabai, David (Princeton University)
Garoufalidis, Stavros (SUSTECH)
Goldman, William (U of Maryland)
Gordon, Cameron (University of Texas at Austin)
Gros, Baptiste (University of Montpellier)
Guevara-Hernandez, Maria de los Angeles (UNAM)
Guzmán Tristan, Araceli (UNAM)
Hamilton, Emily (California Polytechnic State University)
Harvey, Shelly (Rice University)
Hermiller, Susan (University of Nebraska - Lincoln)
Hinojosa, Gabriela (Universidad Autonoma del Estado de Morelos)
Huszar, Kristof * (INRIA Sophia Antipolis - Méditerranée)
Irmer, Ingrid (ICM SUSTech)
Jabuka, Stanislav (University of Nevada Reno)
Joshi, Sahil (IIT Ropar)
Kalelkar, Tejas (Indian Institute of Science Education and Research Pune)
Kapovich, Michael (University of California at Davis)
Karimi, Homayun (McMaster University)
Kim, Inkang (KIAS)
Kim, Geunyoung (University of Georgia)
Kobayashi, Tsuyoshi * (Nara Women's U)
Koda, Yuya (Hiroshima University)
Krishna, Siddhi * (Boston College)
Lee, Jaejeong (Seoul National University)
Lee, Ricky (University of California)
Leininger, Chris (Rice U)
Liu, Beibei (MIT)
Long, Darren (University of California, Santa Barbara)
Makienko, Peter (UNAM)
Manjarrez-Gutierrez, Fabiola (UNAM)
Martinez, Atzimba (Washington University in St. Louis)
Martinez-Granado, Didac (UC Davis)
Mattman, Thomas (California State University, Chico)
McCammond, Jon (University of California Santa Barbara)
McMullen, Curtis (Harvard University)
McReynolds, David (Purdue University)
Mj, Mahan (Tata Institute of Fundamental Research)
Moriah, Yoav (Technion Israel institute of Technology)
Motegi, Kimihiko (Nihon University)
Nariman, Sam (Purdue University)
Neel, Neetal (UC Davis)
Neumann, Max (UNAM)
Ozawa, Makoto (Komazawa University)
Palak Bakshi, Rhea (ETH Zurich)
Parlak, Anna (UC Davis)
Pinsky, Tali (Technion)
Pisharody, Akshata (Washington University)
Pongtanapaisan, Puttipong (Arizona State University)
Potyagailo, Leonid (U de Lille)
Prabhakar, Madeti (IIT Ropar)
Purcell, Jessica (Monash University)
Ramirez Alfonsin, Jorge (Université de Montpellier)
Ramirez-Losada, Enrique (CIMAT)
Rieck, Yoav (University of Arkansas)
Roberts, Rachel (Washington University in St Louis)
Rodriguez Viorato, Jesus (CONACyT-CIMAT)
Rolfsen, Dale (University of British Columbia)
Sakuma, Makoto (Osaka City University)
Sardar, Pranab (IISER Mohali)
Scharlemann, Martin (UCSB)
Schleimer, Saul (University of Warwick)
Schultens, Jennifer (Univ Cal Davis)
Sedgwick, Eric * (DePaul University)
Silvero, Marithania (Universidad de Sevilla)
Starkston, Laura (University of California-Davis)
Taylor, Scott (Colby College)
Teragaito, Masakazu (Hiroshima University)
Tu, David (UC Davis)
Valdez, Luis (University of Texas at El Paso)
Verjovsky, Alberto (UNAM Mexico)
Wang, Yi-Sheng (National Sun Yat-sen University in Taiwan)
Weidmann, Richard (Uni Kiel)
Wienhard, Anna (Max Planck Institute for Mathematics in the Natural Sciences)
Wong, C.-M. Michael (University of Ottawa)

Equivariant Bordism Theory and Applications
June 18 - 23, 2023

Organizers:

Carlos Segovia González (CONACYT-UNAM-Oaxaca)
Colleen Delaney (UC Berkeley)

Rolando Jiménez (UNAM)
Eric Samperton (Purdue University)
Bernardo Uribe (Universidad del Norte)

Imagine your favorite geometric object in nature. Chances are it exhibits pleasing symmetry. For example, a snowflake exhibits the same symmetries as a hexagon. Humans' innate attraction to symmetric geometric objects makes their mathematical study intrinsically appealing. However, there are an overwhelming number of ways in which geometric objects can exhibit symmetry, and so mathematicians have devised various approaches to understanding geometric symmetries. The main subject of this 5-day workshop is "equivariant bordism theory," which is a mathematical framework that combines techniques from algebra with geometry in a way that makes it possible to sort through symmetric geometric objects systematically.

In addition to further developing equivariant bordism theory directly, the workshop participants will apply this theory to understand symmetries of high-dimensional objects in terms of lower-dimensional objects with similar symmetries, and, conversely, to understand when it is possible for an object with symmetry to be used to build a higher dimensional object with the same symmetry. The participants will also apply equivariant bordism theory to certain problems arising in quantum physics. Algebraic aspects of symmetry have been exploited to great effect in recent years in order to understand certain quantum mechanical systems called ``topological quantum field theories," and the workshop will push these applications further by coupling them to the geometric techniques enabled by equivariant bordism theory. The workshop activities have been carefully organized with the goal of nurturing new cosmopolitan research collaborations that unite experts and students from diverse backgrounds–both mathematical and personal.

Participants:

Akif Erdal, Mehmet (Yeditepe University)
Angel, Andres (Universidad de los Andes)
Boggi, Marco (Universidade Federal Fluminense)
Cantarero Lopez, Jose Maria (CIMAT)
Colin Hernandez, Nestor (IM-UNAM)
Cruz Castillo, Omar Alexis (CIMAT)
Davydov, Alexei (Ohio University)
Debray, Arun (Purdue University)
Delaney, Colleen (UC Berkeley)
Gante Escudero, Jesús Emmanuel (UNAM)
Heinz Dovermann, Karl (University of Hawaii)
Hidalgo, Ruben (Universidad de la Frontera)
Hoekzema, Renee (Free University of Amsterdam)
Hu, Po (Wayne State University)
Jezernik, Urban (University of Ljubljana)
Jiménez, Rolando (UNAM)
Jiménez Rolland, Rita (UNAM)
Kriz, Sophie (University of Michigan)
Landweber, Peter (Rutgers University)
Libardi, Alice Kimie Miwa (Sao Paulo State
University)
López-Neumann, Daniel (Indiana University)
Medina Marcelo, Adolfo (Loyola University
Chicago)
Morales Jiménez, Israel (UNAM)
Morales Meléndez, Quitzeh (CONACYT-
Universidad Pedagógica Nacional)
Murray, Laura (Providence College)
Orendain, Juan (Case Western Reserve University)
Ortega Fernández, Gustavo (UNAM)
Rovi, Carmen (Loyola University Chicago)
Samperton, Eric (Purdue University)
Schaffhauser, Florent Marie Roland * (Universidad
de los Andes)
Segovia González, Carlos (CONACYT-UNAM-
Oaxaca)
Semikina, Julia (University of Muenster)
Serrano García, Higinio (CINVESTAV)
Torres Galindo, Arley Fernando (Universidad
Externado de Colombia)
Uribe, Bernardo (Universidad del Norte)
Valdez López, Saúl (CINVESTAV)
Villarreal, Bernardo (CIMAT)
Xicotencatl, Miguel A. (Centro de Investigación y
de Estudios Avanzados)

Interplay between Geometric Analysis and Discrete Geometry
June 25 - 30, 2023

Organizers:

Marton Naszodi (Eötvös University)
Nóra Frankl (Carnegie Mellon University)
Deborah Oliveros (UNAM)

Dmitry Ryabogin (Kent State University)
Konrad Swanepoel (London School of Economics and Political Science)
Karoly Bezdek (University of Calgary)

Convexity is a branch of classical mathematics and it is located at the confluence of geometry, analysis, topology and combinatorics. Although its origins can be traced back to Archimedes and its systematic study started at the end of the nineteenth century, it was not until the mid-twentieth century that convexity became a well established branch of mathematics. Nowadays, it is an important area that is attracting young researchers and students. Why? Because of its intrinsic beauty, it's fascinating and intriguing open questions that have an instant intuitive appeal, but also, because of its many relations with other areas of mathematics and its multiple applications, such as in economics, engineering and data science. The purpose of this workshop is to bring together key people working in this area, in order to explore recent progress and to help focus on future research directions.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5105

Participants:

Ágoston, Péter (Eötvös Loránd University, Budapest)
Alfonseca-Cubero, Maria de los Angeles (North Dakota State University)
Ambrus, Gergely (University of Szeged)

Arman, Andrii (University of Manitoba)
Bárány, Imre * (Alfred Renyi Institute of Mathematics)
Barvinok, Alexander * (University of Michigan - Ann Arbor)

Basit, Bushra (Budapest University of Technology and Economics)
Bezdek, Karoly (University of Calgary)
Bezdek, Andras (Auburn University)
Chatterjee, Siddhartha (NSHM Knowledge Campus, Durgapur, West Bengal, India)
Damásdi, Gábor (Alfréd Rényi Institute of Mathematics)
Dewar, Sean (University of Bristol)
Fernández Unzueta, Maite (CIMAT)
Fodor, Ferenc (University of Szeged)
Füredi, Zoltán (Alfred Renyi Institute of Mathematics)
Gardner, Richard * (Western Washington University)
Gárgyán, Barnabás (University of Szeged)
Gavriliuk, Andrei (Independent Researcher)
Gusakova, Anna (Münster University)
Higueras Monaño, Luisa Fernanda (UNAM)
Ivanov, Grigory (IST Austria)
Ivanov, Illya (University of Calgary)
Jung, Attila (Eötvös Loránd University)
Kalai, Gil * (Hebrew University)
Kupavskii, Andrey (CNRS, Moscow Institute of Physics and Technology)
Kusner, Woden * (Vanderbilt University)
Langi, Zsolt (Budapest University of Technology and Economics)
Litvak, Alexander (University of Alberta)
Livshyts, Galyna (Georgia Institute of Technology)
López, Gyivan E (UNAM)
Martínez Sandoval, Leonardo Ignacio (UNAM)
Montejano, Luis (UNAM)
Naszodi, Marton (Eötvös University)
Oliveros, Deborah (UNAM)
Polyanskii, Alexander (Institute of Mathematics and Informatics, Bulgarian Academy of Sciences)
Por, Attila (Western Kentucky University)
Prosanov, Roman (University of Vienna)
Prymak, Andriy (University of Manitoba)
Ramirez Alfonsin, Jorge (Université de Montpellier)
Robock, Nathan (University of Calgary)
Roldán-Pensado, Edgardo (UNAM)
Sadovsky, Shay (Tel Aviv University)
Sagmeister, Ádám (ELTE Budapest)
Slomka, Boaz (The Open University of Israel)
Soberón, Pablo (City University of New York)
Stancu, Alina (Concordia University)
Strachan, Cameron (University of Calgary)
Swanepoel, Konrad (London School of Economics and Political Science)
Tatarko, Kateryna (University of Waterloo)
Tkocz, Tomasz * (Carnegie Mellon University)
Torres, Antonio de Jesús (UNAM)
Várkonyi, Péter (Budapest University of Technology and Economics)
Vritsiou, Beatrice-Helen (University of Alberta)
Werner, Elisabeth (Case Western Reserve University)
Wyczesany, Katarzyna (Carnegie Mellon University)
Yaskin, Vladyslav (University of Alberta)

Zvavitch, Artem (Kent State University)

Set-Theoretic Topology
July 30 - August 4, 2023

Organizers:

Michael Hrusak (Universidad Nacional Autónoma de México)
Alan Dow (University of North Carolina, Charlotte)

Rodrigo Jesús Hernandez Gutierrez (Universidad Autónoma Metropolitana, Iztapalapa)
Lynne Yengulalp (Wake Forest University)

The workshop is designed to explore the interactions that exists between set theory, topology, and algebra. The focus of the workshop will be on the study of topological problems of set-theoretic flavor arising in topological algebra and algebraic topology, as well as the study of topological games and homogeneity.

The program will bring together senior leaders in the field and students and junior researchers, specifically young mathematicians from Latin America. We proudly acknowledge the growing number of strong female mathematicians in the area, a trend the list of participants of the workshop will certainly reflect.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5025

Participants:

Balderas Cristobal, Emmanuel (CCM UNAM)
Bardyla, Serhii (P.J. Šafárik University in Košice)
Barriga-Acosta, Hector (University of North Carolina at Charlotte)
Bartosova, Dana (University of Florida)
Bell, Jocelyn (Hobart and William Smith Colleges)
Bergfalk, Jeffrey (University of Barcelona)
Brendle, Joerg (Kobe University)
Brian, Will (UNC Charlotte)
Cancino Manríquez, Jonathan (Czech Academy of Sciences)
Carlson, Nathan (California Lutheran University)
Castro Bedoya, Yhon Jairo (CCM UNAM)
Chodounsky, David (Institute of Mathematics CAS)
Clontz, Steven (University of South Alabama)
Cruz Chapital, Jorge Antonio (UNAM)
Dasilva Barbosa, Keegan (Fields Institute)
Dobrinen, Natasha (University of Notre Dame)
Dow, Alan (University of North Carolina, Charlotte)
Dzamonja, Mirna (CRNS Paris)
Eisworth, Todd (Ohio University)
Fernandez Bretón, David (Instituto Politécnico Nacional)
Guzmán, Osvaldo (UNAM)
Heredia, Sebastian (CCM UNAM)
Hernandez Gutierrez, Rodrigo Jesús (Universidad Autónoma Metropolitana, Iztapalapa)
Hoehn, Logan * (Nipissing University)
Hrusak, Michael (Universidad Nacional Autónoma de México)
Jardón Santos, Mario (UNAM)
Juhász, Isván (Alfred Renyi Institute of Mathematics, ELKH)
Junqueira, Lucia (University of São Paulo)
Kojman, Menachem (Ben Gurion University)
Lambie-Hanson, Chris (Czech Academy of Sciences)
Landeros Sánchez, José Eduardo (CCM UNAM)
Larson, Paul (Miami University)
Leiderman, Arkady (Ben Gurion University)
López-Callejas, Carlos (CCM UNAM)
Martínez, Carlos (University of Concepción)
Medini, Andrea (TU Wien)
Meza-Alcantara, David (UNAM)
Navarro Castillo, Angel Jareb (CCM UNAM)
Nieto de la Rosa, Francisco Santiago (CCM UNAM)
Page, Jacob D (University of North Carolina at Charlotte)
Pecoraro, Hayden (University of North Carolina at Charlotte)
Peng, Yinhe (Academy of Mathematics and Systems Science,Chinese Academy of Sciences)
Ramos-García, Ulises Ariet (UNAM)
Reyes Saenz, Luis David (CCM UNAM)
Rojas Hernandez, Reynaldo (Universidad Michoacana de San Nicolás de Hidalgo)
Sánchez, Iván (Universidad Autónoma Metropolitana)
Santiago, Alicia (Universidad Tecnológica de la Mixteca)
Shalev, Roy (Bar-Ilan University)

Shibakov, Alexander (Tennessee Tech University)
Soukup, Lajos (Alfred Renyi Institute of Mathematics)
Spadaro, Santi (University of Palermo)
Steprans, Juris (York University)
Szeptycki, Paul (York University)
Tamariz Mascarúa, Angel (UNAM)
Tkachenko, Mikhail (UAM Mexico City)
Tkatchouk, Vladimir (UAM Mexico)
Todorcevic, Stevo * (University of Toronto)
van Mill, Jan * (University of Amsterdam)
Villanueva-Segovia, Cristina (CCM, UNAM, Morelia)
Yengulalp, Lynne (Wake Forest University)
Zdomskyy, Lyubomyr (TU Wien)
Zindulka, Ondřej (Czech Technical University)

Pathological Behavior of Solutions to Fluid Equations (Cancelled)
August 6 - 11, 2023

Organizers:

Mimi Dai (Institute for Advanced Study)
Alexey Cheskidov (University of Illinois at Chicago)

Vincent Martinez (CUNY Hunter College & Graduate Center)

The equations of fluid motion, derived over a century ago, are a source of enormous challenges and exciting problems for mathematicians. At large velocities, fluid flows become seemingly chaotic, but nevertheless possess some structure. It is widely believed that such flows, called turbulent and often observed in nature, still satisfy the equations of motion (Navier-Stokes equations), but are hard to construct or study mathematically.

In the past couple of decades, mathematical fluid dynamics has been highlighted by numerous constructions of solutions to fluid equations that exhibit what one might call "pathological" or "wild" behavior. These include non uniqueness, singularity formation, and the loss of energy balance. While these constructions are interesting from the mathematical point of view, as they provide counterexamples to various well-posedness (uniqueness, regularity, stability) results, they are becoming more and more relevant from the physical point of view as well. Indeed, an important physical property exhibited by turbulent flows is the existence of energy cascades. This was conjectured by Kolmogorov and has been observed both experimentally and numerically, but had been difficult to produce analytically. The technique of convex integration, however, introduced into the mathematical fluids community in the early 2000s, allows one to explicitly construct solutions to the fluid equations that do exhibit cascades of energy. There has also been tremendous progress in another exciting and related direction — the search for singularity formations in fluid equations. Such phenomenon is also based on the transfer of energy to small scale structures (in some stable manner), which is an important component to the formation of hurricanes and tornados found in nature.

This workshop on pathological behaviors of solutions to fluid equations brings together experts in mathematical fluid mechanics to discuss recent exciting developments in this direction from the mathematical point of view, as well as their relevance to turbulence.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5110

Participants:

Cheskidov, Alexey (University of Illinois at Chicago)
Dai, Mimi (Institute for Advanced Study)
Martinez, Vincent (CUNY Hunter College & Graduate Center)

Multiparameter Persistence: Theory and Applications (Cancelled)
August 13 - 18, 2023

Organizers:

Ran Levi (University of Aberdeen)
Jacek Brodzki (University of Southampton)

Daniela Egas Santander (Ecole Polytechnique Federale de Lausanne)
Katharine Turner (Australian National University)

Modern life is built on vast quantities of very complex data that exists in a great variety of forms, including numbers, text, images and video, graphs and networks, and many others. The data is only useful if we can access the information it contains. In recent years, topology-a branch of mathematics dedicated to the study of shape- joined statistics and machine learning as a key part of data science. A particular power of topology is its ability to visualise complex shapes and provide numerical characteristics to describe them. The topological approach has led to the discovery of a new class of breast cancers which are amenable to treatment, the discovery of new subtypes of Type II diabetes, new insights into the structure and function of the brain, the role of the shape and structure of the lungs in severe diseases and many others.

This workshop will concentrate on the development on new topological tools to capture the structure of data that depends on many parameters simultaneously. The meeting will provide an welcome opportunity to bring together many parts of mathematics to support topology in this work, and to discuss a new range of potential exciting applications.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5010

Participants:

Levi, Ran (University of Aberdeen)

Gravity, Noncommutative Geometry, Cosmology
August 20 - 25, 2023

Organizers:

Lisa Glaser (University of Vienna)
Mairi Sakellariadou (King's College London)

Elmar Wagner (Universidad Michoacana de San Nicolás de Hidalgo)
Andrzej Sitarz (Jagiellonian University)

Our understanding of the history of the Universe and its contents has radically changed during the last decade thanks to cosmological observations and the discovery of gravitational waves. Yet we are still struggling with the puzzles of dark matter and possible modifications of gravity. The workshop brings together the experts in all theoretical aspects of noncommutative geometry, modified gravity and cosmology to discuss and improve the understanding of the structure of gravity theories using the modern approach to geometry through spectral data.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5081

Participants:

Aschieri, Paolo (Università del Piemonte Orientale)
B Mahesh, Suhas (National Institute of Technology Jamshedpur)
Barrett, John (University of Nottingham)
Beggs, Edwin (Swansea University)
Bertozzini, Paolo (Thammasat University)
Blixt, Daniel (Scuola Superiore Meridionale di Napoli)
Bochniak, Arkadiusz (Max-Planck-Institut für Quantenoptik)
Bojowald, Martin (The Pennsylvania State University)
Boyle, Latham (Perimeter Institute)
Chatzistavrakidis, Athanasios (Ruđer Bošković Institute)
Conti, Roberto (Sapienza Università di Roma)
Corichi, Alejandro (CCM UNAM Morelia)
Dabrowski, Ludwik (SISSA)
de Cesare, Marco (Università di Napoli "Federico II" & Istituto Nazionale di Fisica Nucleare, Sezione di Napoli (INFN))
Díaz García, Fredy (Charles University, Czech Republic)
Dimitrevic Ciric, Marija (University of Belgrade)
Etesi, Gabor (Budapest Univ. of Technology and Economics)
Fawad, Hassan (Stockholm University)
Feldbrugge, Job (University of Edinburgh)
Filaci, Manuele (Jagiellonian University)
Fiore, Gaetano (Università di Napoli "Federico II", and INFN Sezione di Napoli)
Franchino-Viñas, Sebastián (Helmholtz-Zentrum Dresden-Rossendorf)
Jonke, Larisa (Rudjer Boskovic Institute)
Jorgensen, Palle (University of Iowa)
Kaundilya, Dipankar (Indian Institute of Science - Bangalore)
Khalkhali, Masoud (University of Western Ontario)
Kowalski-Glikman, Jerzy * (Wrocław University)
Krishna, K. Mahesh (Indian Statistical Institute)
Laird, Thomas (University of Nottingham)
Landi, Giovanni (University of Trieste)
Latremoliere, Frederic (University of Denver)
Lewandowski, Jerzy (University of Warsaw)
Lira Torres, Evelyn (Queen Mary University of London)
Lizzi, Fedele (Università di Napoli Federico II)
Majid, Shahn (Queen Mary University of London)
Martinetti, Pierre (Università degli Studi di Genova & INFN)
Morales Parra, Juan Carlos (Heriot Watt University)
Nagen, Alexander (University of Nottingham)
O'Connor, Denjoe (Dublin Institute for Advanced Studies)
Oeckl, Robert (CCM UNAM Morelia)
Pagliaroli, Nathan (Western University)
Perez Sanchez, Carlos (University o Heidelberg)
Ponge, Raphael (Sichuan University)
Rodríguez Portillo, Kevin Josué (UNAM)
Sahoo, Pradyumn Kumar (BITS-Pilani Hyderabad Campus)
Sakellariadou, Mairi (King's College London)
Saldaña, Amilcar (CIMAT)
Sarbach, Olivier (Universidad Michoacana de San Nicolas de Hidalgo)
Schubert, Christian (Universidad Michoacana de San Nicolas de Hidalgo)
Schupp, Peter (Constructor University)
Sierra Acosta, Arley Yessit (Universidad Michoacana de San Nicolás de Hidalgo and Universidad Nacional Autónoma de México)
Sitarz, Andrzej (Jagiellonian University)
Sontz, Stephen (CIMAT)
Steinacker, Harold (University of Vienna)
Tekel, Juraj (Comenius University, Bratislava)
van Suijlekom, Walter (Radboud University)
Vassilevich, Dmitri (Universidade Federal do ABC)
Verhoeven, Luuk (University of Western Ontario)
Vukasinac, Tatjana (Universidad Michoacana de San Nicolás de Hidalgo)
Wagner, Elmar (Universidad Michoacana de San Nicolás de Hidalgo)
Watcharangkool, Apimook (National Astronomical Research Institute of Thailand)
Wegert, Adam (AGH University of Science and Technology)
Wilson-Ewing, Edward (UNB)
Yang, Rongwei (University at Albany, the State University of New York)

6th Brazil-Chile-Mexico Meeting on Singularities
August 27 - September 1, 2023

Organizers:

Jawad Snoussi (UNAM)
Luz de Teresa (Universidad Nacional Autonoma de Mexico)
Andrés Daniel Duarte (UNAM)

Alexandre Fernandes (Universidade Federal do Ceara)
Maximiliano Leyton (Universidad de Talca, Chile)
Laura Ortiz (UNAM)
Thaís Dalbelo (Universidade Federal de Sao Carlos)

Academic collaboration between Brazilian and Mexican mathematicians in Singularity Theory has a long history. Numerous joint papers, academic exchange of students, co-supervisions of doctoral thesis, and co-organization of conferences are only some aspects of this rich collaboration. We plan to discuss a wide variety of topics including aspects of both real and complex singularities, foliations, and singularities of spaces and maps. Topological, algebraic, geometric, and combinatorial aspects will also be covered.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w2708

Participants:

Ayala Velasco, Annel (UNAM)
Badilla-Céspedes, Wágner (UNAM)
Barajas Guzmán, Paul Vladimir (Universidad Autónoma de Zacatecas)
Carballo Sigler, Laura (UAEM)
Carlucci Rezende, Alex (Universidade Federal de São Carlos)
Chachapoyas Siesquén, Nancy Carolina (Universidade Federal de Itajubá -Brasil)
Da Silva, Otoniel Nogueira (UNAM)
da Silva Pereira, Miriam (Universidad Federal de Paraíba, Brasil)
Dalbelo, Thaís (Universidade Federal de Sao Carlos)
de Fátima Martins, Luciana (UNESP)
de Lima Pereira, Bárbara Karolline (Universidade de São Paulo)
Duarte, Andrés Daniel (UNAM)
Espejo, Gibrán (UNAM)
Fernández de Bobadilla, Javier (Basque Center for Applied Mathematics)
Fernandez-Perez, Arturo (Universidade Federal de Minas Gerais)
Ferreira Costa, João Carlos (UNESP)
García Manoel, Miriam (Universidade de São Paulo)
Garivaldy, Edwin (CIMAT)
Giles Flores, Arturo (UAA)
Gómez, Mirna (UNAM)
Gómez Martínez, Oziel (CIMAT)
Gomez-Mont, Xavier (CIMAT)
González Villa, Manuel (CIMAT)
Jaurez, Jessica (UNAM)
Leyton, Maximiliano (Universidad de Talca, Chile)
Liendo, Álvaro (Universidad de Talca)
López de Medrano, Santiago (UNAM)
Montero Silva, Pedro (Universidad Tecnica Federico Santa Maria)
Ortiz, Laura (UNAM)
Pantaleon Mondragón, Petra Rubí (CIMAT)
Ribeiro, Maico (UFES)
Rodrigues Hernandes, Maria Elenice (Universidade Estadual de Maringá)
Romano Velázquez, Agustín (UNAM)
Romo Alvarado, Ismael (UNAM)
Sampaio, Jose Edson (Universidade Federal do Ceará)
Sanchez Quiceno, Eder Leandro (USP)
Seade Kuri, José Antonio (UNAM)
Snoussi, Jawad (UNAM)
Soares Ruas, Maria Aparecida (Universidad de São Paulo, Brasil)
Tenorio Vázquez, José Alejandro (Benemérita Universidad Autónoma de Puebla)
Torres-Nova, Yerko (Universidad Católica de Chile)
Urzúa, Giancarlo (Pontificia Universidad Católica de Chile)
Vidales Pérez, Jesús Javier (Universidad Michoacana de San Nicolás de Hidalgo)

Group Actions on Cantor Sets
September 3 - 8, 2023

Organizers:

Noé Bárcenas (UNAM)
Steffen Kionke (University of Hagen)

Matteo Vannacci (University of the Basque Country)

Geometry is the study of form and shape. These notions lie at the basis of many instances of geometrical knowledge, and embody different examples of connection between mathematical objects, which might be lines, points, or complex organization systems of geometric nature, which in some cases have singular behaviour.

One of the most famous geometric structures in Mathematics is known as the Cantor set, due to the seminal contribution of Georg Cantor at the end of the 19th Century. It consists of a completely disconnected system of points of the line with a highly singular structure (e.g. no line of positive length is contained in the Cantor set), as well as an apparent scarceness of symmetry at first sight.

On the other hand, the notions of symmetry and regularity naturally lead us to the notions of group and group action. In fact, a group can be thought of as the set of rigid moves that preserve a certain symmetry of an object, for example an hexagon or an icosahedron. Geometric Group Theory is a highly active research direction which explores the role of symmetries in geometry.

In the recent development of Mathematics, the study of symmetry of highly singular objects has contributed to the simultaneous understanding of symmetries and groups. The aims of the Workshop are the study of symmetries of the Cantor set, and the understanding of the groups arising as symmetries of the Cantor set.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5044

Participants:

Barbieri, Sebastian (Universidad de Santiago de Chile)
Bárcenas, Noé (UNAM)
Barnea, Yiftach (Royal Holloway, University of London)
Benli, Gokhan (Middle East Technical University)
Capdeboscq, Inna (University of Warwick)
Castillo-Ramirez, Alonso (Universidad de Guadalajara)
Ceccherini-Silberstein, Tullio (University of Sannio)
Chouraqui, Fabienne (University of Haifa, campus Oranim)
Dey, Soumya (Krea University, Sri City, Andhra Pradesh, India.)
Fernández-Alcober, Gustavo (University of the Basque Country)
Grigorchuk, Rostislav (Texas A & M University)
Hernández Hernández, Jesús (CCM-UNAM)
Kammeyer, Holger (Heinrich-Heine-Unversität Düsseldorf)
Kionke, Steffen (University of Hagen)
Kumar, Pravin (Indian Institute of Science Education and Research)
Laurent, Bartholdi (Saarland University)
Molina Medrano, Oscar Rutilio (CCM-UNAM)
Morales Jiménez, Israel (UNAM)
Nagnibeda, Tatiana (University of Geneva)
Navarro Castillo, Angel Jareb (CCM UNAM)
Nekrashevych, Volodymyr (Texas A & M University)
Niño Hernández, Rogelio (Centro de Ciencias matemáticas)
Nucinkis, Brita (Royal Holloway, University of London)
Ocaso, Alicia (Universidad de la República)
Oh, Sangrok (University of the Basque Country)
Özdemir, Anil (TED University)
Patil, Harsh (University of Bristol)
Pérez, Carlos (UNAM)
Puder, Doron (Tel Aviv University)
Radi, Santiago (Texas A&M University)
Ramos-García, Ulises Ariet (UNAM)
Randecker, Anja (University of Heidelberg)
Sauer, Roman (Karlsruhe Institute of Technology)
Savchuk, Dmytro (University of South Florida)
Schlesler, Eduard (Fernuniversitaet Hagen)
Skipper, Rachel (University of Utah)
Sorkatti, Layla (Al-Neelain University)
Soroko, Ignat (University of North Texas)
Stalder, Yves (Université Clermont Auvergne)
Thillaisundaram, Anitha (Lund University)
Vannacci, Matteo (University of the Basque Country)
Weigel, Thomas (University of Milano-Bicocca)

Silting in Representation Theory, Singularities, and Non-commutative Geometry
September 10 - 15, 2023

Organizers:

Henning Krause (Bielefeld University)
Lara Bossinger (UNAM)

Osamu Iyama (The University of Tokyo)
Daniel Labardini-Fragoso (UNAM)
Michael Wemyss (University of Glasgow)

The proposed Workshop aims to study bridges between representations of algebras on one side and algebraic geometry and singularity theory on the other. One such bridge is provided by a process called `silting', allowing for example the transfer of combinatorial or homological structure in either direction. It is expected that the joint efforts of a group of internationally leading experts from many different areas of mathematics is yielding new insight in the difficult nature of these objects of study.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5047

Participants:

Adachi, Takahide (Yamaguchi University)
Aihara, Takuma (Tokyo Gakugei University)
Allegretti, Dylan (Yau Mathematical Sciences

Center, Tsinghua University)
Angeleri Hügel, Lidia (University of Verona, Italy)
Aoki, Toshitaka (Kobe University)

Dey, Soumya (Krea University, Sri City, Andhra Pradesh, India.)
Fernández-Alcober, Gustavo (University of the Basque Country)
Grigorchuk, Rostislav (Texas A & M University)
Hernández Hernández, Jesús (CCM-UNAM)
Kammeyer, Holger (Heinrich-Heine-Unversität Düsseldorf)
Kionke, Steffen (University of Hagen)
Kumar, Pravin (Indian Institute of Science Education and Research)
Laurent, Bartholdi (Saarland University)
Molina Medrano, Oscar Rutilio (CCM-UNAM)
Morales Jiménez, Israel (UNAM)
Nagnibeda, Tatiana (University of Geneva)
Navarro Castillo, Angel Jareb (CCM UNAM)
Nekrashevych, Volodymyr (Texas A & M University)
Niño Hernández, Rogelio (Centro de Ciencias matemáticas)
Nucinkis, Brita (Royal Holloway, University of London)
Ocaso, Alicia (Universidad de la República)
Oh, Sangrok (University of the Basque Country)
Özdemir, Anil (TED University)
Patil, Harsh (University of Bristol)
Pérez, Carlos (UNAM)
Puder, Doron (Tel Aviv University)
Radi, Santiago (Texas A&M University)
Ramos-García, Ulises Ariet (UNAM)
Randecker, Anja (University of Heidelberg)
Sauer, Roman (Karlsruhe Institute of Technology)
Savchuk, Dmytro (University of South Florida)
Schlesler, Eduard (Fernuniversitaet Hagen)
Skipper, Rachel (University of Utah)
Sorkatti, Layla (Al-Neelain University)
Soroko, Ignat (University of North Texas)
Stalder, Yves (Université Clermont Auvergne)
Thillaisundaram, Anitha (Lund University)
Vannacci, Matteo (University of the Basque Country)
Weigel, Thomas (University of Milano-Bicocca)

IASM 2023 Program

5-Day Workshops 2023

Jul 23   Jul 28   New trends in Symbolic Dynamics and Ergodic Theory: Dynamical Obstructions arising from Complexity Theory (Cancelled)
Aug 6   Aug 11   Partial Differential Equations in Fluid Dynamics
Aug 20   Aug 25   Stochastic Analysis, Mathematical Finance and Economics (Cancelled)
Aug 27   Sep 1   New Trends and Emerging Techniques in Compressible Fluid Dynamics (Cancelled)
Sep 3   Sep 8   Geometry of HyperKahler Varieties
Oct 15   Oct 20   Recursion Theory and its Applications
Oct 22   Oct 27   Lagrangian Multiform Theory and Pluri-Lagrangian Systems
Nov 5   Nov 10   Arthur Packets
Dec 3   Dec 8   Vortex Dynamics: the Crossroads of Mathematics, Physics and Applications
Dec 10   Dec 15   Harnessing the Power of Latent Structure Models and Modern Big Data learning

Institute for Advanced Study in Mathematics

2023

New trends in symbolic dynamics and ergodic theory: dynamical obstructions arising from complexity theory (Cancelled

July 23 - 28, 2023

Organizers:

Xiangdong Ye (University of Science and Technology of China)
Nikos Frantzikinakis (University of Crete)
Bryna Kra (Northwestern University)

Alejandro Maass (Universidad de Chile)
Wenbo Sun (Virginia Polytechnic Institute and State University)

A common intuition in dynamical systems is that systems with low complexity should have some sort of structure, while systems with high complexity should exhibit more randomness. We explore this notion in various settings, particularly focussing on recent developments in ergodic theory and symbolic dynamics that are related to combinatorial, number theoretic, and algebraic problems. Fine properties of sequences of numbers can be studied via dynamics, relating the complexity of the sequence to hidden structures it contains. The proposed meeting will cover such recent developments, bringing together mathematicians from a variety of fields, including ergodic theory, symbolic dynamics, number theory, and group theory to discuss on long-standing open problems that have implications for these fields.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5021

Partial Differential Equations in Fluid Dynamics
August 6 - 11, 2023

Organizers:

Yachun Li (Shanghai Jiao Tong University)
Ming Mei (McGill University)

Ronghua Pan (Georgia Institute of Technology)
Wei Wang (Zhejiang University)

This is a 5-day workshop with about 42 participants. It will focus on the study of the theoretical partial differential equations and application in fluid dynamics, emphasizing the study on the structure of solutions and their large-time behavior to Navier-Stokes equations, Euler equations, Boltzmann equations, and so on. The conference will serve as a platform to report new breakthroughs, exchange research ideas, extend academic networks, and promote diversity and inclusion in this research field. New collaborations are also expected during and after the meeting. Topnotch speakers and talks will be carefully selected to make the conference attractive to a diverse audience.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5066

Participants:

Bae, Myoungjean (KAIST)
Bao, Weizhu (National University of Singapore)
Bianchini, Stefano (SISSA)

Blueman, George * (UBC)
Cao, Yue (East China University of Science and Technology)

Chen, Gui-Qiang G. (University of Oxford)
Chen, Shaohua (Cape Breton University)
Chen, Jiahuan (Shanghai Jiao Tong University)
Chen, Hui (Zhejiang University of Science and Technology)
Chen, Qi (Chinese Academy of Sciences)
Cheskidov, Alexey (University of Illinois at Chicago)
Dafermos, Constantine (BROWN UNIVERSITY)
Dai, Mimi (University of Illinois at Chicago)
Dias, João Paulo (University of Lisbon)
Dong, Huan (Zhejiang University)
Duan, Renjun (The Chinese University of Hong Kong)
Feireisl, Eduard (Institute of Mathematics, Czech Academy of Sciences)
Feng, Yuehong (Beijing University of Technology)
Frid, Hermano (FFCL Ribeirão Preto, University of São Paulo-USP)
Friedlander, Susan (USC)
Guan, Sisi (Zhejiang University)
Ha, Seung Yeal (Seoul National University)
Han, Mengya (Zhejiang University)
Hu, Haifeng (Changchun University)
Hu, Yuxi (China University of Mining and Techology (Beijing))
Huang, Feimin (Chinese Academy of Sciences)
Ji, Shanming (South China University of Technology)
Jiang, Song (Institute of Applied Physics and Conputational Mathematics, Beijing, China)
Jiang, Weifeng (China Jiliang University)
Jiang, Xun (Shanghai Jiao Tong University)
Jin, Rui (Shanghai Jiao Tong University)
Kagei, Yoshiyuki (Tokyo Institute of Technology)
Karlsen, Kenneth (University of Oslo)
Li, Yachun (Shanghai Jiao Tong University)
Li, Haitong (Changchun University of Technology)
Li, Tong (University of Iowa)
Li, Fucai (Nanjing University)
Li, Hao (Zhejiang Normal University)
Li, Hui (New York University Abu Dhabi)
Lin, Zhilin (South China Normal University)
Liu, Lihui (Shanghai Jiao Tong University)
Lu, Yong (Nanjing University)
Lu, Peng (Shanghai Jiao Tong University)
Luo, Tao (City University of Hong Kong)
Mai, Lasu (Inner Mongolia University)
Mei, Ming (McGill University)
Meng, Song (Zhejiang University)
Mou, Junduo (Zhejiang University)
Nguyen, Quoc-Hung (Chinese Academy of Sciences)
Nishibata, Shinya (Tokyo Institute of Technology)
Pan, Ronghua (Georgia Institute of Technology)
Pan, Zihan (Shanghai Jiao Tong University)
Peng, Yue-Jun (Université Clermont Auvergne)
Qin, Xulong (Sun Yat-Sen University)
Serre, Denis (Ecole Normale Supérieure de Lyon)
Shang, Zhaoyang (Shanghai Lixin University of Accounting and Finance)
Sun, Yongzhong (University of Nanjing)
Tong, Leilei (Chongqing University of Posts and Telecommunications)
Wang, Wei (Zhejiang University)
Wang, Dehua (University of Pittsburgh)
Wang, Ya-Guang (Shanghai Jiao Tong University)
Wang, Qin (Yunnan University)
Wang, Yun (Soochow University)
Wang, Huaijie (Zhejiang University)
Wang, Meng (Zhejiang University)
Wang, Yuxi (Sichuan University)
Wu, Guochun (Huaqiao University)
Wu, Jiayan (Zhejiang University)
Wu, Qin (Peking University)
Xu, Tianyuan (Guangdong University of Technology)
Yang, Tong (The Hong Kong Polytechnic University)
Yao, Yao (National University of Singapore)
Yu, Xinwei (University of Alberta)
Yu, Shaojun (Shanghai Jiao Tong University)
Yu, Guanqin (Zhejiang University)
Zeng, Zirong (Shanghai Jiao Tong University)
Zhai, Cuili (University of Science and Technology Beijing)
Zhang, Zhifei (Peking University)
Zhang, Deng (Shanghai Jiao Tong University)
Zhang, Ting (Zhejiang Univeristy)
Zhang, Zhipeng (Nanjing University)
Zhang, Lizhen (Shanghai Jiao Tong University)
Zhang, Jiawen (Chinese Academy of Sciences Academy of Mathematics and Systems Science)
Zhao, Huijiang (Wuhan University)
Zhao, Liang (Oxford Suzhou Centre for Advanced Research)
Zhao, Qi (Zhejiang University)
Zhu, Shengguo (Shanghai Jiao Tong University)

Stochastic Analysis, Mathematical Finance and Economics (Cancelled)
August 20 - 25, 2023

Organizers:

Christa Cuchiero (University of Vienna)
Constantinos Kardaras (London School of Economics)

Ludovic Tangpi (Princeton University)
Gordan Zitkovic (The University of Texas at Austin)

Probabilistic tools, together with a variety of methods from stochastic, functional and convex analysis and partial differential equations are routinely used in mathematical finance and economics; in fact, the field draws from a host of other mathematical disciplines to accomplish its goals. Prior advances in this field have not only made a huge impact on the practice of finance and regulation, but have also inspired a number of breakthroughs in related areas of mathematics traditionally regarded as theoretical.

In this workshop, we bring together a group of experts and young researchers in various sub-areas of mathematical finance and economics, with a special focus on those whose work draws heavily on stochastic analysis. Our goal is to foster a free interchange of ideas and facilitate sharing of some of the recent results in this challenging field.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5104

New Trends and Emerging Techniques in Compressible Fluid Dynamics (Cancelled)
August 27 - September 1, 2023

Organizers:

Cleopatra Christoforou (University of Cyprus)
Juhi Jang (University of Southern California)

Moon-Jin Kang (Korea Advanced Institute of Science and Technology)
Alexis Vasseur (The University of Texas at Austin)

Compressible flows are ubiquitous in nature with a broad spectrum of applications and they are important objects of the study in mathematical and physical sciences and engineering. Despite the old history and physical importance, mathematical understanding of the system of partial differential equations describing dynamics of inviscid compressible fluids such as the Euler equations remain challenging.

In recent years, several deep and unexpected results were obtained by using a variety of elaborate techniques from distinct communities, which generated significant interests in the field and led to major advances in the mathematical study of inviscid compressible flows including non-uniqueness of weak solutions, the stability of very rough solutions, the formation of singularities, and the study of free boundary problems.

The workshop brings together experts in compressible fluid dynamics from diverse communities, creates an inclusive atmosphere where the latest developments, ideas and techniques are vigorously discussed, and provides a unique opportunity to foster a new community with a large set of skills. Another important goal of the workshop is to introduce early career researchers to this active area of research and to provide a training and networking opportunity.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5035

Geometry of HyperKahler Varieties
September 3 - 8, 2023

Organizers:

Xiaolei Zhao (University of California, Santa Barbara)
Ignacio Barros Reyes (Universiteit Antwerpen)
Laure Flapan (Michigan State University)

Emanuele Macri (University Paris-Saclay)
Laura Pertusi (Università degli studi di Milano)

The geometry of Hyperkahler varieties is certainly one of the most studied topics in Algebraic Geometry, with many connections to Representation Theory and Arithmetic Geometry. The aim of this workshop is to survey the recent developments in this area and to investigate the open problems and conjectures, by creating new collaborations between participants from different research fields.

In addition to the research talks provided by selected participants, there will be four mini-courses delivered by some of the main experts in this area, concerning the following topics:

1) Hyperkahler geometry and stability conditions;
2) Moduli of Hyperkahler varieties;
3) Algebraic cycles on Hyperkahler varieties;
4) Applications of the decomposition theorem to the topology of Hyperkahler varieties.

Young postdoctoral researchers and graduate students are very welcome to attend the workshop and to contribute with a junior talk.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5100

Participants:

Abasheva, Anna (Columbia University)
Bai, Chenyu (Sorbonne Universitè)
Bakker, Benjamin (University of Illinois, Chicago)

Barros Reyes, Ignacio (Universiteit Antwerpen)
Beauville, Arnaud (Université Côte d'Azur)
Bernardara, Marcello (Institut de Mathématiques de

Toulouse)
Donovan, Will (Tsinghua University)
Dutta, Yajnaseni (Universitaet Bonn)
Fan, Yu-Wei (Tsinghua University)
Fatighenti, Enrico (Università di Bologna)
Flapan, Laure (Michigan State University)
Fu, Baohua (Chinese Academy of Sciences)
Grossi, Annalisa (Université Paris-Saclay)
Guo, Hanfei (Fudan University)
Hao, Feng (KU Leuven)
Jiang, Zhi (Fudan University)
Jiang, Qingyuan (University of Edinburgh)
Jiang, Chen (Fudan University)
Krah, Johannes (Universität Bielefeld)
Laza, Radu (Stony Brook University)
Lee, Jia-Choon (Peking University)
Li, Zhiyuan (Fudan University)
Li, Chunyi (University of Warwick)
Lin, Hsueh-Yung (National Taiwan University)
Liu, Zhiyu (Zhejiang University)
Liu, Shengxuan (University of Bonn)
Mongardi, Giovanni (University of Bologna)
Ou, Wenhao (Chinese Academy of Sciences)
Pertusi, Laura (Università degli studi di Milano)
Prieto Montanez, Yulieth (The Abdus Salam International Centre for Theoretical Physics)
Sawon, Justin (University of North Carolina)
Shen, Junliang (Yale University)
Shen, Shuting (Peking University)
Su, Zhitong (Sun Yat-sen University)
Tian, Zhiyu (Peking University)
Toda, Yukinobu (University of Tokyo)
Tufo, Federico (Università di Bologna)
Voisin, Claire (CNRS)
Wei, Chuanhao (Westlake University)
Wu, Haoyu (Fudan University)
Xie, Fei (University of Edinburgh)
Xu, Chunkai (CAS)
Yin, Qizheng (Peking University)
Yu, Huishi (Peking University)
Zhang, Zheng (ShanghaiTech University)
Zhang, Ziyu (ShanghaiTech University)
Zhang, Ruxuan (Peking University)
Zhao, Xiaolei (University of California, Santa Barbara)
Zheng, Zhiwei (Tsinghua University)
Zou, Haitao (Bielefeld University)

Recursion Theory and its Applications
October 15 - 20, 2023

Organizers:

Verónica Becher (Universidad de Buenos Aires)
Laurent Bienvenu (CNRS & Université de Bordeaux)
Noam Greenberg (Victoria University of Wellington)

Joseph S. Miller (University of Wisconsin–Madison)
Manlio Valenti (Swansea University)
Liang Yu (Nanjing University)

Recursion theory measures the complexity of mathematical objects in terms of what is computable, in other words, what can be determined by a computer with no space or time limitations. We can define, for example, computable sets of natural numbers, computable (continuous) functions on the real numbers, or computably enumerable open subsets of the reals. Adding an oracle---an outside source of information---allows us to extend the reach of recursion theory beyond the computable. For example, every continuous function on the real numbers is a computable function relative to some oracle. For another example, a set of real numbers has Hausdorff dimension zero if and only if there is an oracle relative to which every real in the set can be significantly compressed. In this way, recursion theory offers a fine-grained way to analyze some of the most central notions in mathematics. This has recently led to deep applications to analysis, number theory, and set theory. The focus of this workshop is on understanding and extending these applications of recursion theory.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5039

Participants:

Barmpalias, George (Chinese Academy of Sciences)
Bienvenu, Laurent (CNRS & Université de Bordeaux)
Cholak, Peter (University of Notre Dame)
Chong, Chi Tat (National University of Singapore)

Duanmu, Haosui (Harbin Technology University)
Dzhafarov, Damir (University of Connecticut)
Ekaterina, Fokina (TU Wien)
Fan, Yun (Southeast University)
Fang, Nan (Chinese Academy of Sciences)
Franklin, Johanna (Hofstra University)
Gherardi, Guido (University of Bologna)
Goh, Jun Le (National University of Singapore)
Greenberg, Noam (Victoria University of Wellington)
Harrison-Trainor, Matthew (University of Illinois Chicago)
Hirschfeldt, Denis (University of Chicago)
Hoyrup, Mathieu (Inria)
Khoussainov, Bakh (University of Electronic Science and Technology of China)
Kihara, Takayuki (Nagoya University)
Levy Patey, Ludovic (CNRS, IMJ-PRG)
Li, Wei (Chinese Academy of Sciences)
Liu, Yong (Nanjing Xiaozhuang University)
Lutz, Patrick * (UCLA)
Marcone, Alberto (University of Udine - Italy)
Marks, Andrew (University of California Los Angeles)
Mayordomo, Elvira (Universidad de Zaragoza)
Melnikov, Alexander (Victoria University of Wellington)
Merkle, Wolfgang (Heidelberg University)
Ng, Keng Meng (Nanyang Technological University)
Nies, Andre (The University of Auckland)
Peng, Yinhe (Academy of Mathematics and Systems Science,Chinese Academy of Sciences)
Peng, Ningning (Wuhan University of Technology)
Reimann, Jan (Pennsylvania State University)
Renrui, Qi (Victoria University of Wellington)
San Mauro, Luca (Vienna University of Technology)
Shafer, Paul (University of Leeds)
Shen, Alexander (CNRS)
Slaman, Theodore (University of California, Berkeley)
Solomon, Reed (University of Connecticut)
Soskova, Mariya (University of Wisconsin–Madison)
Stephan, Frank (National University of Singapore)
Turetsky, Dan (Victoria University)
Valenti, Manlio (Swansea University)
Wang, Wei * (Sun Yat-sen University)
Wong, Tin Lok (National University of Singapore)
Yang, Yue (National University of Singapore)
Yang, Sen (Anshan Normal College)
Yu, Liang (Nanjing University)
Zhang, Xiaoyan (Institution of Software, Chinese Academy of Science)

Lagrangian Multiform Theory and Pluri-Lagrangian Systems
October 22 - 27, 2023

Organizers:

Frank Nijhoff (University of Leeds)
Linyu Peng (Keio University)

Yang Shi (Flinders university)
Da-jun Zhang (Shanghai University)

Formulated first by Maupertuis and Euler around 1744, the least-action principle, asserting the tendency of Nature to follow in its time-evolution paths requiring the least amount of work, has become one of the foundational principles in Physics. It forms a unifying perspective for the mathematical formulation of classical mechanics, through theories of Lagrange and Hamilton, while its counterpart in Quantum Mechanics is Feynman's formulation through the path integral. On both classical and quantum level the action is a functional (a function of functions) of the possible trajectories of the system described through a Lagrange function (also known as 'the Lagrangian') depending on the "fields" (e.g. position variables of particles) and their derivatives.

In 2009 a new direction in variational calculus was proposed, called Lagrangian multiform theory (also referred to as pluri-Lagrangian systems), which breaks with the conventional approach in a fundamental way: in this new theory the Lagrangian is no longer a simple function of the fields, but an extended object (a differential or difference p-form). Furthermore, the Lagrangian is not put in by hand, i.e. chosen on the basis of secondary considerations (such as requiring certain symmetries), but emerges itself as a solution of the principal variational equations. These equations come from varying both the fields (as in the conventional theory) as well as the hyper-surfaces over which the action is integrated in the space of independent variables. The theory forms unique departure from the standard picture, in that it forms the first least-action principle that merges variational calculus with the key integrability notion of 'multidimensional consistency' (which is the key property of integrable systems, comprising the class of remarkable model equations which allow for the coexistence of infinite families of equations on one and the same mathematical functions). The fast development of the theory in the last decade, establishing the basic principles of the classical theory, demonstrating the applications to integrable systems and making the first steps towards a quantum theory, make it very timely to have a meeting on this new subject. The ambition of this novel viewpoint on the least-action principle, possibly as a candidate for a new foundational principle of physics, compel to branch out to researchers working in fundamental physics.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5043

Participants:

Bazhanov, Vladimir * (Australian National University)
Caudrelier, Vincent (University of Leeds)
Chang, Xiangke (Academy of Mathematics and System Science)
Chang, Huai-Liang (Hong Kong University of Science and Technology)
Chen, Yong (East China Normal University)
Cheng, Jipeng (China University of Mining and Technology)
Dittrich, Bianca (Perimeter Institute Canada)
Doliwa, Adam (University of Warmia and Mazury)
Dzhamay, Anton (The University of Northern Colorado)
Faria Martins, Joao (University of Leeds)
Ferapontov, Evgeny (Loughborough University)
Fu, Wei (East China Normal University)
Gunther, Felix (Technische Universität Berlin)
Hamanaka, Masashi (Nagoya University)
Hietarinta, Jarmo (University of Turku)
Kashaev, Rinat * (Universite de Geneve)
Kels, Andrew (University of New South Wales)
Kodama, Yuji (Shandong University of Science and Technology and Ohio State University)
Kogan, Irina (North Carolina State University)
Kongkoom, Thanadon (Naresuan University)
Kuniba, Atsuo (University of Tokyo)
Li, Shihao (Sichuan University)
Li, Xing (Jiangsu Normal University)
Li, Shangshuai (Shanghai University)
Li, Chuanzhong (Shangdong University of Science and Technology)
Liu, Qingping (China University of Mining and Technology)
Liu, Jin (Shanghai University)
Liu, Xingyu (Shanghai University)
Liu, Yaqing (Beijing Information Science and Technology University)
Nakazono, Nobutaka (Tokyo University of Agriculture and Technology)
Nijhoff, Frank (University of Leeds)
Olver, Peter (University of Minnesota -- Twin Cities)
Ono, Yusuke (Keio University)
Peng, Linyu (Keio University)
Qu, Changzheng (Ningbo University)
Quispel, Reinout (La Trobe University)
Ragnisco, Orlando (Università Roma Tre)
Reshetikhin, Nicolai (Tsinghua University)
Riccombeni, Daniel (University of Leeds)
Richardson, Jacob (University of Leeds)
Schief, Wolfgang (University of New South Wales)
Shi, Yang (Flinders university)
Shi, Ying (Zhejiang University of Science and Technology)
Shi, Leilei (Shanghai University)
Singh, Anup Anand (University of Leeds)
Sun, Yingying (University of Shanghai for Science and Technology)
Sun, Pengyu (Shanghai University)

Suris, Yuri (Technical University of Berlin)
Tian, Kelei (Hefei University of Technology)
Tomita, Shigeru (Keio University)
Vermeeren, Mats (Loughborough University)
Vicedo, Benoit (University of York)
Wang, Jing Ping (University of Kent)
Wu, Chengfa (Shenzhen University)
Xenitidis, Pavlos (Liverpool Hope University)
Xie, Yuancheng (Peking University)
Xu, Xiaoxue (Zhengzhou University)
Xue, Lingling (Ningbo University)
Yang, Di (University of Science and Technology in China)
Yang, Bo (Ningbo University)
Yoo-Kong, Sikarin (Naresuan University)
Zhang, Da-jun (Shanghai University)
Zhang, Cheng (Shanghai University)
Zhang, Danda (Ningbo University)
Zhao, Songlin (Zhejiang University of Technology)
Zhou, Zejun (The University of Science and Technology of China)
Zuo, Dafeng (University of Science and Technology of China)

Arthur packets
November 5 - 10, 2023

Organizers:

Clifton Cunningham (University of Calgary)
Anne-Marie Aubert (Centre National de la Recherche Scientifique)

Bin Xu (Yau Mathematical Sciences Center)
Andrew Fiori (University of Lethbridge)
Ahmed Moussaoui (Université de Poitiers)

The Langlands Programme as we now know it was framed as a research agenda in the late 1960s. At the same time that the Nobel Prize was being awarded to Murray Gell-Mann "for his contributions and discoveries concerning the classification of elementary particles and their interactions," the Langlands Program predicted that the elementary particles of arithmetic -- L-functions -- should be classified by automorphic representations of algebraic groups. One of the pillars of the Langlands Programme is a conjecture, known as the local Langlands Correspondence, which is crucial to attaching complete L-functions to automorphic representations. The local Langlands Correspondence is now a theorem for automorphic representations of quasisplit classical groups by the work of James Arthur, relying on the work of many mathematicians. Arthur packets play a key role in this recent work. This conference gathers together experts on Arthur packets over global and local fields to cross-pollinate ideas and work on open problems.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5063

Participants:

Abdellatif, Ramla (Université de Picardie Jules Verne)
Achar, Pramod (Louisiana State University)

Adams, Jeffrey (University of Maryland)
Adrian, Moshe (CUNY)
Arancibia Robert, Nicolas (Cergy Paris Université)

Atobe, Hiraku (Hokkaido University)
Aubert, Anne-Marie (Centre National de la Recherche Scientifique)
Balodis, Kristaps (University of Calgary)
Bapat, Asilata (Australian National University)
Bernstein, Joseph (Tel Aviv University)
Bertoloni Meli, Alexander (University of Bonn)
Beuzart-Plessis, Raphael (CNRS Aix-Marseille Université)
Bourgeois, Adele (Tutte Institute for Mathematics and Computing)
Chan, Kei Yuen (University of Hong Kong)
Chao, Kuok Fai (University of Macao)
Chen, Rui (Zhejiang University)
Chen, Harrison (Institute of Mathematics Academia Sinica)
Ciubotaru, Dan (University of Oxford)
Cui, Peiyi (Weizmann Institute of Science)
Cunningham, Clifton (University of Calgary)
del Castillo, Héctor (Universidad de Santiago de Chile)
Deng, Taiwang (BIMSA)
Deshpande, Tanmay (TIFR)
Dijols, Sarah (UBC)
Droschl, Johannes (University of Vienna)
Emory, Melissa (Oklahoma State University)
Evra, Shai (Hebrew University of Jerusalem)
Fintzen, Jessica (University of Bonn)
Fiori, Andrew (University of Lethbridge)
Gan, Wee Teck (National University of Singapore)
Gao, Fan (Zhejiang University)
Geoff, Vooys (Dalhousie University)
Gordon, Julia (University of British Columbia)
Gurevich, Nadya (Ben Gurion University in the Negev)
Gurevich, Max (Technion)
Gutierrez, Luis (Universidad Austral de Chile)
Haines, Thomas (University of Maryland)
Hanzer, Marcela (University of Zagreb)
Hazeltine, Alexander (University of Michigan)
Heiermann, Volker (Universite d'Aix-Marseille)
Huang, Chang (Tsinghua University)
Jiang, Dihua (University of Minnesota)
Kamgarpour, Masoud (University of Queensland)
Karasiewicz, Edmund (National University of Singapore)
Kim, Yeansu (Chonnam National University)
Kim, Ju-Lee (MIT)
Lanard, Thomas (CNRS)
Landim, Thiago (Sorbonne Université)
Lapid, Erez (Weizmann Institute of Science)
Lee, Heejong (Purdue University)
Li, Wen-Wei (Peking University)
Li, Ning (Nankai University)
Liu, Baiying (Purdue University)
Liu, Dongwen (Zhejiang University)
Lo, Chi-Heng (Purdue)
Lu, Hengfei (Beihang University)
Luo, Caihua (CUHK-Shenzhen)
Luo, Yi (National University of Singapore)
Ma, Jia-Jun (Xiamen University Malaysia Campus)
Mahendraker, Siddharth (Boston College)

Mason-Brown, Lucas (University of Oxford)
Matringe, Nadir (Universite Paris Cité)
Mayeux, Arnaud (The Hebrew University of Jerusalem)
Mezo, Paul (Carleton University)
Minguez, Alberto (University of Vienna)
Moeglin, Colette (CNRS, Paris, France)
Mok, Chung Pang (Soochow University)
Moussaoui, Ahmed (Université de Poitiers)
Nadimpalli, Santosh (IIT KANPUR)
Nair, Arvind (Tata Institute of Fundamental Research)
Navarro, Javier (IMJ-PRG)
Nevins, Monica (University of Ottawa)
Oi, Masao (Kyoto University)
Okada, Emile (National University of Singapore)
Peng, Zhifeng (Soochow University)
Qin, Chuan (Sorbonne University)
Ray, Mishty (University of Calgary)
Renard, David (Ecole Polytechnique)
Savin, Gordan (University of Utah)
Schwein, David (Universität Bonn)
Sécherre, Vincent (Université de Versailles Saint-Quentin)
Shi, Linli (University of Connecticut)
Smith, Jerrod (University of Calgary)
Steele, James (University of Calgary)
Sun, Binyong (Zhejiang University)
Sunohara, Matthew (University of Toronto)
Szumowicz, Anna (IMPAN)
Tam, Geo Kam-Fai (Radboud Universiteit)
Trapa, Peter (University of Utah)
Tsai, Cheng-Chiang (Academia Sinica)
Varma, Sandeep (Tata Institute of Fundamental Research)
Vogan, David (MIT)
Wang, Chuijia (Technion - Israel Institute of Technology)
Wong, Kayue Daniel (CUHK-Shenzhen)
Wu, Chenyan (University of Melbourne)
Xu, Bin (Yau Mathematical Sciences Center)
Xu, Yujie (Columbia University)
Yang, Chang (Hunan Normal University)
Yu, Shilin (Xiamen University)
Yu, Hongjie (Weizmann Institute of Science)
Zhang, Qing (Huazhong University of Science and Technology)
Zhang, Lei (National University of Singapore)
Zhao, Qixian (Tsinghua University)
Zhu, Chengbo (National University of Singapore)
Zhu, Yihang (Tsinghua University)
Zou, Jialang (University of Michigan, Ann Arbor)
Zou, Jiandi (TECHNION - Israel Institute of Technology)

Vortex Dynamics: the Crossroads of Mathematics, Physics and Applications
December 3 - 8, 2023

Organizers:

Bartosz Protas (McMaster University)
Stefanella Boatto (Federal University of Rio de Janeiro)

Elena Luca (The Cyprus Institute)
Takashi Sakajo (Kyoto University)

Vortex dynamics is at the heart of many unresolved problems in fluid mechanics and is also central to numerous applications in science and engineering. The goal of the proposed meeting is to survey the recent progress in this field focusing on applied mathematics aspects of both classical and emerging problems. We are planning to bring together about 40 researchers at different career stages working on various aspects of vortex dynamics, spanning applied mathematical analysis, scientific computing, physical modeling as well as scientific and engineering applications. A highlight of the workshop will be events designed to foster cross-fertilization between applied mathematics and different application areas.

Vorticity was introduced by Helmholtz in 1858, and was a major step forward in overcoming the limitations of classical irrotational fluid mechanics. It has been of critical importance in fluid mechanics ever since. Kelvin's work on vortex atoms sought to establish a fundamental theory of matter based on vorticity. Prandtl's boundary-layer theory, which definitely resolved the 19th century paradoxes of fluid mechanics, depends crucially on the dynamics of vorticity. In the 21st century, vortex dynamics brings together a vibrant community centered around applied mathematics and involving scholars working in an ever growing range of application areas such as biomechanics, astrophysics, oceanography, atmospheric sciences, aeronautics, acoustics, condensed matter and computational physics. Experts in each of these domain-specific areas do not often attend the same specialized conferences, yet could greatly benefit from cross-fertilization of ideas. The proposed workshop will be designed to provide such an opportunity.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5111

Participants:

Alben, Silas (University of Michigan)
Ayapilla, Aditya Sai Pranith (Tohoku University)
Bai, Wenkai (Institude of Physics, Chinese Academy of Sciences)
Boatto, Stefanella (Federal University of Rio de Janeiro)
Brons, Morten (Technical University of Denmark)
Bustamante, Miguel (University College Dublin)
Cao, Daomin (Chinese Academy of Sciences)
Chen, Tao (Nanjing university of Science and Technology)
Chen, Long (Beihang University)
Cho, James * (Brandeis University)
Fukumoto, Yasuhide (Kyushu University)
Gao, Ankang (University of Science and Technology of China)
Gilbert, Andrew (University of Exeter)
Gotoda, Takeshi (Tokyo Institute of Technology)
Hattori, Yuji (Tohoku University)
Iima, Makoto (Hiroshima University)
Ishimoto, Kenta (Kyoto University)
Kang, Linlin (Westlake University)
Kim, Sun-Chul (Chung-Ang University)
Krishnamurthy, Vikas (IIT Hyderabad)
Leweke, Thomas (Centre National de la Recherche Scientifique)
Limacher, Eric (University of Calgary)
Liu, Xin (Beijing University of Technology)
Llewellyn Smith, Stefan (University of California, San Diego)
Luca, Elena (The Cyprus Institute)
Masroor, Emad (Swarthmore College)
Mavroyiakoumou, Christiana (New York University)
Nussenzveig Lopes, Helena (Universidade Federal do Rio de Janeiro)
Pramanick, Tamal (National Institute of Technology Calicut)
Protas, Bartosz (McMaster University)
Qun, Wang (University of Toronto)
Ricca, Renzo (University of Milano-Bicocca)
Roy Chowdhury, Ankita (IIT Hyderabad)
Sakajo, Takashi (Kyoto University)
Shen, Weiyu (Peking University)
Shimizu, Yuuki (The University of Tokyo)
Sohn, Sung-Ik (Gangneung-Wonju National University)
Stremler, Mark (Virginia Tech)
Trichtchenko, Olga (University of Western Ontario)
Wang, Chen (Beijing Normal University - Hong Kong Baptist University United International College)
Wu, Jie-Zhi (Beijing University (retired))
Wu, Chui-Jie (Dalian University of Technology)
Yang, Tao (Northwest University)
Yang, Yue (Peking University)
Yang, Wenchao (Institute of Mechanics, Chinese Academy of Sciences)
Yao, Jie (Beijing Institute of Technology)

Zhao, Xinyu (McMaster University)
Zou, Changjun (Sichuan University)
Zou, Rong (Hawaii Pacific University)

Harnessing the Power of Latent Structure Models and Modern Big Data learning
December 10 - 15, 2023

Organizers:

Jiahua Chen (University of British Columbia)
Yingying Fan (University of Southern California)

Tracy Ke (Harvard University)
Stanislav Volgushev (University of Toronto)

We have lately witnessed one-after-another ground-breaking developments in the AI world. Data science is the essence of this world and perhaps the fastest expanding domain. At the same time, data science is born from the interaction of multiple research areas including statistics and machine learning. The fundamental statistical principles formed a pillar of data science in the beginning and remain pivotal for its healthy growth. The powerful algorithms developed in computer science keep data science practically relevant and central in Big Data analytics. Promoting the interactions between these two areas will undoubtedly further advance the development of data science. Latent structure models are powerful products of statistical principles and offer a simple yet effective platform to capture the complexity and heterogeneity in big data. Their usage goes beyond any single discipline, and naturally integrates the advantages of various areas such as statistics, economics and machine learning. This workshop brings together researchers with expertise in latent structure learning and provides a platform to share their achievements, exchange research ideas, and build new collaborations. We wish to promote the use of latent model techniques and simulate further development of highly interpretable, reproducible, and powerful AI methods. The workshop covers a broad range of topics in the latent structure model: theory, algorithms, and applications. We will also set eyes on future research trends and interdisciplinary directions.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5009

Participants:

Bunea, Florentina (Cornell)
Cai, Zhanrui (Hong Kong University)
Chen, Jiahua (University of British Columbia)

Demirkaya, Emre (The University of Tennessee, Knoxville)
Devkota, Jyoti U. (Kathmandu University)

Dubey, Paromita (University of Southern California)
Fan, Yingying (University of Southern California)
Fan, Jianqing (Princeton University)
Gao, Lan (The University of Tennessee Knoxville)
Gao, Shan (School of Math and Stat, Yunnan U)
Gu, Jiaying (University of Toronto)
Ho, Nhat (University of Texas at Austin)
Holzmann, Hajo (Philipps-University Marburg)
Ignatiadis, Nikolaos (University of Chicago)
Javanmard, Adel (University of Southern California)
Jiang, Xiaohu (School of Math and Stat, Yunnan U)
Jin, Jiashun (Carnegie Mellon University)
Ke, Tracy (Harvard University)
Khalili, Abbas (McGill University)
Lee, Jason * (Princeton University)
Li, Pengfei (University of Waterloo)
li, ziwei (Beijing University of Technology)
Liang, Haodi (The university of British Columbia)
Lin, Xihong (Harvard University)
Lin, Huazhen (Southwestern University of Economics and Finance)
Lin, Wei (Peking University)
Liu, Yukun (Each China Normal University)
Liu, Guanfu (Shanghai University of International Business and Economics)
Loh, Po-Ling (University of Cambridge)
Lv, Jinchi (University of Southern California)
Ma, Ping (University of Georgia Athens)
McLachlan, Geoff (University of Queen'sland)
Munk, Axel (Institute of Mathematical Stochastics, Goettingen)
Nguyen, Long (University of Michigan)
Qiu, Yumou (Peking University)
Reid, Nancy (University of Toronto)
Roeder, Kathryn * (Carnegie Mellon University)
Samworth, Richard (University of Cambridge)
Su, Weijie (University of Pennsylvania)
Sun, Wenguang (Zhejiang University)
Tan, Yan Shuo (National University of Singapore)
Tao, Yuxin (Tsinghua University)
Tong, Xin (University of Southern California)
Volgushev, Stanislav (University of Toronto)
Wang, Wanjie (National University of Singapore)
Wegkamp, Marten (Cornell University)
Wei, Yun (Duke University)
Xia, Lucy (Hong Kong University of Science and Technology)
Yao, Weixin (University of California, Riverside)
Yao, Zhigang (National University of Singapore)
Zhang, Qiong (Renmin University of China)
Zhao, Puying (Yunnan University)
Zhu, Hongtu (The University of North Carolina at Chapel Hill)
Zhu, Liping (Renmin University of China)
Zhu, Lixing (Beijing Normal University/Hong Kong Baptist University)
Zhu, Ji (University of Michigan)
Zhu, Xuening (Fudan University)
Zhu, Yu (department of data science)

UBCO 2023 Program

5-Day Workshops 2023

May 28   Jun 2   The Geometry, Algebra, and Physics of Higgs Bundles
Jun 25   Jun 30   Leveraging Model- and Data-Driven Methods in Medical Imaging
Jul 16   Jul 21   Thermodynamic Formalism for Geodesic Flows
Jul 30   Aug 4   Contextual Integrity for Differential Privacy
Aug 6   Aug 11   Non-Linear Critical Point Theory in Analysis and Geometry

2-Day Workshops 2023

Jul 7   Jul 9   Geometry: Education, Art, and Research (Cancelled)

Summer School 2023

Jul 2   Jul 15   Inclusive Paths in Explicit Number Theory

Research in Teams 2023

Jul 2   Jul 16   Moving Polymer in a Random Environment

Focused Research Groups 2023

Jul 23   Aug 6   Intersections in Projective Spaces
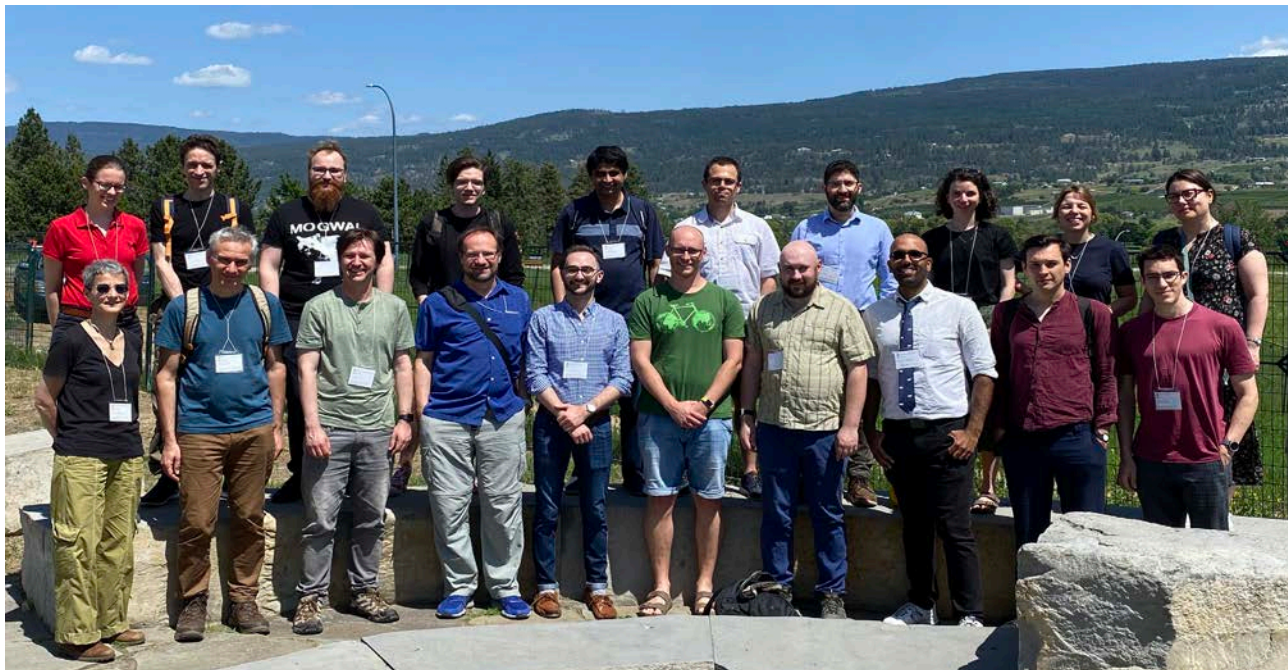
UBC Okanagan

2023

5-Day Workshops

The Geometry, Algebra, and Physics of Higgs Bundles
May 28 - June 2, 2023

Organizers:

Laura Schaposnik (UIC)
Antoine Bourget (ENS Paris and IPhT Saclay)

Steven Rayan (quanTA / University of Saskatchewan)
Lara Anderson (Virginia Tech)

Higgs bundles have received much attention in mathematics for over 30 years now. They are solutions to certain differential equations that originate in mathematical physics -- specifically, the self-dual Yang-Mills equations reduced by two dimensions -- but have become staples in geometry (algebraic, differential, and symplectic), representation theory, and even number theory. In a spectacular way, Higgs bundles were used to prove the Fundamental Lemma, a Fields Medal-worthy result. Coming full circle, Higgs bundles have a renewed importance in high-energy physics through applications to string theory and mirror symmetry.

The workshop will tackle four of the main directions in which Higgs bundles have recently taken a leading role within the mathematics and physics communities, following the breakthroughs of the last years. Bringing together leaders in the area both in mathematics and physics, as well as young researchers in the subfields of the workshop, the meeting will present the ideal setting for novel discoveries and understanding of the uses that Higgs bundles and Hitchin systems may have.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5082

Participants:

Ali Medina, Brady (Waterloo)
Anderson, Lara (Virginia Tech)
Babaei, Hassan (UIC)
Banerjee, Kuntal (University of Saskatchewan)
Barbosa, Rodrigo * (SCGP)

Bimmermann, Johanna (Ruhr-Universität Bochum)
Biswas, Indranil (Tata Institute of Fundamental Research)
Boulter, Eric (University of Saskatchewan)
Bourget, Antoine (ENS Paris and IPhT Saclay)

Braun, Andreas (Durham University)
Cliff, Emily (Université de Sherbrooke)
Collinucci, Giulio (Solvay Institute; Université Libre de Bruxelles)
Cornea, Robert (University of Waterloo)
Dancer, Andrew (University of Oxford)
Felisetti, Camilla (University of Modena and Reggio Emilia)
Grimminger, Julius (Imperial College)
Gukov, Sergei (Caltech)
Hamilton, Eloise (University of Cambridge)
Heckman, Jonathan (University of Pennsylvania)
Heller, Sebastian (Beijing Institute of Mathematical Sciences and Applications)
Huebner, Max (UPenn)
Jackson, Joshua (University of Sheffield)
Kang, Monica (Caltech)
Karkheiran, Mohsen * (University of Alberta / University of Saskatchewan / University of Waterloo)
Kim, heeyeon (Rutgers)
Koban, Matthew (University of Toronto)
Lawrie, Craig (DESY)
Logares, Marina (Universidad Complutense de Madrid)
Mahadeo, Christopher (University of Saskatchewan / UIC)
Marchesano, Fernando (IFT-Madrid)
Mazzeo, Rafe (Stanford University)
McIntosh, Ian (University of York)
Moraru, Ruxandra (University of Waterloo)
Na, Xuesen (UIUC)
Neitzke, Andrew (Yale University)
Pauly, Christian (Université de Nice)
Rayan, Steven (quanTA / University of Saskatchewan)
Schaffhauser, Florent (Uni Andes)
Schaposnik, Laura (UIC)
Schulz, Sebastian (Johns Hopkins University)
Sikora, Adam (State University of New York - Buffalo)
Villacis, Francisco (Carleton University)
Weiss, Hartmut (Chritian-Albrechts-Universität zu Kiel)
Wu, Jingxiang (University of Oxford)
Zimet, Max (Stanford)

Leveraging Model- and Data-Driven Methods in Medical Imaging
June 25 - 30, 2023

Organizers:

Demetrio Labate (University of Houston)
Tatiana Bubba (University of Bath)

Sergio Daniel Vera Rea (Centro de Investigación en Matemática)

Recent remarkable advances in learning-based methods are revolutionizing the field of image analysis resulting in a paradigm shift towards data-driven approaches. These methods have already shown tremendous success in a wide range of applications from computer vision such as object detection and object category classifications. To perform efficiently, such methods typically require a large number of training sample and this requirement is highly impractical or impossible in applications from medical imaging where it is very laborious and expensive to generate labeled data. Another drawback of learning-based method is that they do not come with provable performance guarantees. One remedy to such limitations is to combine data-driven methods with prior knowledge through mathematical and/or physical models in such a way to optimize processing, reconstruction and analysis of medical imaging data without the need of extensive training. This workshop will bring together researchers with a different background ranging from optimization, inverse problem, numerical and harmonic analysis and machine learning to advance state-of-the-art methods combining data- and model-driven approaches for medical imaging. To create a more engaging and productive environment, participants are selected from a diverse pool of researchers from multiple institutions, geographic regions, ethnic background and at different career levels.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5042

Participants:

Alberti, Giovanni S. (University of Genoa)

Anubhav, Gupta (UBC Okanagan)
Arridge, Simon (University College London)

Aspri, Andrea (University of Milan)
Bodmann, Bernhard (University of Houston)
Bubba, Tatiana (University of Bath)
Bui-Thanh, Tan (The University of Texas at Austin)
Chung, Julianne (Emory University)
De Mari, Filippo (University of Genoa)
Dittmer, Sören (University of Bremen)
Esteve-Yagüe, Carlos (University of Cambridge)
Fessler, Jeff (University of Michigan)
Frikel, Jurgen (OTH Regensburg)
Ge, Chunlei (UBCO)
Goossens, Bart (imec-Ghent University)
Greenleaf, Allan (University of Rochester)
Heikkilä, Tommi (University of Helsinki)
Hertrich, Johannes (TU Berlin)
Kiss, Maximilian (CWI)
Labate, Demetrio (University of Houston)
Lee, Yolanne (University College London)
Lucka, Felix (Centrum Wiskunde & Informatica)
Machida, Manabu (Hamamatsu University School of Medicine)
Mang, Andreas (University of Houston)
Murthy, Rashmi (University of Cambridge)
Mylostna, Krystyna (UBCO)
Pock, Thomas (Graz University of Technology)
Poon, Clarice (University of Bath)
Ratti, Luca (University of Genoa)
Rodriguez Delherbe, Andrea (Oxford University)
Roith, Tim (Friedrich-Alexander-Universität Erlangen-Nürnberg)
Santacesaria, Matteo (University of Genoa)
Schönlieb, Carola (University of Cambridge)
Shi, Cong (University of Vienna)
Steidl, Gabriele * (TU Berlin)

Thermodynamic Formalism for Geodesic Flows
July 16 - 21, 2023

Organizers:

Daniel Thompson (The Ohio State University)
Keith Burns (Northwestern University)

Tamara Kucherenko (The City College of New York)
Agnieszka Zelerowicz (University of California - Riverside)

This workshop will study this question for systems of geometric origin. One example of this is a particle bouncing inside a region -- think of a ball bouncing around a billiard table, or a light beam bouncing around a room whose walls are mirrors. If the walls are flat then the behavior is fairly predictable, but if they are curved then one often observes random-looking behavior in the long run. Or imagine walking in a straight line along a surface; if the surface is flat then changing the starting point a little will lead to a predictable change in the trajectory. However, if the surface is curved like a saddle then different trajectories will spread out and your location after walking for a long time will eventually seem to be random. The task of giving precise descriptions of systems such as these requires a more complete development of the theory of thermodynamic formalism for systems of geometric origin, which is precisely the goal of this workshop.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5095

Participants:

Baladi, Viviane (CNRS, Sorbonne Universite)
Ben Ovadia, Snir (Penn State University)
Burns, Keith (Northwestern University)
Call, Ben (University of Illinois Chicago)
Carrand, Jérôme (Sorbonne Université)
Chen, Dong (Ohio State University)
Climenhaga, Vaughn (University of Houston)
Coles, Solly (Northwestern University)
Das, Tushar (University of Wisconsin - La Crosse)
Demers, Mark (Fairfield University)
Dilsavor, Caleb (Ohio State University)
Erchenko, Alena (University of Chicago)
Gelfert, Katrin (Federal University of Rio de Janero)
Hasselblatt, Boris (Tufts University)
He, Yan Mary (University of Oklahoma)
Hemenway, Gregory (University of Houston)
Huneycutt, Katelynn (Ohio State University)
Iommi, Godofredo (Pontificia Universidad Católica de Chile)
Kao, Nyima (The George Washington Univeristy)
Kosenko, Petr (University of Toronto)
Kucherenko, Tamara (The City College of New York)
Lee, George (University of Victoria)
Lima, Yuri (Universidade Federal do Ceará)
Merriman, Claire (Davidson College)
Pollicott, Mark (Warwick University)
Quas, Anthony (University of Victoria)
Ranu, Arantha (University of Victoria)
Riquelme, Felipe (PUC Valparaiso)
Rodriguez Hertz, Federico (Penn State)
Sharp, Richard (University of Warwick)
Thompson, Daniel (The Ohio State University)
Tiozzo, Giulio (University of Toronto)
Urbanski, Mariusz (University of North Texas)
Velozo, Anibal (Pontificia Universidad Católica de Chile)
Wang, JinCheng (Tufts University)
Wang, Tianyu (Fudan)
War, Khadim (Instituto Nacional de Matematica Pura e Aplicada** (IMPA))
Yang, Fan (Universidade Federal Fluminense)
Zelerowicz, Agnieszka (University of California - Riverside)
Zhang, Hongkun (University of Massachusetts Amherst)

Contextual Integrity for Differential Privacy
July 30 - August 4, 2023

Organizers:

Rachel Cummings (Columbia University)
Helen Nissenbaum (Cornell tech)

Joel Reardon (University of Calgary)
Michael Tschantz (International Computer Science Institute)

Contextual integrity is a framework for formalizing context of data use, and offers a descriptive categorization of information flows as either appropriate or inappropriate based upon the context and cultural norms. This workshop will combine tools from differential privacy and contextual integrity to develop context-based prescriptions for the use and implementation of differential privacy. It will bring together a multi-disciplinary team of privacy researchers from computer science, information science, statistics, business, law, and public policy to address this multifaceted challenge.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5106

Participants:

Acquisti, Alessandro (Carnegie Mellon University)
Bailie, James (Harvard University)
Balsa, Ero (Cornell Tech)
Benthall, Sebastian (New York University)
Bun, Mark (Boston University)
Celis, Elisa (Yale University)
Choksi, Madiha Zahrah (Cornell Tech)
Cianfarani, Christian (University of Chicago)
Cummings, Rachel (Columbia University)
Datta, Anupam * (Carnegie Mellon University)
Desai, Deven (Georgia Institute of Technology)
Du, Elbert (Harvard)
Feamster, Nick (University of Chicago)
Fluitt, Aaron * (Georgetown University)
Gong, Ruobin (Rutgers University)
Hegde, Nidhi (University of Alberta)
Hod, Shlomi (Boston University)
Jain, Palak (Boston University)
Jiang, Bei (University of Alberta)
Kacsmar, Bailey (University of Alberta)
Kamath, Gautam (University of Waterloo)
Kreuter, Frauke (LMU Munich)
Laufer, Ben (Cornell Tech)
LeClerc, Phillip (US Census Bureau)
Matz, Sandra (Columbia University)
Mukherjee, Tamalika (Purdue University)
Nanayakkara, Priyanka (Northwestern University)
Nissenbaum, Helen (Cornell tech)
Nissim, Kobbi (Georgetown University)
Reardon, Joel (University of Calgary)
Redmiles, Elissa (Georgetown University)
Robert, Christian (Paris Dauphine University)
Safavi-Naini, Rei (University of Calgary)
Sarathy, Jayshree (Harvard University)
Seeman, Jeremy (University of Michigan)
Shvartzshnaider, Yan (York University)
Steinke, Thomas (Google)
Straus, Stephanie (Georgetown)
Ur, Blase (University of Chicago)
Vietri, Giuseppe (University of Minnesota)
Wood, Alexandra (Harvard University)
Wu, Leanne (University of Calgary)
Zhang, Wanrong (Harvard University)

Non-Linear Critical Point Theory in Analysis and Geometry
August 6 - 11, 2023

Organizers:

Ben Sharp (University of Leeds)
Jingyi Chen (University of British Columbia)

Tobias Lamm (Karlsruhe Institute of Technology)
Elena Mader-Baumdicker (TU Darmstadt)

Minimal surfaces have inspired scientists and mathematicians for centuries and remain a central area of study with a vast number of pure and applied research outputs relating directly to their study. From art and architecture, to fluid dynamics and general relativity, they have an impressive list of applications. The main reason that they remain so popular amongst mathematicians is the fact that they are mysterious, beautiful, and lead to the resolution of challenging and abstract problems, not necessarily in obviously related fields. They can be created in the home by dunking a metal hoop into soapy water - the resulting soap film is a minimal surface (no matter how you bend the hoop). Equally they are integral to, for example, certain proofs of the positive mass theorem from general relativity. A surface is minimal if it is locally stretched tight, so that if you were to focus on a small region of the surface, any perturbation of that small region will increase surface area. In abstract terms, minimal surfaces are critical "points" of the energy - in this case the energy of a surface is given by its area.

A large quantity of physical phenomena admit such a description - they are critical with respect to some energy, or in other words ``nature always tries to optimise energy''. For example the shape of cell membranes, event horizons of black holes and the behaviour of fundamental particles all fit within this regime. This workshop brings together young and experienced researchers in the mathematical/theoretical study of these problems. It mainly utilises the theory of differential geometry and partial differential equations, or broadly Geometric Analysis. This field has enjoyed popular notoriety in recent years with one of the modern progenitors of the subject, Karen Uhlenbeck, being awarded the Abel Prize. Similarly Perelman's proof of the Poincare conjecture, a question that took 100 years (and many contributors) to answer fully, for which Perelman famously turned down the $1,000,000 award.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/5-day-workshops/23w5049

Participants:

Ambrozio, Lucas (Instituto de Matemática Pura e Aplicada)
Bourni, Theodora (University of Tennessee Knoxville)
Buzano, Reto (Università degli Studi di Torino)
Carlotto, Alessandro (ETH and Università degli studi di Trento)
Chau, Albert (University of British Columbia)
Chen, Jingyi (University of British Columbia)
Coulibaly, Patrik (UBC)
DelaTorre Pedraza, Azahara (Sapienza Università di Roma)
Du, Wenkui (University of Toronto)
Franz, Giada (MIT)
Haslhofer, Robert (University of Toronto)
Hassannezhad, Asma (University of Bristol)
He, Weiyong (University of Oregon)
Hirsch, Jonas (Universität Leipzig)
Hong, Han (Tsinghua University)
Karpukhin, Mikhail (University College London)
Kuwert, Ernst (University of Freiburg)
Lambert, Ben (Leeds)
Lamm, Tobias (Karlsruhe Institute of Technology)
Li, Yangyang (University of Chicago)
Lin, Longzhi (University of California, Santa Cruz)
Lynch, Stephen (Imperial College London)
Mader-Baumdicker, Elena (TU Darmstadt)
Malchiodi, Andrea * (Scuola Normale Superiore)
Mazowiecka, Katarzyna (University of Warsaw)
Mihaila, Cornelia (Saint Michael's College)
Ogden, Jacob (University of Washington)
Park, Jiewon (Yale)
Rodiac, Rémy (Université Paris-Sacaly)
Rothe, Melanie (Technische Universität Darmstadt)
Rupflin, Melanie (University of Oxford)
Rupp, Fabian (University of Vienna)
Schikorra, Armin (University of Pittsburgh)
Seemungal, Luca (University of Leeds)
Seidel, Jona (TU Darmstadt)
Sesum, Natasa (Rutgers University)
Sharp, Ben (University of Leeds)
Tinaglia, Giuseppe (King's College London)
Walton, Paul (University of York)
Wang, Zhichao (The University of British Columbia)
Warren, Micah (University of Oregon)
Weth, Tobias * (Goethe-University Frankfurt)
Wickramasekera, Neshan * (University of Cambridge)
Workman, Myles (UCL)
Yuan, Yu (University of Washington)
Zhu, Jonathan (University of Washington)

UBC Okanagan

2023

2-Day Workshops

Geometry: Education, Art, and Research (Cancelled)
July 7 - 9, 2023

Organizers:

Zohreh Shahbazi (University of Toronto Scarborough)
Maliha Ahmed (University of Waterloo)

Parker Glynn-Adey (University of Toronto Mississauga)

Geometry is all around us. The circles and triangles of the Ancient Greeks have never left us. Film, art, and architecture ha ve all been touched by mathematics and geometry. 3D printing, robotics, and origami are a new wave of geometry. At Geometry: Education, Art, and Research, leading researchers pair up with educations and artists to push the boundaries of contemporary geometry.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/2-day-workshops/23w2240

Participants:

Maliha Ahmed (University of Waterloo)

UBC Okanagan

2023

Summer School

Inclusive Paths in Explicit Number Theory
July 2 - 15, 2023

Organizers:

Habiba Kadiri (University of Lethbridge)
Alia Hamieh (University of Northern British Columbia)
Ghaith Hiary (Ohio State University)

Greg Martin (University of British Columbia)
Nathan Ng (University of Lethbridge)
Allysa Lumley (York University)

How primes and L-functions are linked is at the core of analytic number theory, with the Gener- alized Riemann Hypothesis (GRH) being its star conjecture. The field of explicit number theory focuses on simple yet notoriously difficult questions such as the Goldbach conjecture (Can every even number be written as the sum of two primes?) and Legendre's conjecture (Is there a prime number between every two consecutive squares?). It is likely one of the most exacting flavors of number theory: in addition to scientific creativity, it requires precision and endurance to produce meaningful results. Working in teams with complementary expertise would allow to tackle some problems in the field more efficiently.

The Summer School Training Camp: Inclusive Paths in Explicit Number Theory is one of the highlight events as- sociated to the PIMS-funded Collaborative Research Group (CRG) on L- functions in Analytic Number Theory. For the first time, all leading experts in the field will come together to provide mentorship to a new generation of student researchers that is more represen- tative of our diverse society. After an initial week of training, the participants will have the op- portunity to work on cutting-edge problems in a collaborative context with senior and emerging researchers.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/summer-schools/23ss001

Participants:

-, Bittu (IIIT Delhi)
Agbolade, Oluwaferanmi David (Louisiana State University)
Agrawal, Rishika (University of Georgia)
Alsetri, Ali (University of Kentucky)
Basak, Debmalya (University of Illinois Urbana Champaign)
Benli, Kübra (University of Lethbridge)
Bhattacharjee, Saunak (IISER Tirupati)
Bhattacharjee, Maitreyo (IACS)
Bhattacharya, Shubhrajit (University of British Columbia)
Bose, Arnab (University of Lethbridge)
Bou Ezz, Nizar (Temple University)
Castillo, Cruz (University of Illinois at Urbana-Champaign)
Chaudhary, Abhay (University of Dayton)
Cicek, Fatma (University of Northern British Columbia)
Creech, Steven (Brown University)
Cully-Hugill, Michaela (University of New South Wales Canberra)
Das, Sourabh (University of Waterloo)
El Yassini, Ismael (University of Waterloo)
Elma, Ertan (University of Lethbridge)
Farzanfard, Golnoush (University of Lethbridge)
Fellini, Nicolo (Queen's University)
Fiori, Andrew (University of Lethbridge)
Gaba, Swati (University of Connecticut)
Ghosh, Debanshu (IIT Gandhinagar)
Goel, Shivani (IIIT Delhi)
Gunn, Keira (University of Calgary)
Gupta, Rajat (Univresity of Texas at Tyler)
Hamieh, Alia (University of Northern British Columbia)
Harun, Mohd (IIT Kanpur, India)
Hasanalizade, Elchin (University of Lethbridge)
Hiary, Ghaith (Ohio State University)
Iyer, Aditya (University of South Carolina)
Jaskari, Mikko (University of Turku)
Jha, Abhishek (IIIT Delhi)
Kadiri, Habiba (University of Lethbridge)
Kaur, Amrinder (University of Hyderabad)
Kaur, Sumandeep (Panjab University Chandigarh)
Khunger, Simran (University of Michigan)
Lee, Yongjin (University of Illinois Urbana-Champaign)
Lee, Ethan (University of Bristol)
Leong, Nicol (UNSW Canberra)
Lin, Hua (UC Irvine)
Lumley, Allysa (York University)
Luna Martinez, Andradis Elieser (Universidad Autónoma de Santo Domingo)
Mahajan, Jewel (Indian Institute of Science Education and Research, Pune)
Manivel, Marcella (University of Minnesota)
Martin, Greg (University of British Columbia)
Mitra, Pratim (Indian Statistical Institute, Kolkata)
Mkane, Oliver Mkane (University of Alberta)
Mohajer, Mohammadreza (University of Ottawa)

Morales, blue (Autonomous University of Santo Domingo UASD)
Murty, Ram (Queen's University)
Nair, Siva (Universite de Montreal)
Ng, Nathan (University of Lethbridge)
Palojärvi, Neea (University of Helsinki)
Ramaré, Olivier (CNRS / Aix Marseille Univ.)
Ray, Anish (University of Muenster)
Roy, Subham (Université de Montréal)
Roy, Ritoprovo (Kerala School of Mathematics)
sahoo, Jagannath (IIT Gandhinagar)
Savalia, Aditi (Indian Institute of Technology Gandhinagar)
Sinha, Kaneenika (IISER Pune)
Sinha, Saloni (University of Missouri)
Slamen, Alexander (University of Toronto)
Srivastava, Aviral (University of Hyderabad)
Starichkova, Valeriia (UNSW Canberra)
Streipel, Jakob (University of Maine)
Swati, - (University of South Carolina)
Treviño, Enrique (Lake Forest College)
Trudgian, Tim (University of New South Wales Canberra)
Tsai, Hung-Liang (Washington State University)
Tsang, Kin Ming (UBC)
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Vatwani, Akshaa (IIT Gandhinagar)
Vo, Tan (UNBC)
Voros, Jackie (University of Bristol)
Wong, Peng-Jie (National Sun Yat-Sen University)
Yip, Chi Hoi (Kyle) (University of British Columbia)
Zaman, Asif (University of Toronto)
Zhao, Tianyu (The Ohio State University)
Zhao, Shifan (The Ohio State University)
Zhou, Zijie (Kansas State University)
Zuniga Alterman, Sebastian (University of Turku)

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UBC Okanagan

2023

Research in Teams

Moving Polymer in a Random Environment
July 2 - 16, 2023

Organizers:

Siva Athreya (International Centre for Theoretical Sciences - TIFR)

Recently, we worked on the small ball problem in the setting of the stochastic heat equation (SHE) driven by space-time white noise, that is $$\partial_t u = \partial_x^2 u + \sigma(u) \dot W,\;\, t\ge 0, \, x\in [0,1],$$ with periodic boundary conditions and starting with initial profile $u(0,\square)\equiv 0$. Let P0 be the underlying probability measure on the path space of u. The small ball problem concerns asymptotic (as $\epsilon\downarrow 0$) lower and upper bounds on the probability $${\bf P}_0\left(\sup_{t\in [0,T],\, x\in [0,1]} |u(t,x)|\le \epsilon\right)$$ where u(t,x) is the solution to the SHE. We showed under fairly general conditions on σ that the logarithm of the above quantity was of the order $-\epsilon^{-6}$, and the article has now appeared in Annals of Probability.

Our motivation to study the above small ball problem was to understand the behaviour of the moving polymer under the influence of traps or a random field.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/research-in-teams/23rit003

Participants:

Athreya, Siva (International Centre for Theoretical Sciences - TIFR)
Joseph, Mathew (Indian Statistical Institute)
Mueller, Carl (University of Rochester)

UBC Okanagan

2023

Focused Research Groups

Intersections in Projective Spaces
July 23 - August 6, 2023

Organizers:

Justyna Szpond (Pedagogical University of Cracow)
Brian Harbourne (University of Nebraska-Lincoln)

Understanding 3-dimensional structure from 2-dimensional photos is the essential issue behind CT scans and is a significant hurdle in computer vision. A version of this problem has arisen in recent research in algebraic geometry:
if the photographic image of a finite set of points have a nice structure (known technically as being a complete intersection) no matter what angle the photo is taken from, what can we say about the arrangement of the original set of points?

There are significant obstructions to extending what is known in dimension 3 to higher dimensions. The research to be undertaken under this proposal has the goal of exploring how to relax the condition of being a complete intersection in an interesting way that is fruitful for higher dimensions.

For details, please refer to the workshop webpage
https://www.birs.ca/events/2023/focussed-research-groups/23frg006

Participants:

Chiantini, Luca (Universitá degli studi di Siena)
Farnik, Lucja (Pedagogical University of Cracow)
Favacchio, Giuseppe (Università degli Studi di Palermo)
Harbourne, Brian (University of Nebraska-Lincoln)

Migliore, Juan (University of Notre Dame)
Szemberg, Tomasz (Pedagogical University of Cracow)
Szpond, Justyna (Pedagogical University of Cracow)

The **Banff International Research Station** for Mathematical Innovation and Discovery (BIRS) is a collaborative Canada-US-Mexico venture that provides an environment for creative interaction as well as the exchange of ideas, knowledge, and methods within the Mathematical Sciences, with related disciplines and with industry. The research station is located at The Banff Centre in Alberta and is supported by Canada's Natural Science and Engineering Research Council (NSERC), the US National Science Foundation (NSF), Alberta Economic Development and Trade, and Mexico's Consejo Nacional de Ciencia y Tecnología (CONACYT).

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Casa Matemática Oaxaca (CMO) is an International research facility affiliated with the Banff International Research Station (BIRS) of Canada. CMO will host scientific activities and gather mathematicians from around the world in an environment that will promote innovative ideas in the mathematics field. CMO will also support activities to promote local development through research and teaching of mathematics.

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Institute for Advance Study in Mathematics (IASM) inaugurated on November 16, 2017, is designed to offer a tranquil and stimulating environment in which mathematicians worldwide get together to work, think, and exchange ideas. Based in Hangzhou, a city renowned for its natural beauty and cultural heritage, IASM welcomes about one hundred visiting scholars annually from some fifty universities and research institutions.

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University of British Columbia Campus Okanagan (UBCO) UBC's Okanagan campus is an innovative hub for research and learning. The campus was founded in 2005 in partnership with local Indigenous peoples, the Syilx Okanagan Nation, in whose territory the campus resides. Since its inception, UBCO has experienced tremendous growth, including an increase in research funding of 366 percent.

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