

BIRS 2021 Annual Report



Banff International Research Station
for Mathematical Innovation and Discovery



NSERC
CRSNG



CONACYT
Consejo Nacional de Ciencia y Tecnología

Alberta
Government

5-Day Workshops 2021

Jan 10	Jan 15	Continuum Models and Optimisation for Deep Neural Networks (Cancelled)
Jan 17	Jan 22	Adaptive Modelling and Discretization Error Control (Cancelled)
Jan 24	Jan 29	Mathematics of Human Environmental Systems (Online)
Jan 24	Jan 29	Driving Global Inference for New Physics with Machine Learning, Big Data and Large-scale Statistical Simulation (Cancelled)
Jan 31	Feb 5	Geometry, Analysis, and Quantum Physics of Monopoles (Online)
Feb 8	Feb 12	Optimization under Uncertainty: Learning and Decision Making (Online)
Feb 14	Feb 19	Quantum Chaos and Holography (Cancelled)
Feb 21	Feb 26	Geometry, Topology and their Applications in Control System Design (Cancelled)
Feb 28	Mar 5	Astrostatistics in Canada and Beyond (Cancelled)
Mar 7	Mar 12	Stochastics and Geometry (Online)
Mar 21	Mar 26	Mathematical and Statistical Methods for Pathogen Genomics (Cancelled)
Mar 28	Apr 2	Algebraic Aspects of Matroid Theory (Cancelled)
Apr 4	Apr 9	Dynamics of Henon Maps: Real, Complex and Beyond (Cancelled)
Apr 11	Apr 16	Advances in Stein's Method and its Applications in Machine Learning and Optimization (Cancelled)
Apr 18	Apr 23	Big Data Inverse Problems (Cancelled)
May 2	May 7	Efficient Simulation Algorithms for Viscoelastic and Viscous non-Newtonian Fluids (Cancelled)
May 9	May 14	Applications of Stochastic Control to Finance and Economics (Cancelled)
May 16	May 21	Perspectives on Knot Homology (Online)
May 23	May 28	Single Cell Plus – Data Science Challenges in Single Cell Research (Cancelled)
May 30	Jun 4	Quantum Foundations, Gravity, and Causal Order (Online)
Jun 6	Jun 11	Modeling Fluid-Driven Fracture — at the Crossroads of Applied Mathematics, Earth Science, and Earth Resources Engineering (Cancelled)
Jun 13	Jun 18	Novel Mathematical Methods in Material Science: Applications to Biomaterials (Online)
Jun 14	Jun 18	Tangent Categories and their Applications (Online)
Jun 20	Jun 25	Entropic Regularization of Optimal Transport and Applications (Online)
Jun 27	Jul 2	Systematic Effects and Nuisance Parameters in Particle Physics Data Analyses (Cancelled)
Jul 4	Jul 9	Fundamental Groups and their Representations in Arithmetic Geometry (Cancelled)
Jul 11	Jul 16	Geometry via Arithmetic (Online)
Jul 18	Jul 23	Arithmetic Aspects of Deformation Theory (Cancelled)
Jul 25	Jul 30	New Mechanisms for Regularity, Singularity, and Long Time Dynamics in Fluid Equations (Online)
Aug 1	Aug 6	Diophantine Methods in Algebraic Dynamics (Cancelled)
Aug 8	Aug 13	Random Graphs and Statistical Inference: New Methods and Applications (Online)
Aug 15	Aug 20	Totally Disconnected Locally Compact Groups via Group Actions (Online)
Aug 22	Aug 27	Supersingular Isogeny Graphs in Cryptography (Online)
Sep 5	Sep 10	Nonlinear Potential Theoretic Methods in Partial Differential Equations (Online)
Sep 12	Sep 17	Random Growth Models and KPZ Universality (Cancelled)
Sep 12	Sep 17	Modeling, Learning and Understanding: Modern Challenges between Financial Mathematics, Financial Technology and Financial Economics (Cancelled)
Sep 12	Sep 17	Multiscale Models for Complex Fluids: Modeling and Analysis (Cancelled)
Sep 19	Sep 24	New Directions in Statistical Inference on Networks and Graphs (Cancelled)
Sep 19	Sep 24	Permutations and Probability
Sep 26	Oct 1	Connecting Network Structure to its Dynamics: Fantasy or Reality? (Online)
Sep 26	Oct 1	Singularity Formation in Nonlinear PDEs (Online)
Oct 3	Oct 8	Lattices and Cohomology of Arithmetic Groups: Geometric and Computational Viewpoints (Online)
Oct 3	Oct 8	Statistical Methods for Computational Advertising (Online)
Oct 10	Oct 15	Cohomology of Arithmetic Groups: Duality, Stability, and Computations
Oct 10	Oct 15	Topology and Entanglement in Many-Body Systems (Online)
Oct 17	Oct 22	Mathematics of the Cell: Integrating Signaling, Transport and Mechanics
Oct 24	Oct 29	Gravitational Emergence in AdS/CFT
Oct 31	Nov 5	Statistical Aspects of Non-Linear Inverse Problems (Online)
Oct 31	Nov 5	Quantum Field Theories and Quantum Topology Beyond Semisimplicity

Nov 7 Nov 12 Locally Conformal Symplectic Manifolds: Interactions and Applications (Online)
Nov 7 Nov 12 New Directions in Geometric Flows
Nov 14 Nov 19 Basic Functions, Orbital Integrals, and Beyond Endoscopy (Online)
Nov 14 Nov 19 Derived, Birational, and Categorical Algebraic Geometry
Nov 14 Nov 19 Algebraic Dynamics and its Connections to Difference and Differential Equations
Nov 21 Nov 26 Graph Product Structure Theory
Nov 21 Nov 26 Moving Frames and their Modern Applications
Nov 28 Dec 3 Mathematical Statistics and Learning
Dec 5 Dec 10 Women in Inverse Problems (Online)
Dec 5 Dec 10 Women in Operator Algebras II
Dec 5 Dec 10 Foundations for a Distributed Ledger (Cancelled)

2-Day Workshops 2021

Feb 19 Feb 21 Geometry: Education, Art, and Research (Online)
Nov 5 Nov 7 Alberta Number Theory Days XIII

Banff International Research Station

2021

5-Day Workshops

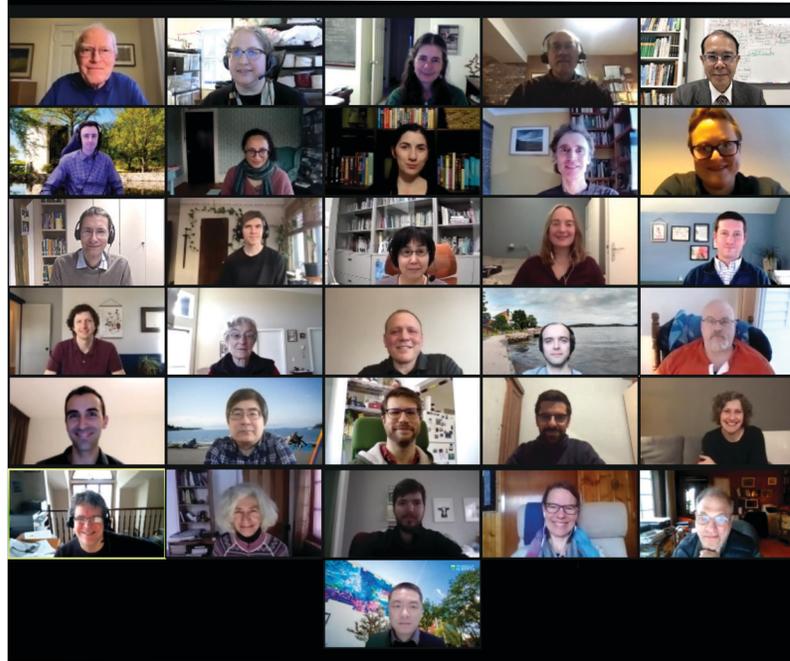
Mathematics of Human Environmental Systems (Online)

January 24 - 29, 2021

Organizers:

Mark Lewis (University of Alberta)
Yoh Iwasa (Kwansei Gakuin University)

Simon Levin (Princeton University)
Pauline Van den Driessche (University of Victoria)



This workshop addressed emerging challenges in human-environment interactions. Ecosystem services are under threat due to human activities. We provided model feedbacks between the environment and human behaviour with a view to illuminating the mathematical structures that govern interactions. Our goal was to develop methods that could suggest a path forward in improving the interactions between humans and the environment. The workshop included some existing case studies where theoretical models have been successful in suggesting a path forward such as vaccination strategies, deployment of antivirals, range corridors for wildlife, restricted shipping speed in areas populated by whales, with a view to expanding the role that mathematics and statistics can play in this endeavour.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5191>

Participants:

Anand, Madhur (University of Guelph)
Bauch, Chris (University of Waterloo)
Beckage, Brian (University of Vermont)
Blackwood, Julie (Williams College)
Cobbold, Christina (University of Glasgow)
den Nijs, Katinka (University of Amsterdam)
Dushoff, Jonathan (McMaster University)
Fefferman, Nina (University of Tennessee)
Fenichel, Eli (Yale University)
Finnoff, David (University of Wyoming)
Gross, Louis (University of Tennessee, Knoxville)
Harrington, Peter (University of Alberta)
Hastings, Alan (University of California - Davis)
Heggerud, Christophe (University of Alberta)
Hilker, Frank (Osnabrück University)
Iwasa, Yoh (Kwansei Gakuin University)
Kaper, Hans (Georgetown University)
Levin, Simon (Princeton University)
Lewis, Mark (University of Alberta)

Lutscher, Frithjof (University of Ottawa)
Ma, Junling (University of Victoria)
Miller, Judith (Georgetown University)
Montiel Molina, Hector (UNAM)
Nakamaru, Mayuko (Tokyo Institute of Technology)
Patterson, Denis (Princeton University)
Rhodes, Stan (Utah State University)
Rousseau, Christiane (Université de Montréal)
Saad-Roy, Chadi (Princeton University)
Santos, Fernando (Princeton University)
Satake, Akiko (Kyushu University)
Tilman, Andrew (University of Pennsylvania)
Tyson, Rebecca (University of British Columbia-Okanagan)
Van den Driessche, Pauline (University of Victoria)
Vasconcelos, Vitor V. (University of Amsterdam)
Wang, Hao (University of Alberta)
Yang, LuoJun (Princeton University)
Zeeman, Mary Lou (Bowdoin College)

Geometry, Analysis, and Quantum Physics of Monopoles (Online)

January 31 - February 5, 2021

Organizers:

Jacques Hurtubise (McGill University)
Benoit Charbonneau (University of Waterloo)

Sergey Cherkis (University of Arizona)
Akos Nagy (Duke University)



The subject of magnetic monopoles is by now classic in both physics and mathematics. Since intense advancements in mid 1970's, numerous deep connections to theoretical physics, algebraic geometry, and geometric analysis have been discovered. Nonetheless, many important problems remain unsolved. Recently, monopoles acquired new significance in areas such as string theory, the Seiberg--Witten theory, quantum gauge-theory spaces of vacua, knot invariants, and the Geometric Langlands correspondence. This workshop brought together experts from around the world advancing very different perspectives, identify important open problems, and connecting diverse methods used by different groups.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5002>

Participants:

Aleali, Ali (Payame Noor University)
Anderson, Lara (Virginia Tech)
Bielawski, Roger (University of Hannover)
Braverman, Alexander (University of Toronto)
Brennan, T. Daniel (University of Chicago)
Charbonneau, Benoit (University of Waterloo)
Cherkis, Sergey (University of Arizona)
Cork, Josh (Leibniz University, Hannover)
Corrigan, Ed (University of York)
Dai, Xianzhe (University of California Santa Barbara)
Degeratu, Anda (University of Stuttgart)
Doan, Aleksander (Columbia University)

Dwivedi, Shubham (Humboldt University of Berlin)
Fadel, Daniel (Peking University)
Finkelberg, Michael (National Research University
Higher School of Economics)
Foscolo, Lorenzo (UCL)
Fredrickson, Laura (Stanford University)
Hanany, Amihay (Imperial College)
Harland, Derek (University of Leeds)
Harris, Thomas (University of Arizona)
He, Siqi (Stony Brook)
Hitchin, Nigel (University of Oxford)
Hurtubise, Jacques (McGill University)

Kelleher, Casey (Princeton)
Kottke, Chris (New College of Florida)
Lang, Christopher (University of Waterloo)
Li, Yang (MIT)
Li, Jiakai (Harvard University)
Mazzeo, Rafe (Stanford University)
Mendizabal, Jaime (UC London)
Mochizuki, Takuro (Kyoto University)
Moore, Greg (Rutgers University)
Nagy, Akos (Duke University)
Neitzke, Andrew (Yale University)
Nekrasov, Nikita (Simons Center for Geometry and Physics)
Norbury, Paul (University of Melbourne)
Oliveira, Goncalo (Universidade Federal Fluminense)
Pym, Brent (McGill University)
Quinones, Jason (Gallaudet University)
Rayan, Steven (University of Saskatchewan)
Royston, Andy (Penn State Fayette)
Schaposnik, Laura (University of Illinois, Chicago)
Singer, Michael (University College London)
Singhal, Ragini (University of Waterloo)
Stern, Mark (Duke University)
Sun, Weifeng (Harvard University)
Walpuski, Thomas (Humboldt-Universität zu Berlin)
Weiss, Hartmut (Christian-Albrechts-Universität zu Kiel)
Yan, Fei (Rutgers University)
Zolkavich, Nicole (McGill University)

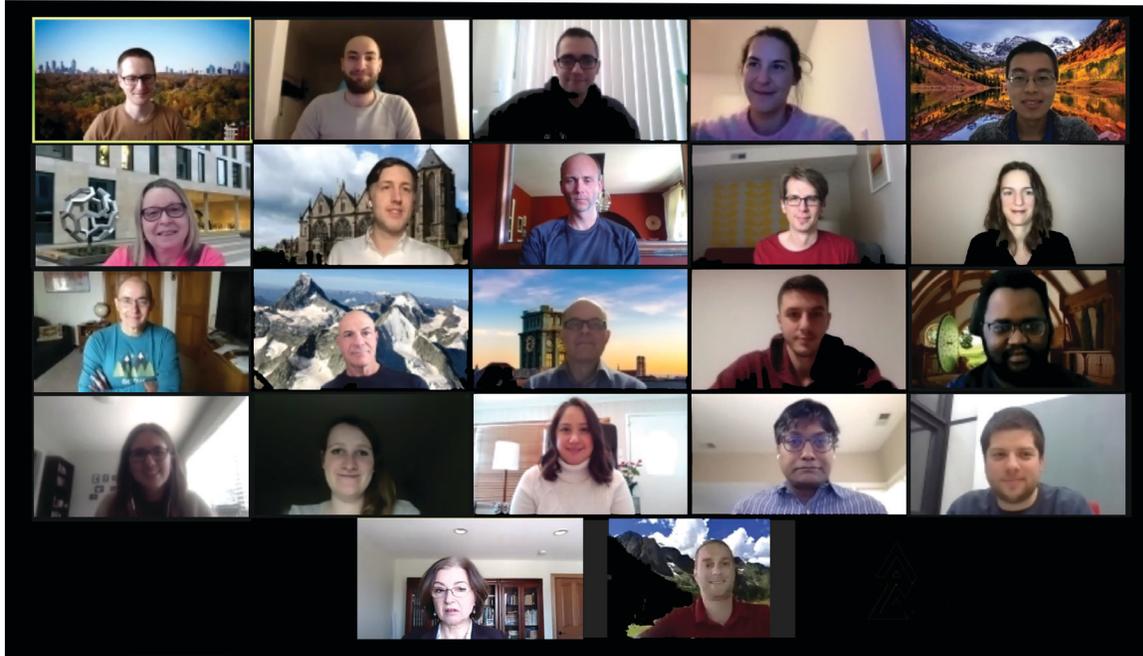
Optimization under Uncertainty: Learning and Decision Making (Online)

February 8 - 12, 2021

Organizers:

Claudia Schillings (University of Mannheim)
Johannes Royset (Naval Postgraduate School)

Lars Ruthotto (Emory University)
Thomas Surowiec (Philipps-Universität Marburg)



Uncertainty pervades all areas of the natural sciences, engineering, and operations research. Such uncertainty may arise due to noisy measurements, model ambiguity, or unknown parameters. Moreover, optimal decision making under uncertainty is crucial to arrive at reliable solutions, which are resilient to catastrophe. This workshop was intended to join researchers in optimization under uncertainty, uncertainty quantification, and machine learning, whose work stands to benefit from cutting-edge machine learning techniques for intricate, data-driven models of real-world phenomena.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5167>

Participants:

Bayraksan, Guzin (Ohio State University)
Burger, Michael (Fraunhofer ITWM)
Chen, Peng (UT Austin)
Dashti, Masoumeh (University of Sussex)
Dentcheva, Darinka (Stevens Institute of Technology)
Effertz, Katharina (Philipps-Universität Marburg)
Fung, Wu (University of California, Los Angeles)
Gahururu, Deborah (Philipps-Universität Marburg)
Geiersbach, Caroline (Weierstrass Institute)
Ghattas, Omar (University of Texas at Austin)
Guth, Philipp (University of Mannheim)
Haber, Eldad (The University of British Columbia)
Hanu, Matei (University of Mannheim)
Hartmann, Vicky (University of Mannheim)
Heibutzki, Sarah (Philipps-Universität Marburg)
Hensel, Eneas (University of Mannheim)
Hosseini, Bamdad (California Institute of Technology)

Hussmann, Pauline (Philipps-Universität Marburg)
Julian, Abbey (Emory)
Kostina, Ekaterina (Heidelberg University)
Kouri, Drew (Sandia National Laboratories)
Kuo, Frances (University of New South Wales)
Madondo, Malvern (Emory University)
Marzouk, Youssef (Massachusetts Institute of Technology)
Newman, Elizabeth (Emory)
Nurbekyan, Levon (UCLA)
Pang, Jong-Shi (University of Southern California)
Pidstrigach, Jakiw (University of Potsdam)
Royset, Johannes (Naval Postgraduate School)
Ruthotto, Lars (Emory University)
Schillings, Claudia (University of Mannheim)
Schultz, Rüdiger (University of Duisburg-Essen)
Sen, Bodhisattva (Columbia University)

Sen, Suvrajeet (University of Southern California)
Stadler, Georg (New York University)
Strauch, Claudia (Aarhus University)
Surowiec, Thomas (Philipps-Universitaet Marburg)
Teckentrup, Aretha (University of Edinburgh)
Theiss, Mike (Philipps-Universität Marburg)
Thompson, Philip (Purdue)
Ulbrich, Michael (Technical University of Munich)
van Bloemen Waanders, Bart (Sandia National Laboratories)
Weissmann, Simon (University of Heidelberg)
Willcox, Karen (UT Austin)
Yin, Wotao (University of California, Los Angeles)

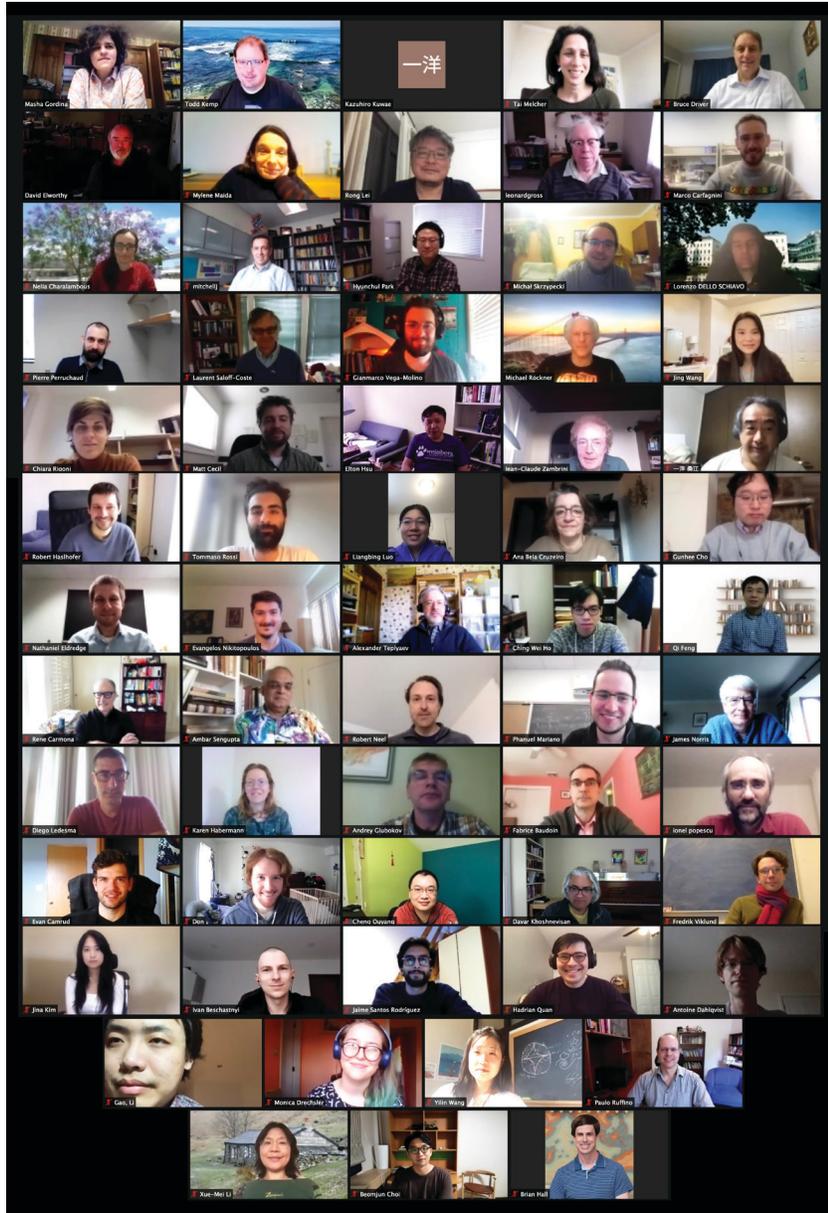
Stochastics and Geometry (Online)

March 7 - 12, 2021

Organizers:

Masha Gordina (University of Connecticut)
Todd Kemp (UC San Diego)

Tai Melcher (University of Virginia)



The workshop brought together some of the world's top experts and promising young researchers working at the interface of Stochastics and Geometry, broadly understood. Through expository talks and research presentations, the workshop gave a vibrant overview of the most recent developments in the interaction between analysis, geometry and stochastic analysis. The focus of the workshop was different approaches to random processes in geometric settings, with emphasis on problems on heat kernel analysis on finite- and infinite-dimensional manifolds, sometimes equipped with degenerate geometries, as well as random matrices and non-commutative probability and geometric rough paths.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5184>

Participants:

Albeverio, Sergio (University of Bonn)
Alonso Ruiz, Patricia (Texas A&M)
An, Zhongshan (University of Connecticut)
Bailleul, Ismael (Universite Rennes 1)
Baudoin, Fabrice (University of Connecticut)
Beschastnyi, Ivan (Universidade de Aveiro)
Buttsworth, Timothy (University of Queensland)
Camrud, Evan (Iowa State University)
Carfagnini, Marco (University of Connecticut)
Carmona, René (Princeton University)
Cass, Thomas (Imperial College London)
Castillo, Victor (Pontificia Universidad Católica de Chile)
Cecil, Matthew (University of Utah)
Charalambous, Nelia (University of Cyprus)
Chen, Li (Louisiana State University)
Cho, Gunhee (University of Connecticut)
Costa, Masterson Falcão de Morais (Universidade Federal de Pernambuco)
Cruzeiro, Ana Bela (Instituto Superior Técnico, Lisbon)
Dahlqvist, Antoine (University of Sussex)
Dautenhahn, Emily (Cornell University)
Debbi, Latifa (National Polytechnic School)
Dello Schiavo, Lorenzo (IST Austria)
Dhar, Sougata (University of Connecticut)
Ding, Hao (Institut de Mathématiques de Bourgogne)
Dobbs, Dan (Trine University)
Drechsler, Monica (Federal University of Santa Catarina- UFSC)
Driver, Bruce (University of California San Diego)
Eldredge, Nathaniel (University of Northern Colorado)
Fang, Shizan (Universite de Bourgogne)
Feng, Qi (University of Southern California)
Friedrich, Roland (ETH)
Gao, Li (Technische Universität München)
Glubokov, Andrey (Purdue University)
Gordin, Mira (Princeton University)
Gordina, Masha (University of Connecticut)
Gross, Leonard (Cornell)
Habermann, Karen (University of Warwick)
Hall, Brian (University of Notre Dame)
Haslhofer, Robert (University of Toronto)
Herry, Ronan (University of Bonn)
Herzog, David (Iowa State University)
Ho, Ching Wei (Indiana University Bloomington)
Hou, Qi (Beijing Institute of Mathematical Sciences and Applications)
Hsu, Elton (Northwestern University)
Kemp, Todd (UC San Diego)
Khoshnevisan, Davar (University of Utah)
Kim, Hyoungji (Iowa State University)
Kopfer, Eva (Hausdorff Center for Mathematics - Bonn)
Kuwae, Kazuhiro (Fukuoka University)
Ledesma, Diego Sebastian (Universidade Estadual de Campinas)
Li, Xue-Mei (Imperial College London)
Li, Zhongyang (University of Connecticut)
Liu, Guoping (Huazhong University of Science and Technology)
Luo, Liangbing (University of Connecticut)
Magnabosco, Mattia (University of Bonn)
Maida, Mylene (Université de Lille, France)
Mariano, Phaniel (Union College)
McSwiggen, Colin (University of Tokyo)
Melcher, Tai (University of Virginia)
Michelangeli, Alessandro (University of Bonn)
Mitchell, Jeffrey (Robert Morris University)
Mramor, Veno (University of Warwick)
Neel, Robert (Lehigh University)
Nikitopoulos, Evangelos (UCSD)
Norris, James (Cambridge University)
Ouyang, Cheng (University of Illinois at Chicago)
Park, Hyunchul (SUNY New Paltz)
Paycha, Sylvie (Potsdam University)
Perruchaud, Pierre (University of Notre Dame)
Petrov, Leonid (University of Virginia)
Phillips, Donnelly (Donnelly Phillips)
Popescu, Ionel (University of Bucharest)
Pulemotov, Artem (The University of Queensland)
Quan, Hadrian (University of Illinois Urbana-Champaign)
Rigoni, Chiara (University of Bonn)
Röckner, Michael (Universitaet Bielefeld)
Rossi, Tommaso (Université Grenoble Alpes)
Rossi, Maurizia (Università di Milano-Bicocca (Italy))
Ruffino, Paulo (Universidade Estadual de Campinas)
Saloff-Coste, Laurent (Cornell University)
Santos Rodríguez, Jaime (MPIM Bonn)
Sengupta, Ambar (University of Connecticut)
Sert, Cagri (Universität Zürich)
Skrzypecki, Michał (University of Warsaw)
Smith, Scott (University of Wisconsin)
Teplyaev, Alexander (University of Connecticut)
Thalmaier, Anton (Universite du Luxembourg)
ÜSTÜNEL, Ali Süleyman (Bilkent University)
Vega-Molino, Gianmarco (University of Connecticut)
Viklund, Fredrik (KTH Royal Institute of Technology)
Wang, Jing (Purdue University)
Wang, Yilin (MIT)
Wendt, Erik (University of Connecticut)
Zambrini, Jean-Claude (University of Lisbon)

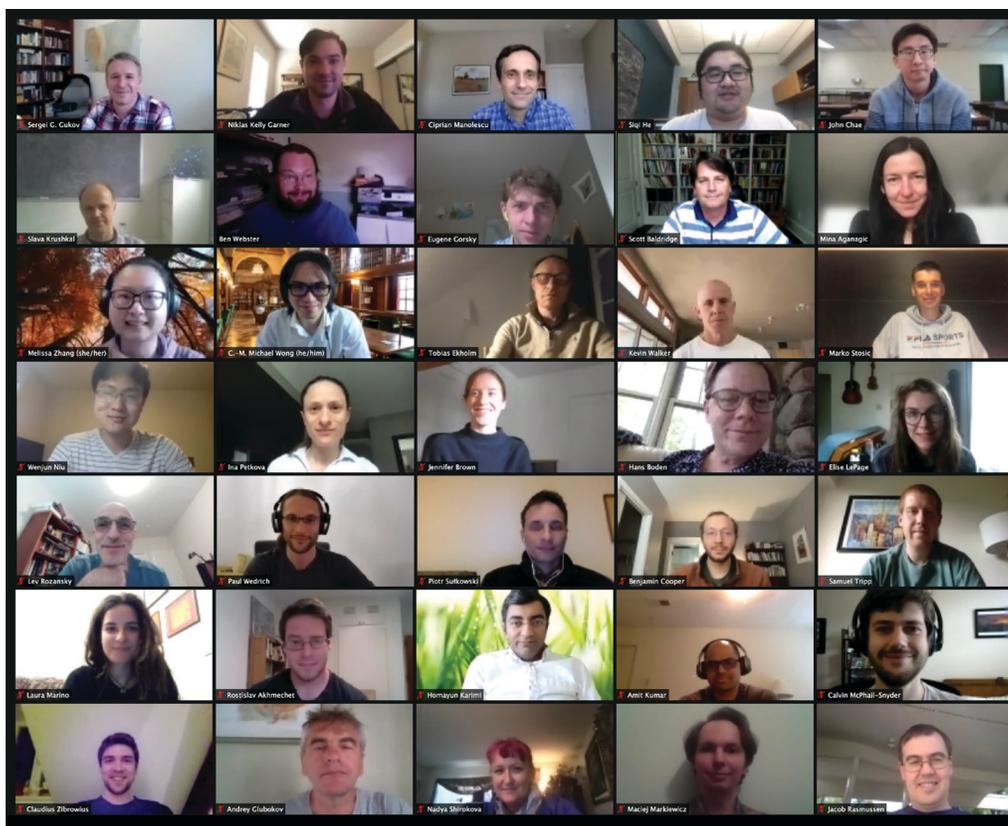
Perspectives on Knot Homology (Online)

May 16 - 21, 2021

Organizers:

Slava Krushkal (University of Virginia)
Mina Aganagic (University of Berkeley)

Ben Webster (University of Waterloo)



Quantum polynomial invariants of links and tangles, such as the Jones polynomial and the HOMFLY-PT polynomial, have played a central role in many areas of mathematics and physics over the last 3 decades. Knot homology is a far reaching generalization of polynomial invariants, which is still being developed. Homological knot invariants are referred to as categorification of the polynomial invariants -- polynomial invariants arise as the (graded) Euler characteristic of a homology theory. There are deeper structures which become manifest at the categorified level -- just like in transition from the Euler characteristic to homology in basic algebraic topology. This workshop brought together experts on many developing perspectives on knot homology (physical, geometric and algebraic) to draw connections between them, and to explore applications.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5105>

Participants:

Adnane, Mostafa (UC Berkeley)
Aganagic, Mina (University of Berkeley)
Agol, Ian (UC Berkeley)
Akhmechet, Rostislav (University of Virginia)
Anno, Rina (Kansas State University)
Baldridge, Scott (Louisiana State University)
Beliakova, Anna (University of Zurich)
Boden, Hans (McMaster University)
Borodzik, Maciej (University of Warsaw)
Brown, Jennifer (UC Davis)

Chae, John (UC Davis)
Cooper, Benjamin (University of Iowa)
Devaux, Steven (Université de Montpellier)
Dimofte, Tudor (University of Edinburgh)
Disney-Hogg, Alec Linden (University of Edinburgh)
Dye, Heather (McKendree University)
Ekholm, Tobias (Uppsala University)
Elias, Ben (University of Oregon)
Fendley, Paul (Oxford)
Fenn, Roger (University of Sussex)

Garner, Niklas (University of Washington)
Glubokov, Andrey (Purdue University)
Gorsky, Eugene (UC Davis)
Grigsby, Elisenda (Boston College)
Gukov, Sergei (California Institute of Technology)
Haydys, Andriy (University of Freiburg)
He, Siqi (Simons Center for geometry and physics)
Hutchings, Michael (University of California)
Im, Mee Seong (United States Naval Academy)
Jankowska, Dorota (University of Warsaw)
Jiyuan, Han (Purdue)
Jordan, David (University of Edinburgh)
Kaiser, Uwe (Boise State University)
Kanstrup, Tina (University of Massachusetts Amherst)
Karimi, Homayun (McMaster University)
Kauffman, Louis (University of Illinois, Chicago)
Khovanov, Mikhail (Columbia University)
Kim, Ken (LLNL University of California)
Kivinen, Oscar (University of Toronto)
Kiwai, Omar (University of Tokyo)
Krushkal, Slava (University of Virginia)
Kumar, Amit (Louisiana State University)
LePage, Elise (UC Berkeley)
Lipshitz, Robert (University of Oregon)
Lomonaco, Samuel (University of Maryland Baltimore County (UMBC))
Manion, Andrew (USC)
Manolescu, Ciprian (Stanford University)
Maricar, Malik (MIT)
Marino, Laura (Universitat Regensburg)
Markiewicz, Maciej (University of Warsaw)
McCarty, Ben (University of Memphis)
McMillan, Matthew (UCLA)
McPhail-Snyder, Calvin (UC Berkeley)
Meshkova, Yulia (University of Helsinki)
Niu, Wenjun (UC Davis)
Oblomkov, Alexei (University of Massachusetts)
Petkova, Ina (Dartmouth College)
Queffelec, Hoel (CNRS)
Rapcak, Miroslav (UC Berkeley)
Rasmussen, Jacob (University of Cambridge)
Rhea, Bakshi (George Washington University)
Robert, Louis-Hadrien (Universite du Luxembourg)
Rozansky, Lev (University of North Carolina)
Rushworth, Will (Syracuse University)
Saxena, Vivek (Rutgers University)
Shende, Vivek (Berkeley)
Shirokova, Nadya (Santa Clara University)
Silvero, Marithania (Universidad de Sevilla)
Stošić, Marko (Instituto Superior Técnico, Portugal)
Sulkowski, Piotr (University of Warsaw)
Sun, Haoyu (University of Texas, Austin)
Tamas, Kalman (Tokyo Institute of Technology)
Tie, Jingzhi (University of Georgia)
Tie, Jingzhi (University of Georgia)
Tripp, Samuel (Dartmouth College)
Wagner, Emmanuel (Institut de Mathematiques de Jussieu)
Webster, Ben (University of Waterloo)
Wedrich, Paul (Max Planck Institute for Mathematics and University of Bonn)

Wildi, Arno (University of Zurich)
Willis, Michael (UCLA.)
Witten, Edward (Institute of Advanced Study)
Wong, C.-M. Michael (Dartmouth College)
Yozgyur, Ramazan (University of Warsaw)
Zhang, Melissa (University of Georgia)
Zibrowius, Claudius (University of Regensburg)

Quantum Foundations, Gravity, and Causal Order (Online)

May 30 - June 4, 2021

Organizers:

Robert Mann (University of Waterloo)
Flaminia Giacomini (Perimeter Institute)

Lucien Hardy (Perimeter Institute)



New experiments are challenging our conventional understanding of past, present, and future in the quantum world. This workshop explored the very foundations of our understanding of space, time, and gravity by looking at new mathematical concepts and methods related to the quantum processes of measuring location, orientation, speed, cause and effect. We expect to forge a path that blends together new ideas on how our description of the structure of space and time must be modified to fully understand how to combine gravity with quantum physics.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5104>

Participants:

Ali Ahmad, Shadi (Dartmouth College)
Allard Guerin, Philippe (Perimeter Institute)
Arabaci, Cemile (University of Waterloo)
Aspelmeyer, Markus (University of Vienna & Austrian Academy of Sciences)
Baccetti, Valentina (RMIT)
Belenchia, Alessio (Universitaet Tuebingen)
Blencowe, Miles (Dartmouth College)
Bose, Sougato (University College London)
Braun, Daniel (Tuebingen Germany)
Brukner, Caslav (Institute for Quantum Optics and Quantum Information - Vienna)
Bunney, Cameron (University of Nottingham)
Butterfield, Jeremy (University of Cambridge)
Carney, Dan (Berkeley National Lab)
Castro Ruiz, Esteban (ETH Zurich)
Cepollaro, Carlo (University of Milan)
Chen, Lin-Qing (University Libre de Bruxelles)
Chiribella, Giulio (The University of Hong Kong)
Christ, Margie (University of Waterloo)
Christodoulou, Marios (University of Vienna)
Costa, Fabio (University of Queensland)
Davis, Tamara (University of Queensland)
Dhumuntarao, Aditya (University of Minnesota)
Dowker, Fay (Imperial College London)
Foo, Joshua (University of Queensland)
Fuentes, Ivette (University of Southampton)
Galley, Thomas (Perimeter Institute)
Giacomini, Flaminia (Perimeter Institute)
Grimmer, Daniel (University of Oxford)
Guryanova, Yelena (IQOQI Vienna)
Hardy, Lucien (Perimeter Institute)
Henderson, Laura (University of Waterloo)
Hoffreumon, Timothee (Universite Libre de Bruxelles)
Ipek, Selman (University at Albany-SUNY)
Jubb, Ian (DIAS)
Kakade, Kartik (Indian Institute of Science Education and Research, Pune)
Kempf, Achim (University of Waterloo)
Kissinger, Aleks (University of Oxford)
León, Juan (Consejo Superior de Investigaciones Científicas - Spain)
Louko, Jorma (University of Nottingham)
MacLaurin, Colin (University of Queensland)
Mann, Robert (University of Waterloo)
March, James (University of Warwick)
Martin-Martinez, Eduardo (University of Waterloo)
Mazumdar, Anupam (University of Groningen)
Morley, Gavin (University of Warwick)
Mueller, Holger (UC Berkeley)
Müller, Markus (Austrian Academy of Sciences)
Oreshkov, Ognyan (Université Libre de Bruxelles)
Papageorgiou, Maria (University of Waterloo/ University of Patras)
Patterson, Everett Avison (University of Waterloo)
Ralph, Timothy (University of Queensland)
Rick Perche, Tales (University of Waterloo)
Ruep, Maximilian H. (University of York)
Russo, Andrea (UCL)
Sakharwade, Nitica (Perimeter Institute)
Sciarrino, Fabio (Sapienza Università di Roma)
Shalabi, Ahmed (University of Waterloo)
Shrapnel, Sally (University of Queensland)
Simao, Jose Diogo (Friedrich-Schiller University Jena)
Smith, Alexander (Saint Anselm College)
Suresh, Ardra (Griffith University)
Surya, Sumati (Raman Research Institute)
Terno, Daniel (Macquarie University)
Tiwari, Madhav (Queen's University Belfast)
Tjoa, Erickson (University of Waterloo)
Walther, Philip (University of Vienna)
Wang, Hui (Dartmouth College)
Weinfurter, Silke (The University of Nottingham)
Wen, Robin (University of Waterloo)
White, Andrew (University of Queensland)
Wilson, Christopher (University of Waterloo)
Wood, Ben (University of Warwick)
Wood, Carolyn (University of Queensland)
Wurtz, Kelly (Perimeter Institute)
Zalel, Stav (Imperial College London)
Zych, Magdalena (University of Queensland)

Novel Mathematical Methods in Material Science: Applications to Biomaterials (Online)

June 13 - 18, 2021

Organizers:

Eleni Panagiotou (University of Tennessee at Chattanooga)

Carme Calderer (University of Minnesota)
Mariel Vazquez (University of California Davis)



The current state of the art of the Mathematical Study of Materials traditionally deals with the fluid-structure interactions (focusing on solving PDEs), often in 2 dimensions, ignoring the topology of the filaments, or focusing on single filaments. Advances in Applied knot theory have made it possible to use topology, an area of traditionally pure mathematics, to study polymer entanglement effects. With this workshop, we brought together Topologists and Applied Mathematicians (PDEs), together with researchers from Physics, Materials Science, Chemistry and Biology to learn from each other with the goal to solve key problems in material science.

We aimed to create new mathematical models of complex fluids that can bridge length and time scales, and study novel ways to model entanglement of polymers and filaments. We stressed that the novelty of this workshop consists not only in bringing together an interdisciplinary array of scientists, but bridging the gap between what has been traditionally catalogued as pure and applied mathematics.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5232>

Participants:

Aguirre Salazar, Lorena (McMaster)
Arsuaga, Javier (University of California, Davis)
Arsuaga-Vazquez, Eithne (University of Saskatchewan)

Baldwin, Quenisha (Tuskegee University)
Barkataki, Kasturi (University of Tennessee at Chattanooga)
Beaton, Nicholas (University of Melbourne)

Bertozzi, Andrea (University of California Los Angeles)
Calderer, Carme (University of Minnesota)
Cantarella, Jason (University of Georgia)
Deguchi, Tetsuo (Ochanomizu University)
Dimitriyev, Mike (University of Massachusetts Amherst)
Earls, Ashley (University of Akron)
Ernst, Claus (Western Kentucky University)
Espanol, Malena (Arizona State University)
Evans, Myfanwy (University of Potsdam)
Farrell, Patrick (University of Oxford)
Ferrari, Margherita Maria (University of South Florida)
Golovaty, Dmitry (University of Akron)
Gorgi, Tiziana (New Mexico State University)
Grosberg, Alexander (New York University)
Gugumcu, Neslihan (Izmir Institute of Technology)
Harris, Sarah (University of Leeds)
Henao, Duvan (Pontificia Universidad Católica de Chile)
Jessee, Jayda (University of Saskatchewan)
Jonoska, Natasha (University of South Florida)
Kauffman, Louis (University of Illinois at Chicago)
Korsah, Maame (University of Tennessee at Chattanooga)
Kumar, Rajeev (Oak Ridge National Laboratories)
Lavrentovich, Oleg (Kent State University)
Liu, Pei (University of Minnesota)
MacKintosh, Fred (Rice University)
Mahmoudi, Sonia (Tohoku University)
Mandya Nagaiah, Hemanth Kumar (University of Tennessee at Chattanooga)
Matsumoto, Elisabetta (Georgia Tech)
Micheletti, Cristian (International School for Advanced Studies)
Millett, Kenneth (University of California, Santa Barbara)
Njagarah, Hatson John Boscoh (Botswana International University of Science and Technology)
Olson, Wilma (Rutgers University)
Panagiotou, Eleni (University of Tennessee at Chattanooga)
Pongtanapaisan, Puttipong (University of Saskatchewan)
Pyne, Alice (The University of Sheffield)
Rawdon, Eric (University of Saint Thomas)
Rechnitzer, Andrew (University of British Columbia)
Redemann, Stefanie (University of Virginia)
Reiter, Philipp (Chemnitz University of Technology)
Richards, Jeffery (East Tennessee State University)
Sazdanovic, Radmila (NC State University)
Scharein, Rob (Hypnagogic Software)
Shimokawa, Koya (Saitama University)
Smith, Philip (University of Tennessee at Chattanooga)
Soteros, Christine (University of Saskatchewan)
Swigon, David (University of Pittsburgh)
Uehara, Erica (Ochanomizu University)
Valentine, Megan (University of California Santa Barbara)
Vazquez, Mariel (University of California Davis)
Walker, Shawn (Louisiana State University)
Wang, Junping (National Science Foundation)
Wang, Jason (University of Pennsylvania)
Weber, Franziska (Carnegie Mellon University)
Wright, Jarod (University of Tennessee at Chattanooga)
Yao, Lingxing (University of Akron)
Yoshida, Ken'ichi (Saitama University)
Zbitniff, Mathew (University of Saskatchewan)
Zhao, Longhua (Case Western Reserve University)
Zhu, Zihao (UC Davis)
Zidovska, Alexandra (New York University)
Ziegler, Uta (Western Kentucky University)
Zumer, Slobodan (University of Ljubljana)

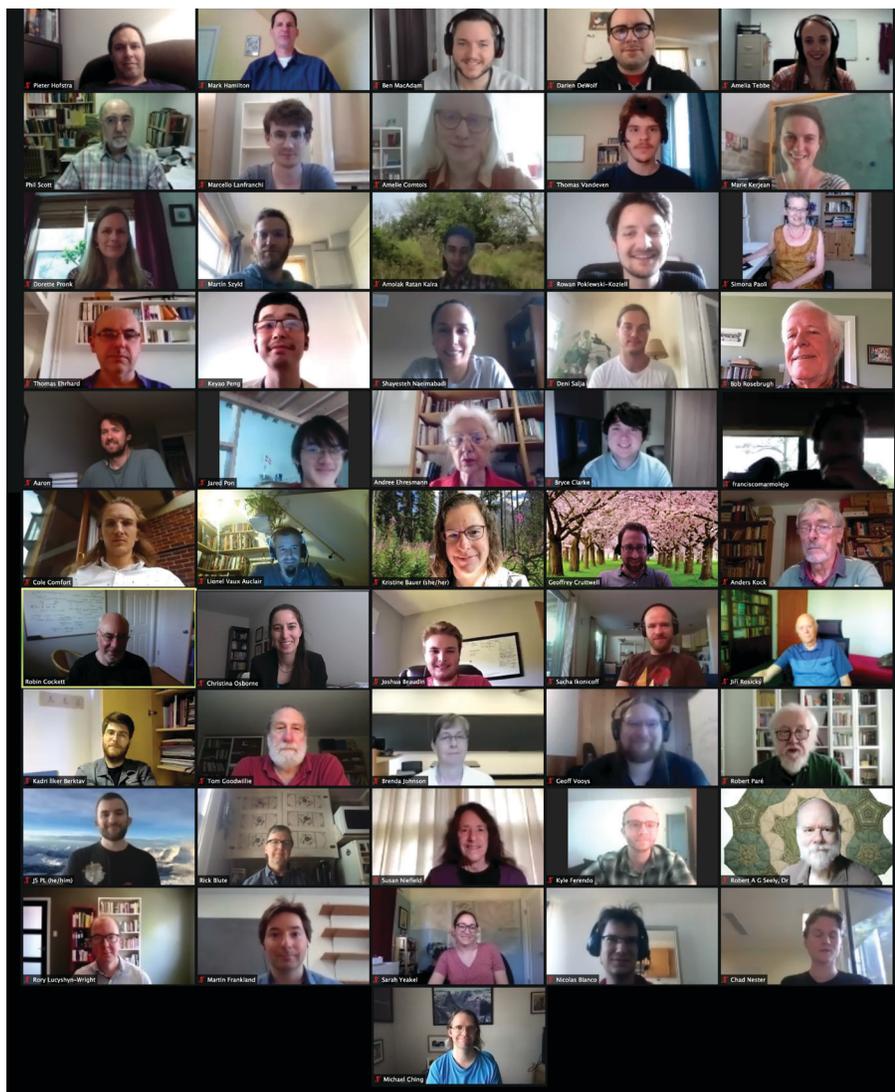
Tangent Categories and their Applications (Online)

June 14 - 18, 2021

Organizers:

Robin Cockett (University of Calgary)
Kristine Bauer (University of Calgary)

Geoffrey Cruttwell (Mount Allison University)



One of the most fundamental notions when studying functions of a real variable is the rate of change of a function, as measured by its derivative. Geometrically, the derivative is the slope of the tangent line. Both the notion of the derivative and the tangent line (or more generally, the tangent bundle of a smooth manifold) can be defined purely axiomatically because of the underlying structure of the category of smooth functions. The derivative, for example, is determined by its properties (such as the sum and product formulae for differentiation, the chain rule, etc.). This structural approach to the derivative leads to the notion of a differential category. Category theory has proven to be a powerful way to organize mathematical structures and to show how these structures relate. The goal of this workshop was to utilize the cross-disciplinary language of tangent categories to identify and delineate general phenomena related to tangent structures in a wide variety of disciplines, including algebraic and differential geometry, algebraic topology and theoretical computer science.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5251>

Participants:

Alvarez-Picallo, Mario (Huawei Research)
Anel, Matthieu (Carnegie Melon University)
Bauer, Kristine (University of Calgary)
Bayeh, Marzieh (University of Ottawa)
Behr, Nicolas (Université de Paris, CNRS, IRIF)
Berktav, Kadri Ilker (Middle East Technical University, Turkey)
Biederman, Georg (Universidad del Norte, Barranquilla)
Blanco, Nicolas (University of Birmingham)
Blute, Rick (University of Ottawa)
Burke, Matthew (Lyryx Learning Inc.)
Ching, Michael (Amherst College)
Christensen, J. Daniel (University of Western Ontario)
Clarke, Bryce (Macquarie University)
Cockett, Robin (University of Calgary)
Comfort, Cole (University of Oxford)
Comtois, Amelie (University of Ottawa)
Cruttwell, Geoffrey (Mount Allison University)
Dewolf, Darien (Brandon University)
Dicaire, Nuiok (University of Edinburgh)
Draguta, David (Ottawa)
Ehresmann, Andree (Université de Picardie)
Ehrhard, Thomas (CNRS and Université de Paris)
English, Aaron (Ottawa)
Ferendo, Kyle (Brown University)
Finster, Eric (University of Cambridge)
Flores, Andres (Instituto de Matemáticas)
Fomatati, Yves Baudelaire (University of Ottawa)
Fortier-Garceau, Simon (University of Ottawa)
Frankland, Martin (University of Regina)
Gallagher, Jonathan (Dalhousie University)
Garner, Richard (Macquarie University)
Gavranovic, Bruno (University of Strathclyde)
Gietelink Oldenzien, Alexander (Paris)
Goodwillie, Tom (Brown University)
Hamilton, Mark (Mount Allison University)
Hardeman Morrill, Rachel (University of Calgary)
Hofstra, Pieter (University of Ottawa)
Ikonicoff, Sacha (University of Calgary)
Johnson, Brenda (Union College)
Johnson, Michael (Macquarie University)
Joyal, André (Université du Québec à Montréal)
Kalra, Amolak Ratan (University of Calgary)
Karvonen, Martti (University of Ottawa)
Kerjean, Marie (Université Sorbonne Paris Nord)
Kim, Ken (LLNL University of California)
Kock, Anders (Aarhus, Denmark)
Kudzman-Blais, Rose (University of Ottawa)
Lafranchi, Marcello (Dalhousie University)
Lemay, Jean-Simon (Mount Allison University)
Leung, Poon (Macquarie University)
Lucyshyn-Wright, Rory (Brandon University)
MacAdam, Ben (University of Calgary)
MacDonald, John Lauchie (University of British Columbia)
Marmolejo Rivas, Francisco (UNAM)
Martínez Ruiz, Sebastián (UNAM)
Menni, Matías (Universidad Nacional de La Plata (UNLP) and Conicet, Argentina)
Murfet, Daniel (University of Melbourne)
Naeimabadi, Shayesteh (University of Ottawa)
Nester, Chad (Tallinn university of technology)
Niefield, Susan (Union College)
Osborne, Christina (Cedarville University)
Pagani, Michele (IRIF Paris France)
Paoli, Simona (Leicester University)
Paré, Robert (Dalhousie University)
Parker, Jason (Brandon University)
Peng, Keyao (Grenoble Alpes University)
Plotkin, Gordon (Google Research)
Poklewski-Koziell, Rowan (University of Cape Town)
Pon, Jared (University of Calgary)
Prasma, Matan (Neurocat GmbH)
Pronk, Dorette (Dalhousie University)
Qiao, Juan (Calgary)
Rosebrugh, Robert (Mount Allison university)
Rosicky, Jiri (Masarykova Univerzita)
Salja, Deni (Dalhousie University)
Scott, Philip (UOttawa)
Scull, Laura (Fort Lewis College)
Seely, Robert (McGill University)
Srinivasan, Priyaa (University of Calgary)
Sulyma, Yuri (Brown University)
Szyld, Martin (Dalhousie University)
Taggart, Niall (Utrecht University)
Tasson, Christine (LIP6 - Sorbonne Université)
Tebbe, Amelia (Indiana University Kokomo)
Uustalu, Tarmo (Reykjavik University)
Vandeven, Thomas (University of Ottawa)
Vaux, Lionel (Aix-Marseille University, France)
Vienney, Jean-Baptiste (Centrale Marseille, Aix-marseille Université)
Vooyoys, Geoff (University of Calgary)
Wilson, Paul (University of Southampton)
Yeakel, Sarah (University of California, Riverside)

Entropic Regularization of Optimal Transport and Applications (Online)

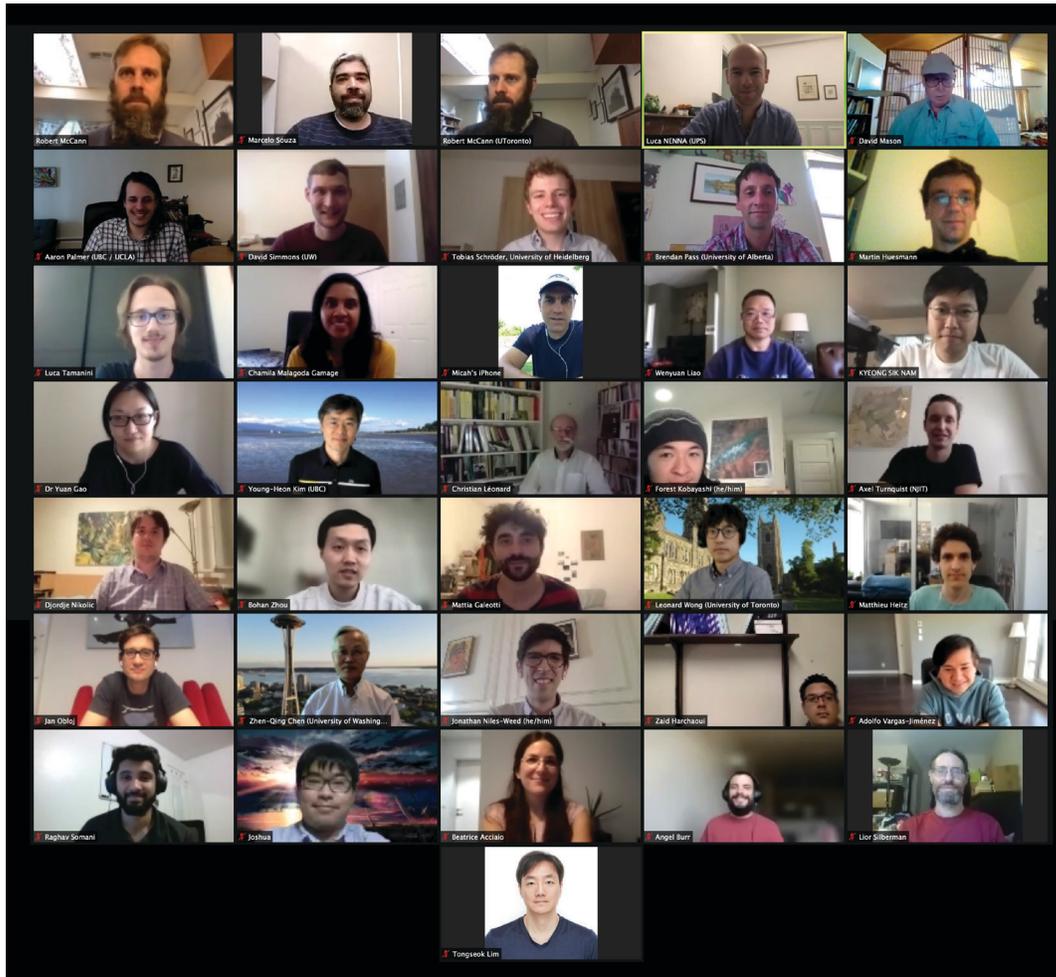
June 20 - 25, 2021

Organizers:

Soumik Pal (University of Washington)

Brendan Pass (University of Alberta)

Aaron Palmer (University of California, Los Angeles)



The mathematics of optimal transport (OT) has grown to become a unifying theme in many scientific disciplines, from solving purely mathematical problems of analysis, geometry, and partial differential equations to developing revolutionary new methods in economics, statistics, machine learning and artificial intelligence.

Much of these recent advances are due to remarkable leaps in computational methods in OT that hinge on entropy based regularizations. Optimal transport, as an optimization problem, is expensive to compute. The entropy regularized version of the same problem finds near-optimal solutions at so-called lightning-fast speed. Not only has this transformed the scope of applications, but the theory of entropy-regularized optimal transport has made important contributions in theoretical probability, statistical physics, and other areas of pure mathematics and engineering. With this breadth of theory and applications comes the challenge of organizing the different groups of researchers to allow an exchange of their most recent problems and results. Our proposed BIRS meeting aimed squarely at bringing together the disparate groups working on entropic regularizations of OT problems, irrespective of their home field. Special consideration is being given towards training younger researchers and students by exposing them to different aspects of theory and giving them opportunities for possible cross-disciplinary collaborations.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5120>

Participants:

Acciaio, Beatrice (ETH Zürich)
Backhoff, Julio (Universität Wien)
Beiglöck, Mathias (University of Vienna)
Borza, Samuël (Durham University)
Burr, Angel (University of Washington)
Chen, Yongxin (Georgia Tech)
Chen, Zhen-Qing (University of Washington)
Chen, Xiaohui (U. Illinois at Urbana Champaign)
Chen, Xiaohong (Yale University)
Conforti, Giovanni (Ecole Polytechnique Paris)
Corblet, Pauline (Sciences Po)
Craig, Katy (University of California Santa Barbara)
Elamvazhuthi, Karthik (University of California, Los Angeles)
Fan, Yanqin (University of Washington)
Fan, Jiaojiao (Georgia Tech.)
Fazel, Maryam (University of Washington)
Fox, Jeremy (Rice University)
Galeotti, Mattia (Università di Bologna.)
Galichon, Alfred (New York University)
Gao, Yuan (Duke University)
Ge, Yuxin (Université Toulouse 3)
Ghosal, Promit (MIT)
Ghoussoub, Nassif (University of British Columbia)
Greco, Giacomo (TU Eindhoven)
Han, Fang (University of Washington)
Heitz, Matthieu (UBC)
Henry, Marc (The Pennsylvania State University)
Hiew, Joshua Zoen-Git (University of Alberta)
Hoffmann, Franca (University of Bonn)
Huang, Hui (University of Calgary)
Huesmann, Martin (Universität Münster)
Irfan, Talha (UET Lahore)
Jo, Min Jun (UBC)
Kausamo, Anna (University of Florence)
Kim, Young-Heon (University of British Columbia)
Kitagawa, Jun (Michigan State University)
Kobayashi, Forest (University of British Columbia)
Korba, Anna (École Nationale de la Statistique et de l'Administration Économique)
Léger, Flavien (Sciences Po Paris)
Leonard, Christian (Université Paris Nanterre)
Li, Lixiong (Johns Hopkins University)
Liao, Wenyuan (University of Calgary)
Lim, Tongseok (Purdue University)
Liu, Lang (University of Washington)
Loewen, Philip (University of British Columbia)
Maas, Jan (IST Austria)
Maaz, Muhammad (University of Toronto)
Malagoda Gamage, Chamila (Michigan State University)
Mason, David M. (University of Delaware)
McCann, Robert (University of Toronto)
Murugan, Mathav (University of British Columbia)
Nam, Kyeongsik (UCLA)
Nenna, Luca (Université Paris-Saclay)
Nikolic, Dorde (UCSB)
Niles-Weed, Jonathan (New York University)
Nurbekyan, Levon (University of California at Los Angeles)
Nurbekyan, Levon (UCLA)
Obloj, Jan (University of Oxford)
Ohta, Shin-ichi (Osaka University)
Ottolini, Andrea (Stanford University)
Pal, Soumik (University of Washington)
Palmer, Aaron (University of California, Los Angeles)
Pass, Brendan (University of Alberta)
Peyré, Gabriel (CNRS and Ecole Normale Supérieure)
Pooladian, Aram-Alexandre (NYU)
Rashid, Umar (University of Engineering and Technology)
Ruan, Yuanlong (McGill University)
Savare, Giuseppe (Bocconi University)
Scetbon, Meyer (ENSAE)
Schiebinger, Geoffrey (University of British Columbia)
Schroeder, Tobias (Ruprecht Karl University of Heidelberg)
Silberman, Lior (University of British Columbia)
Simmons, David (University of Washington)
Somani, Raghav (University of Washington)
Souza, Marcelo (Purdue University)
Tamanini, Luca (Université Paris Dauphine)
Tripathi, Raghav (University of Washington)
Turnquist, Axel (New Jersey Institute of Technology)
Vargas-Jimenez, Adolfo (University of Alberta)
von Renesse, Max (Universität Leipzig)
Warren, Micah (University of Oregon)
Wong, Ting-Kam Leonard (University of Toronto)
Xue, Wendao (University of Washington)
Yang, Yunan (University of California Berkeley)
Yu, Tingzhou (University of Victoria)
Zhou, Bohan (Dartmouth College)

Geometry via Arithmetic (Online)

July 11 - 16, 2021

Organizers:

Brian Lehmann (Boston College)
Tim Browning (Institute of Science and Technology Austria)

David McKinnon (University of Waterloo)
Sho Tanimoto (Nagoya University)



There is an age-old relationship between arithmetic and geometry, going back at least to Euclid's Elements. Historically, it has usually been geometry that has been used to enrich our understanding of arithmetic, but the purpose of this workshop is to study the flow of information in the other direction. Namely, how can arithmetic enhance our understanding of geometry? This meeting brought together researchers from both sides of the partnership, to explore ways to bind the two fields ever closer together.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5051>

Participants:

Alfaraj, Abdulmuhsin (University of Warwick)
Ascher, Kenneth (Princeton University)
Banerjee, Oishee (Hausdorff Center for Mathematics)
Beheshti, Roya (Washington University (St. Louis - MO))
Bilu, Margaret (IST Austria)

Brandes, Julia (University of Gothenburg)
Browning, Tim (Institute of Science and Technology Austria)
Capuano, Laura (Università degli Studi Roma Tre)
Castravet, Ana Maria (University of Paris-Saclay, Versailles)

Chen, Qile (Boston College)
Ciurca, Tudor (Cambridge)
DeVleming, Kristin (University of California San Diego)
Ellenberg, Jordan (University of Wisconsin)
Faisant, Loïs (Grenoble)
Farb, Benson (University of Chicago)
Fontanari, Claudio (Università degli Studi di Trento)
Glubokov, Andrey (Purdue University)
Gounelas, Frank (Technische Universität München)
Grieve, Nathan (Royal Military College of Canada, Carleton University and L'Université du Québec à Montréal (UQAM))
Huang, Zhizhong (IST Austria)
Javanpeykar, Ariyan (Universität Mainz)
Kebekus, Stefan (Albert-Ludwigs-Universität Freiburg)
Lehmann, Brian (Boston College)
Loeser, Francois (Sorbonne Université)
Loughran, Daniel (University of Bath)
Manzateanu, Adelina (University of Leiden)
Matei, Vlad (University of Tel Aviv)
McKinnon, David (University of Waterloo)
Mello, Jorge (York University)
Nakahara, Masahiro (University of Washington)
Park, Jun-Yong (IBS Center for Geometry and Physics)
Peyre, Emmanuel (University of Grenoble)
Pieropan, Marta (Utrecht University)
Poonen, Bjorn (Massachusetts Institute of Technology)
Riedl, Eric (Notre Dame)
Roth, Mike (Queen's University)
Santens, Tim (KU Leuven)
Satriano, Matthew (University of Waterloo)
Sawin, Will (Columbia University)
Sengupta, Akash (Columbia University)
Shen, Mingmin (University of Amsterdam)
Smeets, Arne (Radboud Universiteit Nijmegen)
Starr, Jason (SUNY Stony Brook)
Streeter, Sam (University of Bath)
Tanimoto, Sho (Nagoya University)
Tian, Zhiyu (Beijing University)
Tosteson, Philip (University of Chicago)
Tschinkel, Yuri (Courant Institute NYU and Simons Foundation)
Turchet, Amos (Roma Tre University)
Uppal, Harkaran (University of Bath)
Várilly-Alvarado, Anthony (Rice University)
Viada, Evelina (Georg-August-Universität)
Viray, Bianca (University of Washington)
Vishe, Pankaj (Durham University)
Vogt, Isabel (University of Washington)
Wang, Julie Tzu-Yueh (Academia Sinica)
Yasuda, Takehiko (Osaka University)
Yasufuku, Yu (Nihon University)

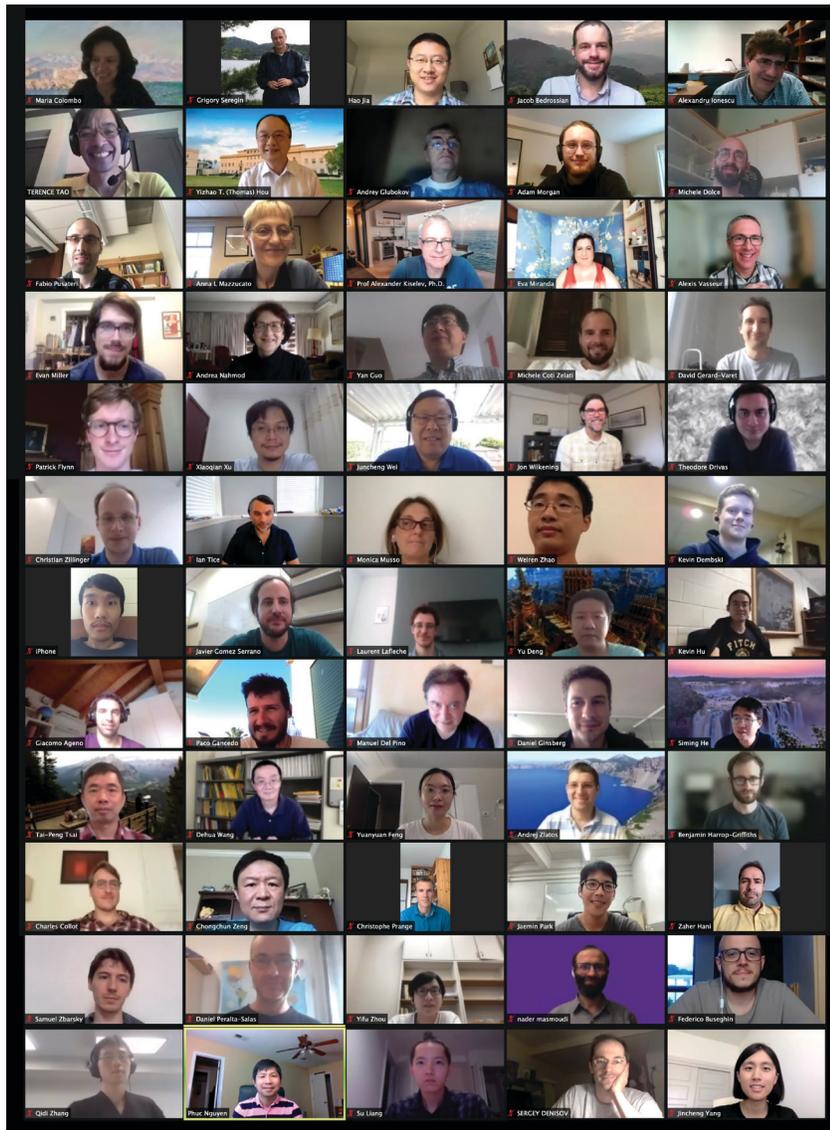
New Mechanisms for Regularity, Singularity, and Long Time Dynamics in Fluid Equations (Online)

July 25 - 30, 2021

Organizers:

Hao Jia (University of Minnesota)
 Jacob Bedrossian (University of Maryland)

Alexandru Ionescu (Princeton University)
 Alexander Kiselev (Duke University)



Partial differential equations (PDEs) inspired by dynamics of incompressible fluid are among the oldest PDEs that were studied, due to their importance in science and engineering. Mathematically understanding the fundamental equations such as Euler and Navier Stokes equations remain challenging. Recently, new mechanisms were discovered that led to significant progresses in several classical problems, including nonlinear asymptotic stability of coherent structures, possible formation of singularities near boundaries, and uniqueness issue of weak solutions. This workshop brought together top experts in the field, and creates an environment where all the latest ideas, intuition and techniques can be shared and refined. Another important goal of the proposed workshop is to introduce junior researchers to a highly active area of research in PDEs of fluid dynamics.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5110>

Participants:

Alazard, Thomas (ENS Paris-Saclay)
ALBRITTON, DALLAS (Courant Institute of Mathematical Sciences)
Aleali, Ali (Payame Noor University)
An, Jing (Max Planck Institute)
Bedrossian, Jacob (University of Maryland)
BEEKIE, RAJENDRA (Courant Institute)
Blumenthal, Alex (Georgia Institute of Technology)
Buckmaster, Tristan (Princeton University)
Cardona, Robert (Universitat Politècnica de Catalunya)
Chen, Jiajie (Caltech)
Chen, Hui (Zhejiang University of Science and Technology)
Chen, Gong (University Of Toronto)
Collot, Charles (Cergy Paris Université)
Colombo, Maria (EPFL)
Constantin, Peter (Princeton University)
Constantin, Adrian (Vienna University)
Cordoba, Diego (ICMAT Madrid)
Coti Zelati, Michele (Imperial College London)
Dai, Mimi (University of Illinois at Chicago)
Davila, Juan (University of Bath)
del Pino, Manuel (University of Bath)
Dembski, Kevin (University of Toronto)
Deng, Yu (University of Southern California)
Denisov, Sergey (University of Wisconsin Madison)
Disconzi, Marcelo (Vanderbilt University)
Doering, Charlie (University of Michigan)
Dolce, Michele (Imperial college London)
Drivas, Theodore (Stony Brook University)
Fan, Chenjie (Chinese Academy of Sciences)
Feng, Yuanyuan (Pennsylvania State University)
Feng, Zhewen (University of Queensland)
Flynn, Patrick (Brown University)
Gancedo, Francisco (University of Seville)
Gerard-Varet, David (University Paris Diderot)
Ghoul, Tej-Eddine (New York university Abu Dhabi)
Ginsberg, Dan (Princeton University)
Glubokov, Andrey (Purdue University)
Golding, Will (University of Texas at Austin)
Gomez Serrano, Javier (Brown University)
Guillod, Julien (Sorbonne Université)
Guo, Yan (Brown University)
Harrop-Griffiths, Benjamin (UCLA)
He, Siming (Duke University)
He, Siming (Duke University)
Hou, Thomas (California Institute of Technology)
Hu, Yiran (University of Texas at Austin)
Hu, Zhongtian (Duke University)
Ignatova, Mihaela (Temple University)
Ionescu, Alexandru (Princeton University)
Iyer, Sameer (Princeton University)
Jang, Juhi (University of Southern California)
Jeong, In-Jee (Seoul National University)
Jerrard, Bob (University of Toronto)
Jia, Hao (University of Minnesota)
Jin, Kexin (Princeton university)
Jin, Xueting (Capital Normal University)
Jo, Min Jun (UBC)
Kiselev, Alexander (Duke University)
Kukavica, Igor (University of Southern California)
Lacave, Christophe (Universite Grenoble Alpes)
Lafleche, Laurent (University of Texas at Austin)
Leger, Tristan (Princeton University)
Lei, Zhen (Fudan University)
Liao, Xian (Karlsruhe Institute of Technology)
Lin, Zhiwu (Georgia Institute of Technology)
Lin, Quyan (University of California Santa Barbara)
Liu, Yue (University of Texas at Arlington)
Liu, Yanlin (Beijing Normal University)
Lu, Wenjie (University of Minnesota)
Luo, Xiaoyutao (Duke University)
Luo, Ting (Zhejiang Normal University)
Ma, Xiao (Princeton University)
Masmoudi, Nader (nyu)
Mazzucato, Anna (Penn State University)
Mei, Yu (Northwestern Polytechnical University)
Mei, He (Peking University)
Miller, Evan (McMaster University)
Miranda, Eva (Universitat Politècnica de Catalunya)
Morgan, Adam (University of Toronto)
Musso, Monica (University of Bath)
Nahmod, Andrea (University of Massachusetts)
Nguyen, Toan (Penn State University)
Nguyen, Phuc (Louisiana State University)
Nguyen, Huy (Brown University)
Novack, Matt (Courant Institute)
Park, Jaemin (University of Barcelona)
Pasqualotto, Federico (University of California Berkeley)
Pausader, Benoit (Brown University)
Pavlovic, Natasa (University of Texas at Austin)
Peralta-Salas, Daniel (Instituto de Ciencias Matemáticas - Madrid)
Prange, Christophe (CNRS and CY Cergy Paris University)
Punshon-Smith, Sam (Brown University)
Pusateri, Fabio (University of Toronto)
Ruan, Zhuoping (Nanjing University)
Seregin, Grigory (Oxford University)
Shkoller, Steve (UC Davis)
Speck, Jared (Vanderbilt University)
Stingo, Annalaura (ICERM at Brown University)
Strauss, Walter (Brown University)
Sun, Ruoci (Karlsruhe Institute of Technology (KIT))
Sun, Changzhen (University Paris-Saclay)
Sverak, Vladimir (University of Minnesota)
Tao, Terence (University of California - Los Angeles)
Tice, Ian (Carnegie Mellon University)
Tong, Jiajun (Peking University)
Tsai, Tai-Peng (University of British Columbia)
Vasseur, Alexis (The University of Texas at Austin)
Walsh, Samuel (University of Missouri)
Wang, Dehua (University of Pittsburgh)
Wang, Yixuan (Caltech)
Wang, Xuecheng (Tsinghua University)
Wei, Juncheng (University of British Columbia)

Widmayer, Klaus (EPFL)
Wilkening, Jon (University of California, Berkeley)
Wu, Sijue (University of Michigan)
Xu, Xiaoqian (Duke Kunshan University)
Yang, Jincheng (University of Texas at Austin)
Yang, Yupei (Duke)
Yao, Yao (National University of Singapore)
Zbarsky, Sam (Princeton University)
Zeng, Chongchun (Georgia Institute of Technology)
Zeng, Zirong (Shanghai Jiao Tong University)
Zhang, Zhiyuan (NYU)
Zhang, Zhaoyun (Duke)
Zhang, Qingtian (West Virginia University)
Zhang, Qidi (UBC Mathematics Department)
Zhang, Deng (Shanghai Jiao Tong University)
Zhang, Wanwan (Capital Normal University)
Zhao, Weiren (New York University in Abu Dhabi)
Zhao, Zehua (University of Maryland)
Zhao, Lifeng (University of Science and Technology of China)
Zhao, Xinyu (McMaster University)
Zhou, Yifu (Johns Hopkins University)
Zillinger, Christian (Karlsruhe Institute of Technology)
Zlatos, Andrej (University of California San Diego)

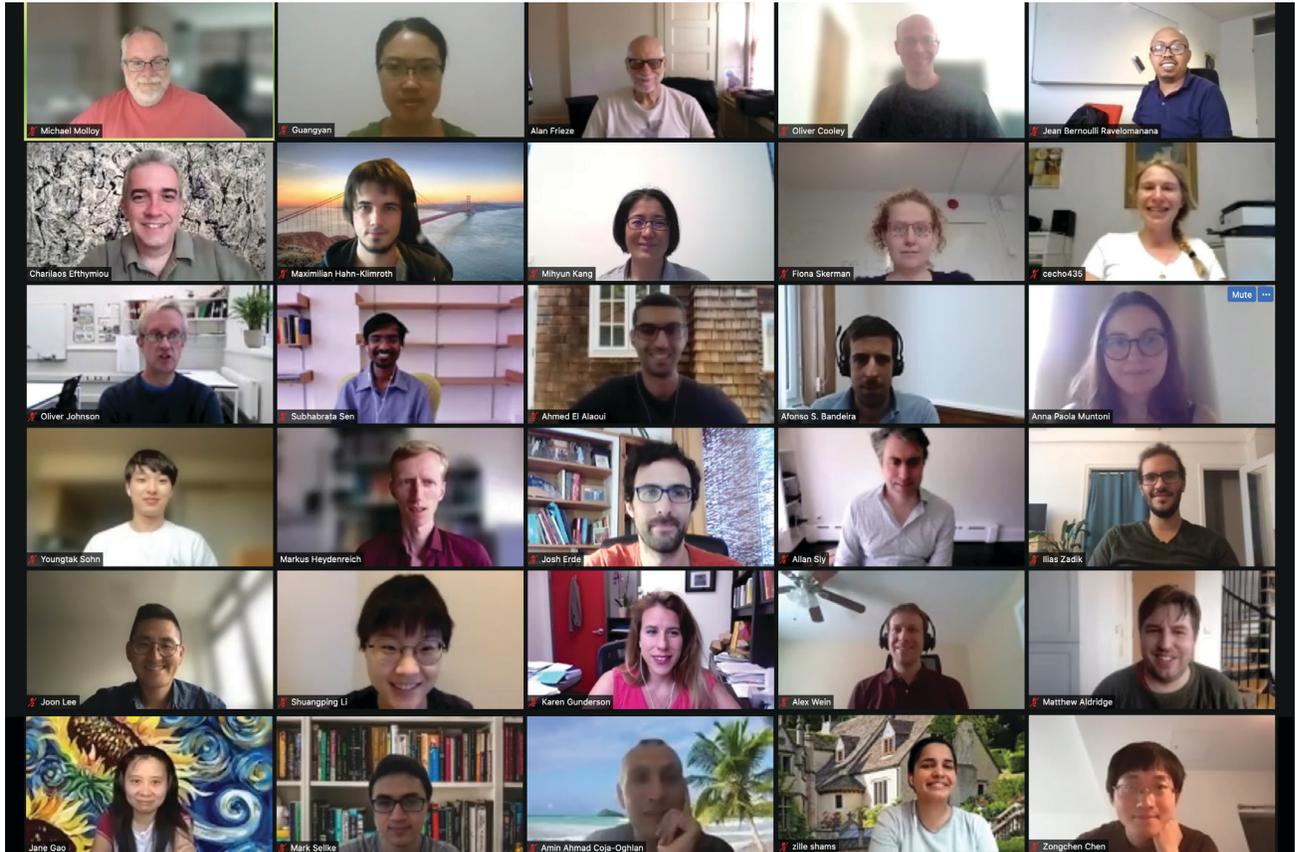
Random Graphs and Statistical Inference: New Methods and Applications (Online)

August 8 - 13, 2021

Organizers:

Michael Molloy (University of Toronto)
Amin Coja-Oghlan (University of Frankfurt)
Pu Gao (University of Waterloo)

Mihyun Kang (TU Graz)
Joon Lee (Goethe University Frankfurt)



The systematic study of random graphs commenced with the seminal work of Erdős and Renyi in the 1960s. Beyond the classical connections and synergies between random graphs and computer science, over the last few years a new exciting connection between random graphs and statistical inference has been discovered. These connections have led to important new insights on computational problems and statistical inference problems and to new methods for the analysis of random graphs or random discrete structures in general. In addition, since the late 1990s an insightful approach called the cavity method by physicists has been applied to put forward predictions on structural properties of random graphs and their phase transitions. More recently, it has inspired new algorithms for statistical inference problems such as message passing algorithms and novel spectral algorithms. This workshop was able to stimulate research and foster new exciting interdisciplinary collaborations between researchers with different backgrounds and expertise in random graphs, computer science, probability, statistics, statistical inference and information theory.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5108>

Participants:

Abbe, Emmanuel (EPFL)
Achlioptas, Dimitris (University of Athens)
Addario-Berry, Louigi (McGill University)
Aldridge, Matthew (University of Leeds)

Angel, Omer (University of British Columbia)
Bandeira, Afonso (ETH Zurich)
Barbier, Jean (ICTP)
Ben Arous, Gerard (New York University)

Chatterjee, Sourav (Stanford University)
Chen, Zongchen (Georgia Institute of Technology)
Coja-Oghlan, Amin (University of Frankfurt)
Cooley, Oliver (Graz University of Technology)
Efthymiou, Charilaos (University of Warwick)
El Alaoui, Ahmed (Cornell University)
Erde, Joshua (TU Graz)
Frieze, Alan (Carnegie Mellon University)
Gao, Pu (University of Waterloo)
Glubokov, Andrey (Purdue University)
Gunderson, Karen (University of Manitoba)
Hahn-Klimroth, Max (Goethe University Frankfurt)
Heydenreich, Markus (LMU Munich)
Holmgren, Cecilia (Uppsala University)
Johnson, Oliver (University of Bristol)
Kang, Mihyun (TU Graz)
Krieg, Lena (TU Dortmund)
Kupavskii, Andrey (Moscow Institute of Physics and Technology)
Lee, Joon (Goethe University Frankfurt)
Li, Shuangping (Princeton University)
Loh, Po-Ling (University of Cambridge)
Molloy, Michael (University of Toronto at Scarborough)
Mossel, Elchanan (MIT)
Mueller, Noela (TU Eindhoven)
Muntoni, Anna Paola (Politecnico di Torino)
Ramdas, Aaditya (Carnegie Mellon University)
Ravelomanana, Jean (Goethe University Frankfurt)
Rolvien, Maurice (Goethe University Frankfurt)
Sellke, Mark (Stanford)
Sen, Subhabrata (Harvard)
Shams, Zill e (The Women University Multan, Pakistan)
Sicuro, Gabriele (King's College London)
Skerman, Fiona (Uppsala University)
Sly, Allan (Princeton)
Sohn, Youngtak (Stanford University)
Vontobel, Pascal (The Chinese University of Hong Kong)
Wein, Alex (NYU)
Wormald, Nicholas (Monash University)
Zadik, Ilias (New York University)
Zhou, Guangyan (Beijing Technology and Business University)

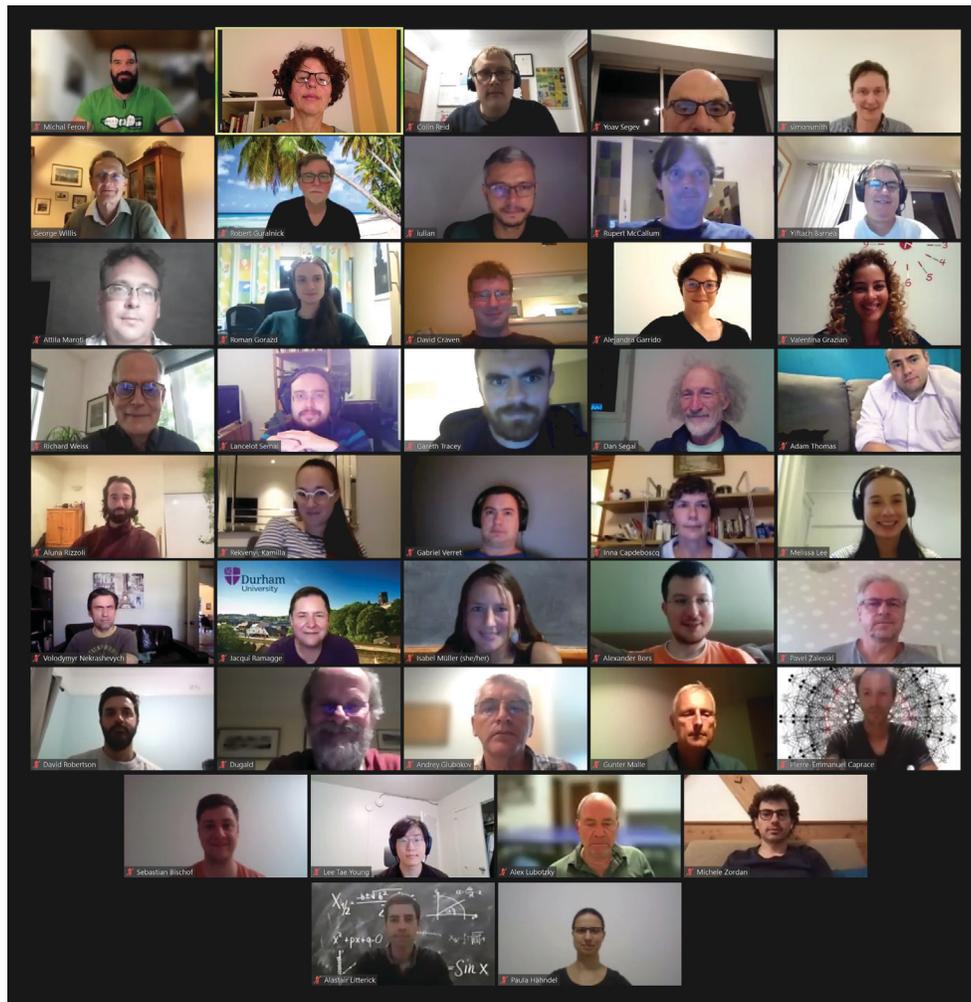
Totally Disconnected Locally Compact Groups via Group Actions (Online)

August 15 - 20, 2021

Organizers:

George Willis (University of Newcastle, New South Wales)
Robert Guralnick (University of Southern California)

Katrin Tent (Universitaet Muenster)
Donna Testerman (Ecole Polytechnique Federale de Lausanne)



Finite permutation groups are understood through combinatorial methods, with a large role played by representation theory, while concepts from logic and topology come to the fore when studying infinite permutation groups. This workshop brought together researchers on both finite and infinite permutation groups to share techniques and recent advances, but with the main focus being on infinite groups, in particular totally disconnected locally compact groups. These infinite permutation groups have finite sub-degrees and so the theory is intrinsically related to that of finite permutation groups. The subject is advancing on many fronts due to several recent developments, in model theory, in analysis and topology, in number theory and combinatorics, in geometry, and via the numerous applications of the classification of finite simple groups. This workshop was ideal for a diverse group of researchers to gather and discuss these advances and the future directions.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5151>

Participants:

Allingham, David (University of Newcastle)
Aschbacher, Michael (California Institute of Technology)
Bamberg, John (University of Western Australia)
Barnea, Yiftach (University of London)
Bartosova, Dana (University of Florida)
Baumeister, Barbara (Universitaet Bielefeld)
Bischof, Sebastian (University of Giessen)
Borovik, Alexandre (University of Manchester)
Bors, Alexander (Carleton University)
Burness, Tim (University of Bristol)
Capdeboscq, Inna (University of Warwick)
Caprace, Pierre-Emmanuel (UCLouvain)
Carter, Max (The University of Newcastle)
Castellano, Ilaria (University of Milano-Bicocca)
Chang, Mun See (University of St. Andrews)
Chatterjee, Pralay (Institute of Mathematical Sciences - India)
Craven, David (University of Birmingham)
Devillers, Alice (University of Western Australia)
Ershov, Mikhail (University of Virginia)
Ferov, Michal (The University of Newcastle)
Freedman, Saul (University of St Andrews)
Garrido, Alejandra (Universidad Autónoma de Madrid and ICMAT)
Garzoni, Daniele (University of Tel Aviv)
Ghadernezhad, Zaniar (Imperial College London)
Giudici, Michael (The University of Western Australia)
Glubokov, Andrey (Purdue University)
Goffer, Gil (Weizmann Institute)
Gorazd, Roman (The University of Newcastle)
Grazian, Valentina (University of Milano - Bicocca)
Gruber, Jonathan (Ecole Polytechnique Federale de Lausanne)
Guralnick, Robert (University of Southern California)
Hähndel, Paula (Martin Luther University Halle-Wittenberg)
Harper, Scott (University of Bristol)
Hudson, Scott (University of South Wales)
Kaplan, Itay (Hebrew University of Jerusalem)
Kechris, Alexander (California Institute of Technology)
Korhonen, Mikko (SUSTech)
Lederle, Waltraud (UCLouvain)
Lee, Melissa (University of Auckland)
Lee, Tae Young (Rutgers University)
Li, Cai Heng (Southern University of Science and Technology)
Liebeck, Martin (Imperial College)
Litterick, Alastair (University of Essex)
Lubotzky, Alex (Hebrew University of Jerusalem)
Macpherson, Hugh (University of Leeds)
Malicki, Maciej (Institute of Mathematics of the Polish Academy of Sciences)
Malle, Gunter (Technische Universität Kaiserslautern)
Mandal, Arunava (IISER Mohali)
Marchionna, Bianca (University of Milano-Bicocca)
Maroti, Attila (Alfréd Rényi Institute of Mathematics)
Marquis, Timothee (Université Catholique de Louvain)
McCallum, Rupert (University of Tübingen)
Mckemmie, Eilidh (Hebrew University of Jerusalem)
Monod, Nicolas (EPFL)
Morgan, Luke (University of Primorksa)
Moscatiello, Mariapia (University of Bologna)
Muller, Isabel (Imperial College London)
Nagnibeda, Tatiana (University of Geneva)
Nekrashevych, Volodymyr (Texas A & M University)
Neretin, Yury (Universität Wien)
Nies, Andre (The University of Auckland)
Norris, Miriam (Kings College London)
Nuez González, Javier de la (University of the Basque Country)
Panagiotopoulos, Aristotelis (University of Münster)
Parker, Chris (University of Birmingham)
Pengelly, Rachel (University of Birmingham)
Pinto E Silva, João Vitor (The University of Newcastle)
Praeger, Cheryl (University of Western Australia)
Pyber, Laci (Renyi Institute of Mathematics Budapest)
Raja, C.R.E. (Indian Statistical Institute)
Ramagge, Jacqui (Durham University)
Reid, Colin (University of Newcastle)
Rekvenyi, Kamilla (Imperial College London)
Rizzoli, Aluna (University of Cambridge)
Robertson, David (University of New England)
Roney Dougal, Colva (University of St Andrews)
Rosendal, Christian (University of Maryland)
Saunders, Jack (University of Western Australia)
Schillewaert, Jeroen (University of Auckland)
Segal, Dan (Oxford University)
Segev, Yoav (Ben-Gurion University)
Seitz, Gary (University of Oregon)
Semal, Lancelot (UCLouvain)
Sercombe, Damian (Ruhr-Universität Bochum)
Shah, Riddhi (Jawaharlal Nehru University)
Shalev, Aner (Hebrew University of Jerusalem)
Simion, Iulian (Babes-Bolyai University)
Skipper, Rachel (Ohio State)
Smith, Simon (University of Lincoln)
Song, Shujiao (Yantai University)
Stewart, David (Newcastle University)
Sunic, Zoran (Hofstra University)
Tent, Katrin (University of Muenster)
Testerman, Donna (Ecole Polytechnique Federale de Lausanne)
Thillaisundaram, Anitha (University of Lincoln)
Thomas, Anne (The University of Sydney)

Thomas, Adam (Warwick University)
Tiep, Pham (Rutgers University)
Tornier, Stephan (The University of Newcastle)
Tracey, Gareth (University of Oxford)
Trost, Alexander (Ruhr University Bochum)
van Beek, Martin (University of Birmingham)
Vdovina, Alina (Newcastle University)
Verret, Gabriel (University of Auckland)
Wales, David (California Institute of Technology)
Weigel, Thomas (University of Milano-Bicocca)
Weiss, Richard (Tufts University)
Willis, George (University of Newcastle, New South Wales)
Wilson, John (University of Cambridge)
Z, Shaopeng (University of Maryland)
Zaleskii, Pavel (University of Brasilia)
Zheng, Tianyi (UC San Diego)
Zordan, Michele (Imperial College London)

Supersingular Isogeny Graphs in Cryptography (Online)

August 22 - 27, 2021

Organizers:

Victoria de Quehen (ISARA Corp)
Kristin Lauter (Facebook)

Chloe Martindale (University of Bristol)
Christophe Petit (University of Birmingham)



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 focused on isogeny-based cryptography, one of the most promising areas in post-quantum cryptography. In particular, we examined 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 comprised of keynote speakers and working group sessions.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5229>

Participants:

Adj, Gora (Universitat de Lleida)
Amoros, Laia (Aalto University)
Arpin, Sarah (University of Colorado Boulder)
Balakrishnan, Jennifer (Boston University)
Basso, Andrea (University of Birmingham)
Bernstein, Daniel J. (University of Illinois at Chicago)
Biase, Jean-Francois (University of South Florida)
Booher, Jeremy (University of Canterbury)
Bowden, Ross (University of Bristol)
Castrycck, Wouter (KU Leuven)
Chenu, Mathilde (INRIA)
De Feo, Luca (IBM Research Zurich)
de Quehen, Victoria (ISARA Corp)
Dobson, Samuel (The University of Auckland)
Doliskani, Javad (Ryerson University)
Eisentrager, Kirsten (Penn State University)
Fouotsa, Tako Boris (Roma Tre)
Galbraith, Steven (University of Auckland)
Ghantous, Wissam (University of Oxford)
Goren, Eyal (McGill University)
Iezzi, Annamaria (Université de la Polynésie Française)
Jao, David (University of Waterloo)
Kelly, Shane (ISARA Corp)
Kirimli, Eda (University of Bristol)
Kutas, Peter (Birmingham University)
Lai, Yi-Fu (The University of Auckland)
Lange, Tanja (Technische Universiteit Eindhoven)
Lauter, Kristin (Facebook)
LeGrow, Jason (University of Auckland)
Leonardi, Chris (ISARA Corporation)
Leroux, Antonin (DGA)
Merz, Simon-Philipp (Royal Holloway)
Minko, Romy (University of Oxford)
Morrison, Travis (Virginia Tech)
Panny, Lorenz (Academia Sinica - Taiwan)
Petit, Christophe (University of Birmingham)
Smith, Benjamin (Inria and École polytechnique)
Sotakova, Jana (QuSoft/University of Amsterdam)
Springer, Caleb (The Pennsylvania State University)
Stange, Katherine (University of Colorado, Boulder)
Ti, Yan Bo (DSO)
Voloch, Felipe (University of Canterbury)
Weitkaemper, Charlotte (University of Birmingham)
Wesolowski, Benjamin (CNRS, Bordeaux University)
Zobernig, Lukas (The University of Auckland)

Nonlinear Potential Theoretic Methods in Partial Differential Equations (Online)

September 5 - 10, 2021

Organizers:

Andrea Cianchi (University of Firenze)
Giuseppe Mingione (University of Parma)

Igor Verbitsky (University of Missouri)
Jerome Vetois (McGill University)



Partial differential equations (PDE) are a rich and deep area of mathematics which is strongly motivated by problems arising in applied sciences and technology, such as physics, engineering, medicine. Most physical phenomena appearing, in reality, can indeed be modeled through PDE. Unfortunately, explicit solutions to PDE can only be determined in very few special cases. On the other hand, it is often possible to describe some relevant qualitative and quantitative properties of theirs. This theoretical analysis enables, for instance, to develop effective numerical approximation methods for solutions. The workshop focused on some fundamental aspects of the theory of PDE, including existence of solutions, their regularity and a priori estimates. Information on these issues allows for a deeper understanding of the structure of solutions and of the physical phenomena that they describe. They addressed in connection with some of the most advanced developments of the theory of PDE, that rely upon methods and results from Nonlinear Potential Theory, Harmonic Analysis, Geometric Analysis.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5100>

Participants:

Alberico, Angela (National Research Council of Italy (CNR))
Armstrong, Scott (Scott Armstrong)
Beck, Lisa (Augsburg University)
Bjorn, Jana (Linköping University)
Bogelein, Verena (Paris-Lodron-University Salzburg)
Breit, Dominic (Heriot-Watt University)

Cabre, Xavier (ICREA and Universitat Politècnica de Catalunya)
Cao, Dat (Minnesota State University, Mankato)
Carozza, Menita (Università del Sannio)
Chlebicka, Ivona (University of Warsaw)
Cianchi, Andrea (University of Firenze)
Cîrstea, Florica (University of Sydney)
De Filippis, Cristiana (Università di Torino)

De Lellis, Camillo (Camillo De Lellis)
De Silva, Daniela (Barnard College - Columbia University)
Diebou Yomgne, Gael (Rheinische Friedrich-Wilhelms-Universitaet Bonn)
Diening, Lars (Bielefeld University)
Dong, Hongjie (Brown University)
Focardi, Matteo (Università di Firenze)
Frank, Rupert (Caltech / University of Munich)
Gazzola, Filippo (Politecnico di Milano)
Ghoussoub, Nassif (University of British Columbia)
Glubokov, Andrey (Purdue University)
Guan, Pengfei (McGill University)
Hänninen, Timo (University of Helsinki)
Kh.Balci, Anna (Bielefeld University)
Kristensen, Jan (University of Oxford)
Kuusi, Tuomo (University of Helsinki)
McOwen, Robert (Northeastern Univeristy)
Mengesha, Tadele (The University of Tennessee, Knoxville)
Mingione, Giuseppe (University of Parma)
Mooney, Connor (University of California, Irvine)
Nguyen, Phuc (Louisiana State University)
Nguyen, Quoc-Hung (Chinese Academy of Sciences)
Nitsch, Carlo (Università di Napoli "Federico II")
Premoselli, Bruno (Université Libre de Bruxelles)
Robert, Frédéric (Universite de Lorraine)
Salani, Paolo (Università di Firenze)
Savin, Ovidiu (Columbia University)
Schwarzacher, Sebastian (Charles University)
Seesanea, Adisak (Sirindhorn International Institute of Technology)
Shaposhnikova, Tatiana (Royal Institute of Technology)
Singh, Gurpreet (Dublin City University)
Slavikova, Lenka (Charles University in Prague)
Storn, Johannes (Bielefeld University)
Van Schaftingen, Jean (Université catholique de Louvain)
Verbitsky, Igor (University of Missouri)
Vetois, Jerome (McGill University)
Vladimir, Maz'ya (Linkoeping University)
Weng, Liangjun (Albert-Ludwigs-Universität Freiburg)
Weth, Tobias (Goethe-University Frankfurt am Main)

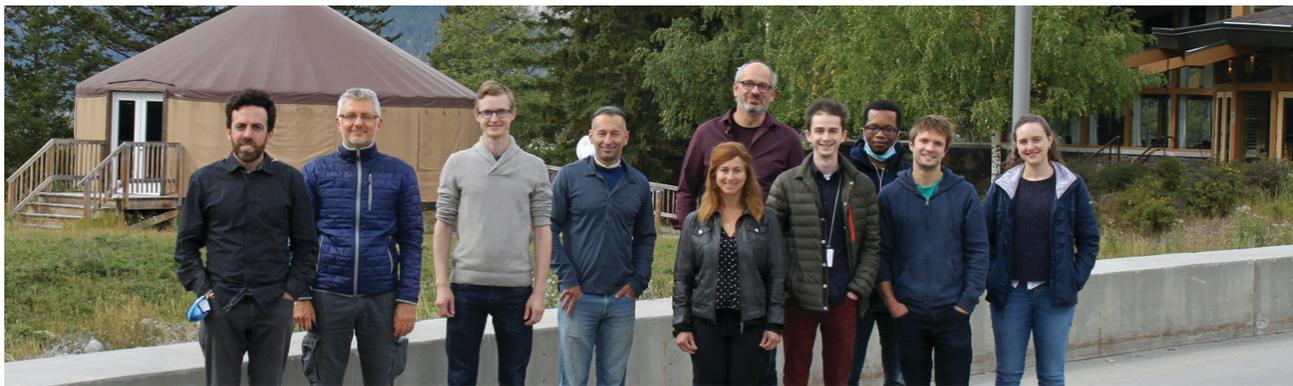
Permutations and Probability

September 19 - 24, 2021

Organizers:

Omer Angel (University of British Columbia)
Balint Virag (University of Toronto)

James Martin (Oxford University)



A permutation is an ordering or arrangement of a set of objects. One might think of shuffling a pack of cards, or sorting a list of options into order of preference, or arranging the seating of passengers on an aeroplane or guests at a dinner. Permutations are central objects in many areas of mathematics. This workshop explored aspects of permutations which arise in probability theory and related fields. This is a highly active area of study, with a variety of striking results in the last few years and many challenging problems outstanding. Random permutations have applications ranging from genetics to computer science to economics, and arise in many challenging questions throughout mathematics. Many interesting random processes can be thought of as permutations evolving over time. The workshop brought together researchers from many backgrounds including probability, combinatorics, physics and theoretical computer science, with the goal of advancing our understanding of random permutations and permutation processes, and of sharing ideas from across the many disparate fields where they are studied.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5511>

Participants:

Aas, Erik (Pennsylvania State University)
Abert, Miklos (Alfred Renyi Institute of Mathematics)
Adamczak, Radoslaw (University of Warsaw)
Addario-Berry, Louigi (McGill University)
Adhikari, Kartick (IISER Bhopal)
Ahlberg, Daniel (Stockholm University)
Alie-Lamarche, Lemonte (University of Toronto)
Alon, Gil (Open University of Israel)
Alsmeyer, Gerold (Muenster)
Amir, Gidi (Bar-Ilan University)
Angel, Omer (University of British Columbia)
Ayyer, Arvind (Indian Institute of Science)
Balazs, Marton (Bristol)
Balchev, Stanislav (University of Toronto)
Bassino, Frédérique (Université Sorbonne Paris Nord)
Björnberg, Jakob (Chalmers)
Bordenave, Charles (Institut de Mathématiques de Marseille)
Borga, Jacopo (Stanford University)
Bouttier, Jérémie (CEA Saclay & ENS de Lyon)
Bouvel, Mathilde (CNRS)
Bufetov, Alexey (Leipzig University)
Bukh, Boris (Carnegie Mellon University)
Corsini, Benoit (McGill University)
Cotar, Codina (University College London)
Dauvergne, Duncan (UofT)
de la Riva, Daniel (Stockholm University)
Elizalde, Sergi (Dartmouth)
Eslava, Laura (UNAM)
Evans, Steve (University of California, Berkeley)
Féray, Valentin (Université de Lorraine)
Ferrari, Pablo (Universidad de Buenos Aires)
Glubokov, Andrey (Purdue University)
Gonçalves, Patricia (Instituto Superior Técnico, Lisboa)
Gorin, Vadim (UW Madison / IITP)
Gravner, Janko (University of California, Davis)
Holmgren, Cecilia (Uppsala University)
Holroyd, Alexander (University of Bristol)
Huang, Zoe (UBC)
Hutchcroft, Tom (California Institute of Technology)
Janson, Svante (Uppsala University)
Kang, Ross (Radboud University Nijmegen)
Kenyon, Richard (Yale University)
Kleptsyn, Victor (CNRS)
Kohayakawa, Yoshiharu (University of Sao Paulo)
Kotowski, Michał (Polish Academy of Sciences)
Kozma, Gady (Weizmann Institute)
Krattenthaler, Christian (University of Vienna)
Lai, Zehua (University of Chicago)
Lichev, Lyuben (St Etienne)
Linial, Nathan (Hebrew University of Jerusalem)
Linusson, Svante (KTH-Royal Institute of Technology Stockholm)
MacDonald, Sophie (UBC)
Madras, Neal (York University)
Mandelshtam, Olya (University of Waterloo)
Martin, James (Oxford University)
Mason, David M. (University of Delaware)
McDiarmid, Colin (Oxford University)
Meszaros, Andras (University of Toronto)
Miermont, Grégory (ENS de Lyon)
Milman, Emanuel (Technion - I.I.T.)
Muehlbacher, Peter (Warwick)
Müller, Tobias (Groningen University)
Neinger, Ralph (J.W. Goethe-Universität)
Noel, Jonathan (University of Victoria)
Pak, Igor (University of California Los Angeles)
Panagiotis, Christoforos (University of Geneva)
Panario, Daniel (Carleton University)
Pandey, Aaradhya (Indian Institute of Science)
Pedreira, Virginia (University of Toronto)
Peled, Ron (Tel Aviv University)
Pete, Gabor (Budapest University of Technology and Economics)
Pierrot, Adeline (Université Paris Saclay - LISN)
Propp, James (University of Massachusetts-Lowell)
Puder, Doron (Tel Aviv University)
Pymar, Richard (Birkbeck)
Rahman, Mustazee (University of Durham)
Rastegar, Reza (Occidental Petroleum/University of Tulsa)
Ray, Gourab (University of Victoria)
Richey, Jacob (University of British Columbia)
Rudzis, Peter (University of Washington)
Sakai, Akira (Hokkaido University)
Sen, Arnab (UMN)
Sénizergues, Delphin (University of British Columbia)
Shapir, Yonathan (Univ Rochester)
Slivken, Erik (University of North Carolina Wilmington)
Steif, Jeff (Chalmers)
Stenlund, David (UBC)
Stewart, Andrew (TBA)
Teyssier, Lucas (Universität Wien)
Ueltschi, Daniel (Warwick)
Uribe Bravo, Gerónimo (Universidad Nacional Autónoma de México)
Valko, Benedek (University of Wisconsin - Madison)
Virag, Balint (University of Toronto)
Volkov, Stanislav (Lund University)
Williams, Lauren (Harvard University)
Winkler, Peter (Dartmouth College)
Wu, Qiang (UIUC)
Young, Benjamin (University of Oregon)
Zhang, Lingfu (Princeton University)

Connecting Network Structure to its Dynamics: Fantasy or Reality? (Online)

September 26 - October 1, 2021

Organizers:

Tomas Gedeon (Montana State University)
Steve Haase (Duke University)

Konstantin Mischaikow (Rutgers University)



A key challenge in biology and medicine is to understand how network of interacting genes gives rise to cellular behavior. Experimental limitations and the big data generated by 'omics technologies requires the development of quantitative approaches to overcome this challenge. In the context of mathematical models this challenge takes form of predicting complex dynamic behavior of gene and signaling networks inside cells. Construction of appropriate models is difficult due to large uncertainty in the state of the cell, the efficiency of its enzymes, and the form of interactions between genes. In this workshop leading systems biologists and mathematical modelers discussed how the newest mathematical ideas on how to capture dynamic behavior of cellular networks addresses outstanding problems in both system biology and synthetic biology.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5005>

Participants:

Albert, Reka (Pennsylvania State University)
Andreas, Elizabeth (Montana State University)
Belton, Robin (Montana State University)
Benfey, Philip (Duke University & HHMI)
Cannon, William (Pacific Northwest National Lab and UC Riverside)
Carlson, Ross (Montana State University)
Chaves, Madalena (INRIA Sophia Antipolis)
Cummins, Bree (Montana State University)
Day, Sarah (William & Mary)
de Jong, Hidde (INRIA Grenoble)
Duncan, William (Montana State University)
Dunlap, Jay (Dartmouth)
Edwards, Roderick (University of Victoria)
Gameiro, Marcio (Rutgers University)
Gedeon, Tomas (Montana State University)
Glass, Leon (McGill University)
Haase, Steve (Duke University)
Hurley, Jennifer (Rensselaer Polytechnic Institute)

Kaern, Mads (University of Ottawa)
Kalies, William (Florida Atlantic University)
Kelliher, Tina (Geisel School of Medicine at Dartmouth)
Kumar Jolly, Mohit (Indian Institute of Science)
Mischaikow, Konstantin (Rutgers University)
Paulevé, Loïc (CNRS & LaBRI)
Perkins, Theodore (Ottawa Hospital Research Institute / University of Ottawa)
Santillan, Moises (Centro de Investigacion y de Estudios Avanzados del IPN)
Savageau, Michael (University of California, Davis)
Skotheim, Jan (Stanford University)
Thieffry, Denis (Ecole Normale Supérieure)
Tyson, John (Virginia Polytechnic Institute & State University)
Veliz-Cuba, Alan (University of Dayton)
Xing, Jianhua (University of Pittsburg)
Yeung, Enoch (Santa Barbara)

Singularity Formation in Nonlinear PDEs (Online)

September 26 - October 1, 2021

Organizers:

Monica Musso (University of Bath)
Bob Jerrard (University of Toronto)

Juncheng Wei (University of British Columbia)



This five-day workshop gathers world-wide expert in formation of singularities in several different mathematical models that involve partial differential equations (PDEs). These equations arise in situations as diverse as the long-term evolution of temperature and winds on earth surface due to climate change, the spreading of a tumor, changes of light's behavior near a black hole, the evolution of stock markets or the shape an ice mountain takes as it melts. Solutions to PDE can be interpreted as attainable situations. They may exhibit "singularities", namely places or instants where they "blow-up" or exhibit irregular behavior.

The main purpose of this workshop was to share high quality information related to the contemporary research in the fields of partial differential equations, dispersive equations and geometric flows, with the objective of working on common research problems and favoring the formation of students and young researchers.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5503>

Participants:

Aguirre Salazar, Lorena (McMaster)
Ao, Weiwei (Wuhan University)
Carrillo, José A. (University of Oxford)
Chodosh, Otis (Stanford University)
Collot, Charles (Cergy Paris Université)
Contreras, Andres (New Mexico State University)
Danielli, Donatella (Arizona State University)
Daskalopoulos, Panagiota (Columbia University)
Davila, Juan (University of Bath)
del Pino, Manuel (University of Bath)
DelaTorre, Azahara (University of Granada)
Dolbeault, Jean (Université Paris-Dauphine)
Dong, Hongjie (Brown University)
Fernández, Juan Carlos (UNAM - Mexico)
Fila, Marek (Comenius University)
Gallay, Thierry (Université Grenoble Alpes)
Geevechi, Amirmasoud (University of Toronto)
Ghoussoub, Nassif (University of British Columbia)
Glubokov, Andrey (Purdue University)

Harada, Junichi (Akita University)
Hou, Thomas (California Institute of Technology)
Ibrahim, Slim (University of Victoria)
Jerrard, Bob (University of Toronto)
Jia, Hao (University of Minnesota)
King, John R. (University of Nottingham)
Kiselev, Alexander (Duke University)
Krieger, Joachim (Ecole Polytechnique Federale de Lausanne)
Lai, Chen-Chih (Columbia University)
Li, Dong (SUSTECH)
Lin, Fang-Hua (New York University)
Mantoulidis, Christos (Rice University)
Masmoudi, Nader (nyu)
Musso, Monica (University of Bath)
Nakanishi, Kenji (Kyoto University)
Pacard, Frank (Ecole Polytechnique)
Pistoia, Angela (Sapienza Università di Roma)
Pusateri, Fabio (University of Toronto)

Román, Carlos (Catholic University of Chile)
Schlag, Wilhelm (Yale University)
Seis, Christian (Munster University)
Sire, Yannick (Johns Hopkins University)
Souplet, Philippe (Université Sorbonne Paris Nord)
Tonegawa, Yoshihiro (Tokyo Institute of Technology)
Tsai, Tai-Peng (University of British Columbia)
Wang, Changyou (Purdue University)
Wei, Juncheng (University of British Columbia)
Wu, Jiahong (Oklahoma State University)
Yan, Xukai (Oklahoma State University)
Yu, Yong (The Chinese University of Hong Kong)
Zhang, Liqun (Chinese Academy of Sciences)
Zhang, Ping (Chinese Academy of Science)
Zhang, Qidi (UBC Mathematics Department)
Zhou, Yifu (Johns Hopkins University)

Lattices and Cohomology of Arithmetic Groups: Geometric and Computational Viewpoints (Online)

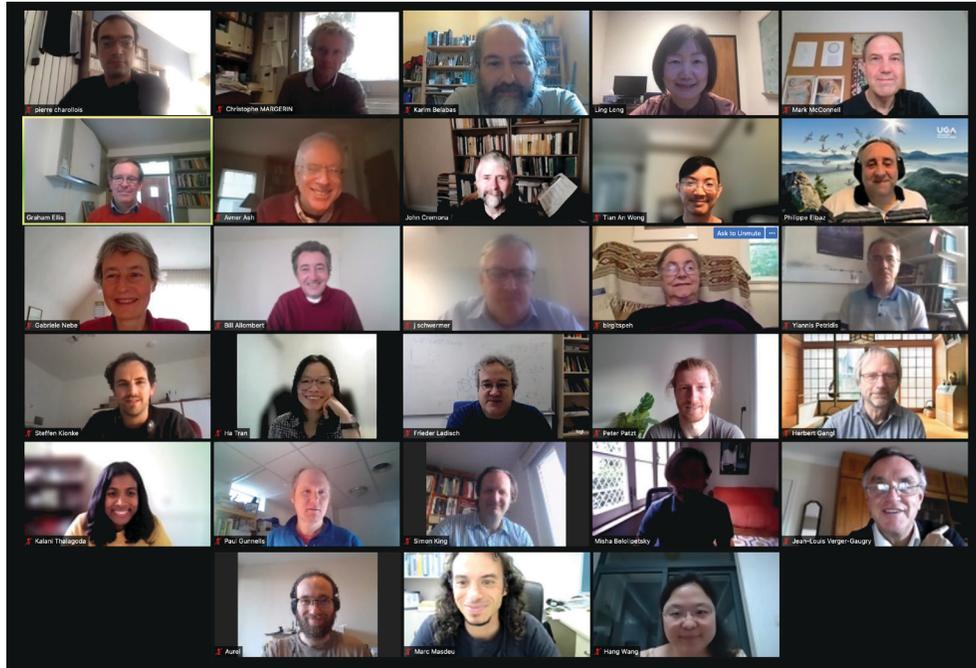
October 3 - 8, 2021

Organizers:

Paul Gunnells (University of Massachusetts)

Philippe Elbaz-Vincent (Université Grenoble Alpes)

Graham Ellis (National University of Ireland)



The focus of this workshop was the connections between lattices and number theory and geometry. Number theory, one of the oldest branches of pure mathematics, is devoted to the study properties of the integers and more sophisticated number systems. Lattices and number theory have many deep connections. For instance using number theory it was recently demonstrated that certain packings of balls in high dimensions are optimally efficient. Lattices also appear naturally when one studies certain spaces that play an important role in number theory; one of the main focuses of this meeting is to investigate computational and theoretical methods to understand such spaces and to expand the frontier of our algorithmic knowledge in working with them.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5205>

Participants:

Abert, Miklos (Alfred Renyi Institute of Mathematics)

Allombert, Bill (Institut de Mathématiques de Bordeaux)

Alvarenga, Roberto (University of São Paulo)

Ash, Avner (Boston College)

Assaf, Eran (Dartmouth College)

Babei, Angelica (McMaster)

Bacher, Roland (University Grenoble-Alpes)

Bayad, Abdelmejid (Université d'Evry, Université Paris-Saclay)

Belabas, Karim (Institut de Mathématiques de Bordeaux)

Beliaeva, Tatiana (Université de Strasbourg)

Belolipetsky, Mikhail (IMPA)

Berger, Tobias (University of Sheffield)

Bergström, Jonas (Stockholm University)

Blanks, Tamar (Rutgers University)

Bosma, Wieb (Radboud Universiteit Nijmegen)

Breen, Benjamin (Clemson University)

Brumer, Armand (Fordham University)

Burrin, Clare (ETH)

Cakir, Burak (University of Massachusetts Amherst)

Chan, Wai Kiu (Wesleyan University)

Chanfi, Dorian-Karim (Ecole Polytechnique)

Charollois, Pierre (Sorbonne)

Cohn, Henry (Microsoft Research New England)

Combes, Lewis (University of Sheffield)

Coulangeon, Renaud (Institut de Mathématiques de Bordeaux)

Cowan, Alexander (Harvard University)

Cremona, John (University of Warwick)
Dahmen, Sander (Vrije Universiteit Amsterdam)
de Jeu, Rob (Vrije Universiteit Amsterdam)
Dembélé, Lassina (Warwick University)
Deraux, Martin (Université Grenoble Alpes)
Dutour Sikiric, Mathieu (Rudjer Bosković Institute)
Elbaz-Vincent, Philippe (Université Grenoble Alpes)
Ellenberg, Jordan (University of Wisconsin)
Ellis, Graham (National University of Ireland)
Espitau, Thomas (NTT Secure Platform Laboratories)
Fraczyk, Mikolaj (University of Chicago)
Fretwell, Dan (Bristol)
Gangl, Herbert (Durham University)
Garcia, Luis (University College London)
Green, David (Friedrich-Schiller-Universität Jena)
Gunnells, Paul (University of Massachusetts)
Harder, Gunter (Max Planck Instituts für Mathematik Bonn)
Henn, Hans-Werner (Université de Strasbourg)
Henniart, Guy (University Paris-Sud Orsay)
Hill, Richard (University College London)
Hosseinijafari, Farid (Purdue University)
Hurtado, Sebastian (University of Chicago)
Idelhaj, Amin (University of Wisconsin)
Jarvis, Frazer (University of Sheffield)
Kellerhals, Ruth (University of Fribourg)
King, Simon (Friedrich-Schiller-Universität Jena)
Kionke, Steffen (University of Hagen, Germany)
Kirschmer, Markus (Universität Paderborn)
Kupers, Alexander (University of Toronto)
Ladisch, Frieder (University of Rostock)
Lipnowski, Michael (McGill University)
Logan, Adam (Government of Canada)
Long, Ling (Louisiana State University)
Lorscheid, Oliver (University of Groningen / IMPA)
Lowry-Duda, David (ICERM)
Magnot, Jean-Pierre (Université d'Angers et Lycée Jeanne d'Arc)
Marcatel, Etienne (Atos / Université Grenoble Alpes)
Margerin, Christophe (Ecole Polytechnique)
Martin, Kaitlyn (UC Davis)
Masdeu, Marc (Universitat Autònoma de Barcelona)
McConnell, Mark (Princeton University)
Mila, Olivier (CRM)
Miller, Jeremy (Purdue University)
Miller, Stephen (Rutgers University)
Mishra, Pratyush (North Dakota State University)
Mondal, Arghya (Chennai Mathematical Institute)
Nebe, Gabrielle (RWTH Aachen)
Nordentoft, Asbjørn (Université Paris Sorbonne Nord)
Page, Aurel (Inria -- Institut de Mathématiques de Bordeaux)
Patnaik, Manish (University of Alberta)
Patz, Peter (Copenhagen University/ University of Oklahoma)
PETRIDIS, YIANNIS (University College London)
Pham, Lam (Brandeis University)
Pollack, David (Wesleyan University)
Pollack, Robert (Boston University)
Rahm, Alexander D. (University of French Polynesia)
Raimbault, Jean (Institut de Mathématiques de Toulouse)
Rickards, James (University of Colorado Boulder)
Roe, David (MIT)
Roset Julia, Marti (McGill)
Schoof, Rene (University of Rome II)
Schwermer, Joachim (Universität Wien)
Sengun, Haluk (University of Sheffield)
Speh, Birgit (Cornell University)
Stange, Katherine (University of Colorado, Boulder)
Stevens, Glenn (Boston University)
Thalagoda, Kalani (UNC Greensboro)
Tran, Ha (Concordia University of Edmonton)
Vallentin, Frank (University of Cologne, Germany)
van Woerden, Wessel (Centrum Wiskunde & Informatica (CWI, Amsterdam))
Venkataramana, Tyakal (Tata Institute of Fundamental Research)
Verger-Gaugry, Jean-Louis (CNRS, Université Savoie Mont Blanc)
Voight, John (Dartmouth College)
Wang, Hang (East China Normal University)
Weiss, Ariel (Hebrew University of Jerusalem)
Wilson, Jennifer (University of Michigan)
Wilson, Sinead (Australian National University)
Wong, Tian An (University of Michigan-Dearborn)
Yasaki, Dan (The University of North Carolina at Greensboro)
Zhang, Hao (Hunan University)
Zhang, Robin (Columbia University)

Statistical Methods for Computational Advertising (Online) October 3 - 8, 2021

Organizers:

David Banks (Duke University)
Nancy Heckman (University of British Columbia)

Nancy Reid (University of Toronto)



Computational advertising is a multi-billion dollar business, but it has received little attention from academic statisticians. Nonetheless, this collection of pricing models, keyword auctions, A/B tests, and recommender systems depends heavily upon statistical methodology in nearly every aspect of its performance. This workshop brought together scientists from the information technology companies and university] researcher to collaborate on new methods to enable consumers to only see ads for things they actually want to buy, and to enable manufacturers to save advertising budget by accurately targeting interested customers.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5508>

Participants:

Airoldi, Edoardo (Temple University)
Aridor, Guy (Columbia University)
Banks, David (Duke University)
Berman, Ron (Wharton School)
Bi, Xuan (University of Minnesota)
Bian, Yuan (University of Western Ontario)
Braun, Michael (Southern Methodist University)
Chen, Jiahua (University of British Columbia)
Chen, Aiyou (Google)
Craiu, Radu (University of Toronto)
Feit, Elea McDonnell (Drexel University)
Ferruzza, Gene (Vericast)
Fokoue, Ernest (Rochester Institute of Technology)
Guo, Yi (Duke University)
Hardie, Bruce (London Business School)
He, Wenqing (University of Western Ontario)
Heckman, Nancy (University of British Columbia)
Hesterberg, Tim (Google)
Ju, Phyllis (Purdue University)
Kambara, Ayako (Bloomberg, L.P.)
LeBlanc, Patrick (Duke University)
Li, Fan (Duke University)
Lu, Ying (Google)

Luo, Yiyun (UNC)
Mak, Simon (Duke University)
Mao, Maggie (eBay)
Maravillas, Mart Andrew (Georgia Institute of Technology)
Menchetti, Fiammetta (University of Florence)
Michailidis, George (University of Florida)
Mogrovejo, Joseph (Hunter College)
Natour, Sammy (Vericast)
Newport-Foster, Amanda (Vericast)
Owen, Art (Stanford University)
Poulos, Jason (Harvard Medical School)
Reid, Nancy (University of Toronto)
Said, Yasmin (George Mason University)
Samadi, S. (Southern Illinois University Carbondale)
Sen, Deborshee (University of Bath)
Shen, Xiaotong (University of Minnesota)
Shen, Sumin (eBay)
Skraina, Benjamin (eBay)
Stevens, Nathaniel (University of Waterloo)
Tierney, Graham (Duke University)
Wu, Qiuyi (University of Rochester)
Yauck, Mamadou (Université du Québec à Montréal)

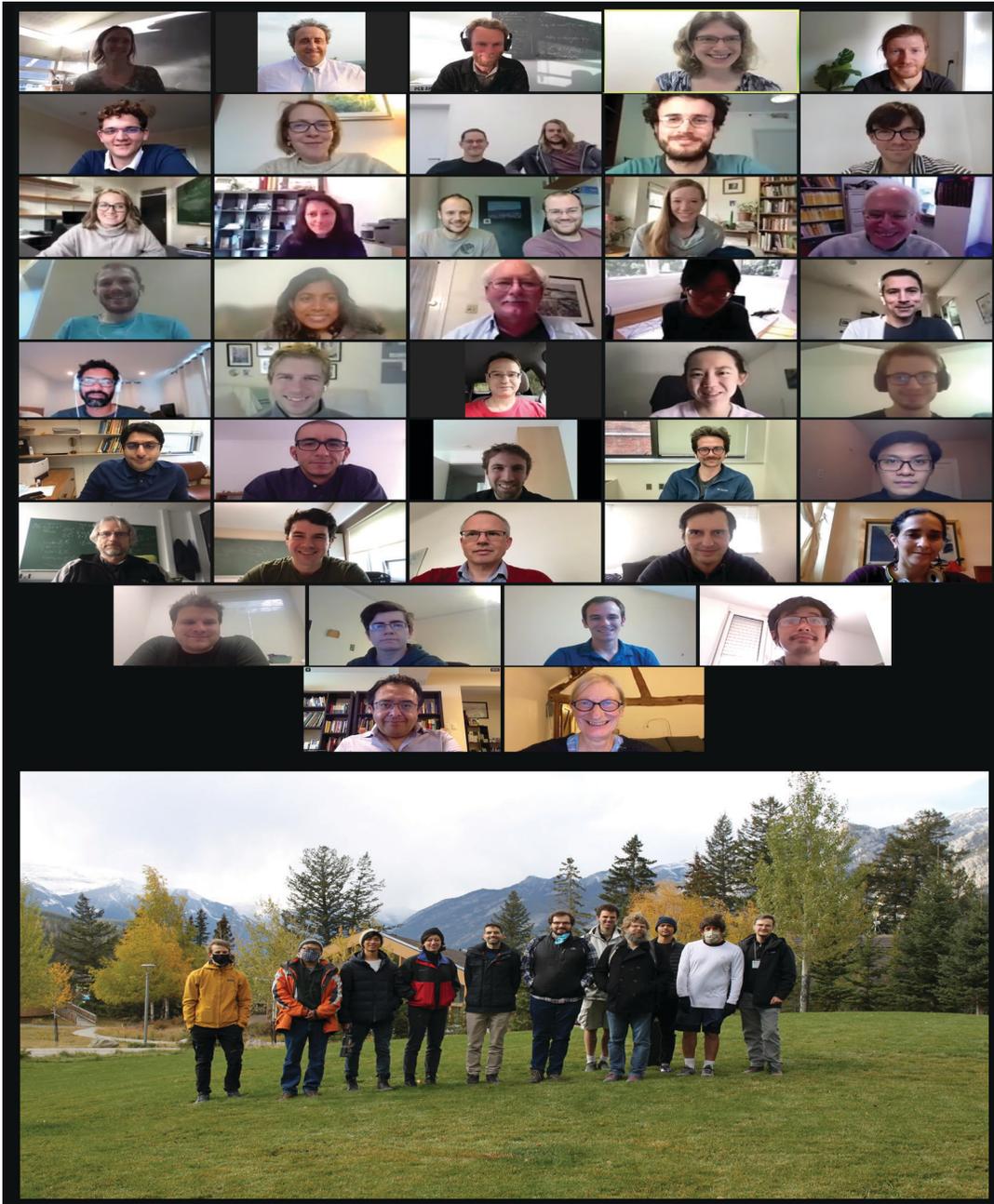
Yi, Grace (Western University)
ZHANG, ZEZHONG (eBay)
Zhang, Anru (Duke University)
Zhao, Zifeng (University of Notre Dame)
Zhu, Ji (University of Michigan)

Cohomology of Arithmetic Groups: Duality, Stability, and Computations October 10 - 15, 2021

Organizers:

Jeremy Miller (Purdue University)

Jennifer Wilson (University of Michigan)



The cohomology of arithmetic groups is the study of the properties of “holes” in geometric spaces that contain information about number theory. The workshop brought together mathematicians with expertise in number theory, topology, and geometric group theory to tackle these problems and explore recent developments.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5011>

Participants:

Adem, Alejandro (University of British Columbia)
Ash, Avner (Boston College)
Aumonier, Alexis (Københavns Universitet)
Bao, Chengyang (University of Chicago)
Bauman, Alex (University of Michigan)
Bellovin, Rebecca (University of Glasgow)
Belmont, Eva (UC San Diego)
Berglund, Alexander (Stockholm University)
Berkove, Ethan (Lafayette College)
Bernard, Calista (University of Minnesota)
Berrick, Jon (Yale-NUS College)
Bianchi, Andrea (Universität Bonn)
Bibby, Christin (Louisiana State University)
Boggi, Marco (Universidade Federal de Minas Gerais)
Boyd, Rachael (Max Planck Institut für Mathematik)
Brendle, Tara (University of Glasgow)
Broadus, Nathan (The Ohio State University)
Bruce, Juliette (University of California, Berkeley)
Brück, Benjamin (ETH Zürich)
Bustamante, Mauricio (Universidad Católica de Chile)
Calegari, Frank (University of Chicago)
Chan, Melody (Brown University)
Chen, Eric (Princeton University)
Coulangeon, Renaud (Institut de Mathématiques de Bordeaux)
Cremona, John (University of Warwick)
Das, Ronno (University of Copenhagen)
Djament, Aurélien (CNRS et université de Lille)
Dotto, Andrea (University of Chicago)
Dutour Sikiric, Mathieu (Rudjer Bosković Institute)
Edson, Nzaganya (Stellenbosch University)
Elbaz-Vincent, Philippe (Université Grenoble Alpes)
Ellenberg, Jordan (University of Wisconsin)
Emerton, Matthew (University of Chicago)
Farb, Benson (University of Chicago)
Feng, Tony (Massachusetts Institute of Technology)
Fennell, James (NSA-retired)
Fisher, Sam (University of Oxford)
Fu, Yu (University of Wisconsin)
Gadish, Nir (University of Michigan)
Galatius, Soren (University of Copenhagen)
Ganapathy, Karthik (University of Michigan)
Gangl, Herbert (Durham University)
Garkusha, Grigory (Swansea University)
Gerbelli-Gauthier, Mathilde (Institute for Advanced Study)
Glubokov, Andrey (Purdue University)
Grayson, Daniel R. (University of Illinois Urbana-Champaign)
Gunnells, Paul (University of Massachusetts)
Hainaut, Louis (Stockholm University)
Harman, Nathan (University of Michigan)
Hebestreit, Fabian (University of Bonn)
Himes, Zachary (Purdue University)
Hoang, Anh (University of Minnesota)
Hogben, Leslie (Iowa State University)
Howe, Sean (University of Utah)
Iwasa, Ryomei (University of Copenhagen)
Jain, Yajit (Brown University)
Jiménez Rolland, Rita (UNAM)
Kammeyer, Holger (Heinrich-Heine-Universität Düsseldorf)
Karn, Trevor (University of Minnesota)
Kechagias, Nondas (University of Ioannina)
Koziol, Karol (University of Michigan)
Krannich, Manuel (University of Cambridge)
Kumar V, Pravin (Indian Institute of Science Education and Research)
Kupers, Alexander (University of Toronto)
Land, Markus (University of Copenhagen)
Laudone, Robert (University of Michigan)
Le, Daniel (Purdue University)
LEWIS, TUDUR (University of Glasgow)
Li, Shiyue (Brown University)
Lin, Milton (Johns Hopkins University)
Lindell, Erik (Stockholm University)
Linskens, Sil (University of Bonn)
Lipnowski, Michael (McGill University)
Litt, Daniel (University of Georgia)
Maity, Saikat (University of Calcutta)
Malestein, Justin (University of Oklahoma)
Malin, Connor (University of Notre Dame)
Margalit, Dan (Georgia Institute of Technology)
Mathew, Akhil (University of Chicago)
Mawyer, Farley (York College)
McConnell, Mark (Princeton University)
Mejia, Andres (University of Pennsylvania)
Meyer, Anja (University of Manchester)
Miller, Jeremy (Purdue University)
Minahan, Daniel (Georgia Institute of Technology)
Mishra, Pratyush (North Dakota State University)
Mondal, Arghya (Chennai Mathematical Institute)
Morris, Dave (University of Lethbridge)
Nariman, Sam (Purdue University)
Ørsnes Jansen, Mikala (Københavns Universitet)
Pacheco-Tallaj, Natalia (Massachusetts Institute of Technology)
Page, Aurel (Inria -- Institut de Mathématiques de Bordeaux)
Palmer-Anghel, Martin (Mathematical Institute of the Romanian Academy)
Patzl, Peter (Copenhagen University/ University of Oklahoma)
Pedersen, Jonathan (University of Toronto)
Pelletier, Hector (École polytechnique fédérale de Lausanne)
Peng, Keyao (Grenoble Alpes University)
Pitman, Kevin (Universidad de Buenos Aires)
Pol, Luca (Universität Regensburg)
Powell, Geoffrey (Université d'Angers)
Putman, Andrew (University of Notre Dame)

Raksit, Arpon (MIT)
Randal-Williams, Oscar (University of Cambridge)
Reiner, Victor (University of Minnesota)
Sam, Steven (UC San Diego)
Scalamandre, Matthew (University of Notre Dame)
Schewiller, Lukas (University of Michigan)
Schwermer, Joachim (Universität Wien)
Sengun, Haluk (University of Sheffield)
Serrano Garcia, Higinio (CINVESTAV, México)
Sharifi, Romyar (University of California, Los Angeles)
Sierra, Ismael (University of Cambridge)
Soroko, Ignat (Florida State University)
Soulié, Arthur (University of Glasgow)
Spitler, Ryan (Rice University)
Sroka, Robin (McMaster University)
Stark, Christopher (NSF)
Stavrou, Andreas (University of Cambridge)
Stevens, Glenn (Boston University)
Stoll, Robin (Stockholm University)
Studenmund, Daniel (Binghamton University)
Sytilidis, Filippos (University of Oxford)
Thalagoda, Kalani (UNC Greensboro)
Tommasi, Orsola (University of Padova)
Tosteson, Philip (University of Chicago)
Tshishiku, Bena (Brown University)
Vespa, Christine (Université de Strasbourg)
Vogtmann, Karen (University of Warwick)
Wahl, Nathalie (University of Copenhagen)
Wawrykow, Nicholas (University of Michigan)
Westerland, Craig (University of Minnesota)
Wilson, Jennifer (University of Michigan)
Wong, Tian An (University of Michigan-Dearborn)
Wortman, Kevin (University of Utah)
Xicotencatl, Miguel A. (Centro de Investigación y de Estudios Avanzados)
Yao, Zijian (University of Chicago)
Yasaki, Dan (The University of North Carolina at Greensboro)
Yost-Wolff, Calvin (University of Michigan)
Yun, Claudia (Brown University)
Zou, Foling (University of Michigan)

Topology and Entanglement in Many-Body Systems (Online)

October 10 - 15, 2021

Organizers:

Sven Bachmann (The University of British Columbia)

Fernando Brandao (Caltech)
Martin Fraas (UC Davis)



The possibility of using quantum mechanics to build computers that are both faster and more secure is an exciting technological leap. One of the most promising pathways to a robust architecture, referred to as topological quantum computing, has led to fascinating research at the frontier of mathematics and physics. Properties of new, exotic states of matter can be understood - and hence implemented in practice - using tools that were developed by pure mathematicians in connection to surfaces and their curvature. This workshop brought together international experts to explore the intimate connections between such topological properties of quantum matter and the key resource of quantum computing: entanglement.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5502>

Participants:

Alhambra, Alvaro (MPQ)
Anshu, Anurag (UC Berkeley)
Artymowicz, Adam (Caltech)
Avron, Yosi (Technion)
Bachmann, Sven (The University of British Columbia)
Bols, Alex (Copenhagen University)
Cirac, Juan Ignacio (Max-Planck-Institut für Quantenoptik)
De Roeck, Wojciech (KU Leuven)
Du, Zhiqian (UC Davis)
Elgart, Alexander (Virginia Tech)
Fidkowski, Lukasz (University of Washington)
Fraas, Martin (UC Davis)
Furlotte, Justin (University of British Columbia)
Glubokov, Andrey (Purdue University)
Gosset, David (University of Waterloo)
Graf, Gian Michele (ETH Zurich)
Haah, Jeongwan (Microsoft Research)
Hannani, Amirali (KU Leuven)

Hingorani, Rahul (UC Davis)
Jackson, Thomas (UC Davis)
Jappens, Tijl (KU Leuven)
Kapustin, Andrey (Caltech)
Kato, Kohtaro (Nagoya University)
Lange, Markus (SISSA)
Lemm, Marius (University of Tübingen)
Levin, Michael (University of Chicago)
Moon, Alvin (Copenhagen)
Nachtergaele, Bruno (University of California, Davis)
Ogata, Yoshiko (The University of Tokyo)
Oshikawa, Masaki (University of Tokyo)
Pérez-García, David (Complutense University of Madrid - ICMAT)
Porta, Marcello (SISSA, Trieste)
Prosniak, Oskar (KU Leuven)
Ragone, Michael (UC Davis)
Ranard, Daniel (Massachusetts Institute of Technology)

Raussendorf, Robert (University of British Columbia)
Schuch, Norbert (University of Vienna)
Schulz-Baldes, Hermann (Universitat Erlangen-Nurnberg)
Sopenko, Nikita (Caltech)
Tauber, Clément (Université de Strasbourg)
Vadnerkar, Siddharth (UC Davis)
Walter, Michael (University of Amsterdam)
Warzel, Simone (Technical University of Munich)
Wild, Dominik (Max-Planck Institute of Quantum Optics)
Witteveen, Freek (University of Amsterdam)
Yang, Bowen (Caltech)
Young, Amanda (Technical University of Munich)
Zhang, Carolyn (University of Chicago)

Mathematics of the Cell: Integrating Signaling, Transport and Mechanics

October 17 - 22, 2021

Organizers:

William Holmes (Vanderbilt)
Jay Newby (University of Alberta)

Veronica Ciocanel (Duke University)
Alexandra Jilkine (University of Notre Dame)



The underlying goal of this meeting of interdisciplinary and diverse scientists is to understand the fundamental principles connecting cell signaling, geometry, transport, and mechanics. This leads to many important and ambitious questions at multiple scales, from single protein molecules segregating and generating signaling involved in cell polarity, to cargo-motor interactions in promoting effective intracellular transport, to environmental signals and mechanical forces involved in cell migration and spreading. Many of these processes involve the spatiotemporal dynamics and remodeling of the cytoskeleton, which is responsible for transport and organization of intracellular components in all eukaryotic cells, as well as for regulating cell shape and motility. The workshop participants' expertise covers all scales of cytoskeletal arrays, from actin filaments and their network structure, to intermediate filaments with space-filling properties, to microtubules that provide long-range transport tracks for various cellular cargoes. These problems have applications going beyond fundamental science research; confirmed participants work on understanding single and multicellular wounding and repair, dynamics of epithelium tissues, antibody immune responses against pathogens, and brain cancer progression.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5154>

Participants:

Ashenafi, Yonatan (University of Alberta)
Baker, Ruth (University of Oxford)
Banwarth-Kuhn, Mikhal (UC Merced)
Bement, Bill (U Wisconsin Madison)
Bressloff, Paul (University of Utah)
Buttenschoen, Andreas (University of British Columbia)
Celora, Giulia (University of Oxford)
Chang, Fred (UCSF)
Chou, Tom (UCLA)
Ciocanel, Veronica (Duke University)
Cook, Keisha (Clemson University)
Coombs, Daniel (University of British Columbia)
Cytrynbaum, Eric (University of British Columbia)
Dao Duc, Khanh (University of British Columbia)
Das, Maitreyi (University of Tennessee Knoxville)
Dawes, Adriana (The Ohio State University)
De Belly, Henry (UCSF)
de Vries, Gerda (University of Alberta)
Ding, Wandí (Middle Tennessee State University)
Edelstein-Keshet, Leah (University of British Columbia)
Elston, Timothy (University of North Carolina, Chapel Hill)
Fai, Thomas (Brandeis University)
Floyd, Carlos (University of Chicago)
Fozard, John (John Innes Centre)
Gopinathan, Ajay (University of California, Merced)
Gu, Mengxin (University of Maryland)
Hancock, Will (Penn State University)
Harrison, Jonathan (University of Warwick)
Hernández-Garduño, Antonio (Instituto Tecnológico Autónomo de México)
Holmes, William (Vanderbilt)
Isaacson, Samuel (Boston University)
Jilkine, Alexandra (University of Notre Dame)
Kelly, Gess (Brandeis University)
Kogan, Oleg (Cal Poly, San Luis Obispo)
Kramer, Peter (Rensselaer Polytechnic Institute)
Lee, Dongheon (Duke)
Lemière, Joël (UCSF)
Lindsay, Alan (University of Notre Dame)
Liu, Jian (Johns Hopkins University)
Lubkin, Sharon (North Carolina State University)
Lucker, Joshua (University of Maryland)
McKinley, Scott (Tulane University)
McLaughlin, Grace (University of North Carolina Chapel Hill)
McTiernan, Joey (UC Merced)
Miles, Christopher (UC Irvine)
Mogilner, Alex (New York University)
Molines, Arthur (UCSF)
Munro, Ed (University of Chicago)
Nelson, Anna (Duke University)
Newby, Jay (University of Alberta)
Ni, Haoran (University of Maryland)
Noerr, Patrick (UC Merced)
Odde, David (University of Minnesota)
Papoian, Garegin (University of Maryland)
Payne, Christine (Duke)
Portet, Stéphanie (University of Manitoba)
Rangamani, Padmini (UCSD)
Rappel, Wouter-Jan (University of California, San Diego)
Real, Paula (UCSF)
Rolls, Melissa (Penn State University)
Saha, Suvrajit (UCSF)
Sarpangala, Niranján (UC Merced)
Solomon, Liane (University of Alberta)
Tan, Catherine (UCSF)
Town, Jason (UCSF)
Upadhyaya, Arpita (University of Maryland)
Vavylonis, Dimitrios (Lehigh University)
Volkening, Alexandria (Purdue University)
VPS, Ritwika (UC Merced)
Weiner, Orion (University of California San Francisco)
Wilson, Daniel (Boston University)
Winer, Ben (UCSF)
Xiao, Jie (John Hopkins University School of Medicine)
Xue, Chuan (Self-employed)
Yosprakob, Tharana (University of Alberta)
Yun, Grace (UCSF)
Zhang, Ying (Brandeis University)
Zimmerberg, Nathan (University of Maryland)

Gravitational Emergence in AdS/CFT

October 24 - 29, 2021

Organizers:

Sebastian Fischetti (McGill University)
Netta Engelhardt (Massachusetts Institute of Technology)

Mark Van Raamsdonk (University of British Columbia)



A particular model of quantum gravity, and the one on which this workshop focuses, works to understand an idealized situation in which gravity essentially lives “in a box”. It is a remarkable property of quantum gravity that the behavior of gravity inside the box, including quantum effects, can be described purely by the physics on the surface of the box. Importantly, because the surface of the box is rigid, no gravity is needed in describing its physics: hence the remarkable feature of this model is that quantum gravitational physics can actually be described without apparently using any gravity at all! Answering questions like what happened in the Big Bang or what happens inside black holes then amounts to rephrasing what’s happening on the boundary of the box, which we understand well, in the gravitational language of the inside. This rephrasing is called bulk reconstruction, and is the focus of this workshop. This workshop brought together a number of physicists and mathematicians from different backgrounds in order to address the question of bulk reconstruction of gravitational physics in the context of AdS/CFT.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5136>

Participants:

Alexakis, Spyros (University of Toronto)
Almheiri, Ahmed (Institute for Advanced Study)
Balehowsky, Tracey (University of Calgary)
Belin, Alexandre (CERN)
Bouso, Raphael (University of California, Berkeley)
Caceres, Elena (U. of Texas / U. of Colima)
Cao, Charles (University of Maryland)
Dafermos, Mihalis (University of Cambridge)
de Boer, Jan (University of Amsterdam)
Dong, Xi (University of California, Santa Barbara)
Engelhardt, Netta (Massachusetts Institute of Technology)
Faulkner, Tom (University of Illinois)
Feizmohammadi, Ali (University of Toronto)
Fischetti, Sebastian (McGill University)
Folkestad, Aasmund (Massachusetts Institute of Technology)
Giorgi, Elena (Columbia University)
Guica, Monica * (NORDITA)
Harlow, Daniel (MIT)
Hartman, Thomas (Cornell)
Hernandez Cuenca, Sergio (UC Santa Barbara)
Horowitz, Gary (University of California, Santa Barbara)
Kabat, Daniel (City University of New York)
Kar, Arjun (University of British Columbia)
Keeler, Cynthia (Arizona State University)
Lamprou, Lampros (University of British Columbia)
Levine, Adam (Institute for Advanced Study)
Lin, Henry (Princeton University)
Liu, Hong (Massachusetts Institute of Technology)
Maldacena, Juan (Institute for Advanced Study)
Maloney, Alexander (McGill University)
Maxfield, Henry (Stanford)
May, Alex (Stanford University)
Myers, Robert (Perimeter Institute)
Nachman, Adrian (University of Toronto)
Neuenfeld, Dominik (Perimeter Institute)
Papadoulaki, Olga (Perimeter Institute)
Parrikar, Onkar (TIFR Mumbai)
Penington, Geoff (UC Berkeley)
Shahbazi-Moghaddam, Arvin (Stanford University)
Shenker, Stephen (Stanford University)
Sully, James (UBC)
Van Raamsdonk, Mark (University of British Columbia)
Verlinde, Herman (Princeton University)
Wiseman, Toby (Imperial College London)
Zhao, Ying (KITP)

Statistical Aspects of Non-Linear Inverse Problems (Online)

October 31 - November 5, 2021

Organizers:

Gabriel Paternain (University of Cambridge)
Francois Monard (University of California Santa Cruz)

Angkana Rüland (University of Heidelberg)



Nonlinear inverse problems are ubiquitous in medical sciences, engineering, physics and other natural sciences. This workshop advanced a statistical paradigm that allows underpinning statistical decision making in such problems in a scientifically rigorous way. This has achieved by providing ‘frequentist’ large sample guarantees for inferences arising from commonly used (Bayesian or non-Bayesian) algorithms in such problems. Thereby, a large cluster of applied problems, where algorithms are used for day-to-day decision making with statistical data, will be put on a solid and robust foundation, facilitating its confident use in modern society.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5009>

Participants:

Abraham, Kweku (University of Cambridge)
Agapiou, Sergios (University of Cyprus)
Alberti, Giovanni S. (University of Genoa)
Altmeyer, Randolf (University of Cambridge)
Beretta, Elena (NYU Abu Dhabi)
Bohr, Jan (University of Cambridge)
Bubba, Tatiana (University of Cambridge)
Caddel, Brynn (University of California Santa Cruz)
Caro, Pedro (Basque Center for Applied Mathematics)
Castillo, Ismaël (Sorbonne Université)
Covi, Giovanni (TK)
Cristina, Butucea (Paris)
Dashti, Masoumeh (University of Sussex)
de Hoop, Maarten (Rice University)
Deo, Neil (University of Cambridge)
Flynn, Steven (University of Bath)

Frederiksen, Christian (Tulane University)
Garcia Ferrero, Maria Angeles (BCAM Bilbao)
Giordano, Matteo (University of Oxford)
Glatt-Holtz, Nathan (Tulane University)
Glubokov, Andrey (Purdue University)
Helin, Tapio (LUT University)
Hoffmann, Marc (Paris)
Hohage, Thorsten (University of Goettingen)
Hosseini, Bamdad (California Institute of Technology)
Ilmavirta, Joonas (University of Jyväskylä)
Kaltenbacher, Barbara (University of Klagenfurt Austria)
Kato, Kengo (Cornell University)
Kay, Jonathan (University of California Santa Cruz)
Kekkonen, Hanne (Delft University of Technology)
Krometis, Justin (Virginia Tech)

Krupchyk, Katya (University of California, Irvine)
Lassas, Matti (University of Helsinki)
Mammen, Enno (Heidelberg)
Marzouk, Youssef (Massachusetts Institute of Technology)
Monard, Francois (University of California Santa Cruz)
Nelsen, Nicholas (California Institute of Technology)
Nickl, Richard (University of Cambridge)
Nisbet, Alex (Tulane University)
Oksanen, Lauri (University of Helsinki)
Paternain, Gabriel (University of Cambridge)
Railo, Jesse (University of Cambridge)
Ray, Kolyan (Imperial College London)
Reich, Sebastian (Universität Potsdam)
Reiß, Markus (Universität zu Berlin)
Rousseau, Judith (Oxford University)
Rüland, Angkana (University of Heidelberg)
Saksala, Teemu (North Carolina State University)
Salo, Mikko (University of Jyväskylä)
Santacesaria, Matteo (University of Genoa)
Scheichl, Robert (Heidelberg University)
Schmidt Hieber, Johannes (University of Twente)
Schmidt-Hieber, Johannes (University of Twente)
Schwab, Christoph (ETHZ)
Siltanen, Samuli (University of Helsinki)
Somersalo, Erkki (Case Western Reserve University)
Spokoiny, Vladimir (WIAS and Humboldt University Berlin)
St-Amant, Simon (University of Cambridge)
Stefanov, Plamen (Purdue)
Strauch, Claudia (Aarhus University)
Szabo, Botond (Vrije Universiteit Amsterdam)
Teckenstrup, Aretha (University of Edinburgh)
Trabs, Mathias (Hamburg)
Tsybakov, Alexandre (Institut Polytechnique de Paris)
Uhlmann, Gunther (University of Washington and HKUST)
van de Geer, Sara (Eidgenössische Technische Hochschule Zürich)
Wang, Sven (MIT)
Wang, Yiran (Emory University)
Xi, Chen (Fudan University)
Zech, Jakob (Universität Heidelberg)
Zhou, Hanming (UC Santa Barbara)
Zou, Joey (University of California Santa Cruz)

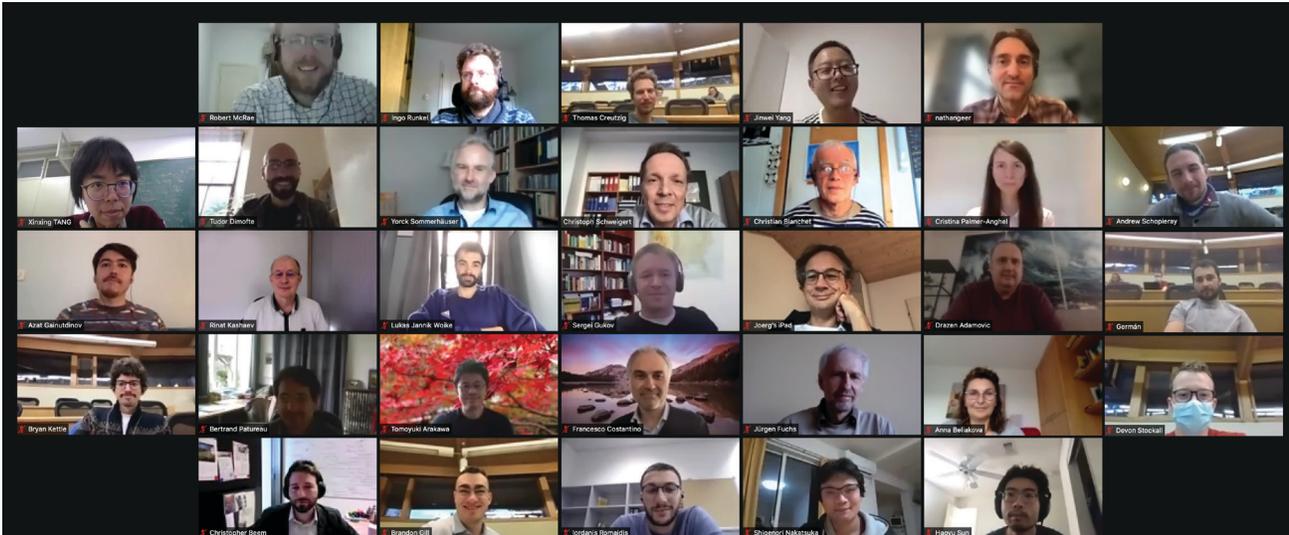
Quantum Field Theories and Quantum Topology Beyond Semisimplicity

October 31 - November 5, 2021

Organizers:

Thomas Creutzig (University of Alberta)
Nathan Geer (Utah State University)

Christoph Schweigert (U Hamburg)



Rich mathematical structures appear in supersymmetric quantum field theories. These provide new perspectives on deep mathematics while at the same time allow for a better understanding of the quantum field theories. This workshop brought together experts from different areas in mathematics and theoretical physics with the aim of deepening our understanding and to foster new interdisciplinary collaborations.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5121>

Participants:

Adamovic, Drazen (University of Zagreb, Faculty of Science,)
Arakawa, Tomoyuki (RIMS, Kyoto University)
Ballin, Andrew (UC Davis)
Beem, Christopher (Oxford University)
Beliakova, Anna (University of Zurich)
Blanchet, Christian (Universite de Paris)

Cheng, Miranda (Harvard University)
Cliff, Emily (Université de Sherbrooke)
Costantino, Francesco (Toulouse University)
Creutzig, Thomas (University of Alberta)
Dimofte, Tudor (University of Edinburgh, on leave from University of California Davis)
Faitg, Matthieu (University of Hamburg)

Farnsteiner, Julian (University of Hamburg)
Feigin, Boris (Higher School of Economics - Moscow)
Fuchs, Jürgen (Karlstad University)
Gainutdinov, Azat (CNRS, Université de Tours)
Gaiotto, Davide (Perimeter Institute)
Gannon, Terry (University of Alberta)
Garces, German (University of Alberta)
Garner, Niklas (University of Washington)
Geer, Nathan (Utah State University)
Genra, Naoki (The University of Tokyo)
Gill, Brandon (University of Alberta)
Glubokov, Andrey (Purdue University)
Gukov, Sergei (California Institute of Technology)
Han, Li (Capital Normal University, China)
Joshi, Aniket (University of Alberta)
Kanade, Shashank (University of Denver)
Kashaev, Rinat (Université de Genève)
Kettle, Bryan (University of Alberta)
Korff, Christian (University of Glasgow)
Lentner, Simon (University of Hamburg)
Linshaw, Andy (University of Denver)
McRae, Robert (Tsinghua University)
Milas, Antun (State University of New York at Albany)
Nakatsuka, Shigenori (IPMU)
Niu, Wenjun (UC Davis)
Orosz Hunziker, Florencia (University of Denver)
Palmer-Anghel, Cristina (Université de Genève)
Patureau-Mirand, Bertrand (Bretagne-Sud University)
Pei, Du (Harvard University)
Plavnik, Julia (Indiana University)
Prochazka, Tomas (Ludwig Maximilian University of Munich)
Rapcak, Miroslav (UC Berkeley)
Reshethikin, Nicolai (University of California at Berkeley and Tsinghua University, Beijing)
Ridout, David (University of Melbourne)
Riesen, Andrew (University of Alberta)
Romaidis, Iordanis (Hamburg University)
Ros Camacho, Ana (Cardiff University)
Runkel, Ingo (U Hamburg)
Rupert, Matthew (Utah State University)
Schopieray, Andrew (University of Alberta)
Schweigert, Christoph (U Hamburg)
Sommerhauser, Yorck (Memorial University of Newfoundland)
Stockall, Devon (University of Alberta)
Teschner, Joerg (University of Hamburg and DESY)
Traube, Matthias (Hamburg University)
Turaev, Vladimir (Indiana University)
Voss, Thomas (Hamburg University)
Woike, Lukas (University of Copenhagen)
Wood, Simon (Cardiff University)
Yang, Jinwei (University of Alberta)
Yang, Yang (University of Hamburg)
Young, Matthew (Utah State University)

Locally Conformal Symplectic Manifolds: Interactions and Applications (Online)

November 7 - 12, 2021

Organizers:

Baptiste Chantraine (Université de Nantes)
Vestislav Apostolov (Université du Québec à Montréal)

Andrei Moroianu (CNRS - Université Paris-Saclay)
Emmy Murphy (Northwestern University)



This workshop brought together established and young mathematicians working in complex analytic, differential and symplectic geometry, as well as in geometric PDE's, in an attempt to produce a road-map for future research in the domain of LCS manifold. By focusing during a single week on the topological, differential geometric and complex analytic aspects of the theory of locally symplectic manifolds, we provided the necessary synergy for a substantial future progress in the field. A problem session organized at the end of the workshop.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5049>

Participants:

Angella, Daniele (University of Florence)
Apostolov, Vestislav (Université du Québec à Montréal)
Bande, Gianluca (University of Cagliari)
Barraud, Jean-François (Université de Toulouse)
Bazzoni, Giovanni (University of Insubria)
Bertelson, Mélanie (Université Libre de Bruxelles)
Chantraine, Baptiste (Université de Nantes)
Currier, Adrien (Université de Nantes)
Damian, Mihai (Université de Strasbourg)
Del Barco, Viviana (Universidade Estadual de Campinas)
Dioussky, Georges (Aix-Marseille University)
Ferreira, Ana Cristina (University of Minho)
Fino, Anna (Università di Torino)
Flamencourt, Brice (Université Paris-Saclay)
Gąbłed, Agnès (Université Paris-Saclay)
Gauduchon, Paul (Centre National de la Recherche Scientifique)
Gironella, Fabio (Humboldt University)

Glubokov, Andrey (Purdue University)
Goto, Ryushi (Osaka University)
Grantcharov, Gueo (Florida International University)
Istrati, Nicolina (Philipps-Universität Marburg)
Kotschick, Dieter (Ludwig-Maximilians-Universität München)
Le, Hong Van (Institute of Mathematics of Czech Academy of Sciences)
Meersseman, Laurent (Université d'Angers)
Meigniez, Gaël (Université de Bretagne-Sud - Dept. of Mathematics)
Moroianu, Andrei (CNRS - Université Paris-Saclay)
Moroianu, Sergiu (IMAR)
Murphy, Emmy (Northwestern University)
Ono, Kaoru (Kyoto University)
Ornea, Liviu (University of Bucharest & IMAR)
Otiman, Alexandra (IMAR and University of Florence)
Parton, Maurizio (Università di Chieti-Pescara)
Pilca, Mihaela (University of Regensburg)

Pontecorvo, Massimiliano (Roma Tre University)
Rivière, Gabriel (Université de Nantes)
Sackel, Kevin (Stony Brook University)
Savelyev, Yasha (University of Colima)
Semmelmann, Uwe (University of Stuttgart)
Spotti, Cristiano (Aarhus University)
Streets, Jeff (University of California, Irvine)
Toma, Matei (Université de Lorraine)
Toussaint, Luran (Université Libre de Bruxelles)
Ustinovskiy, Yury (Lehigh University)
Van Overscheld, Pacôme (Université Libre de Bruxelles)

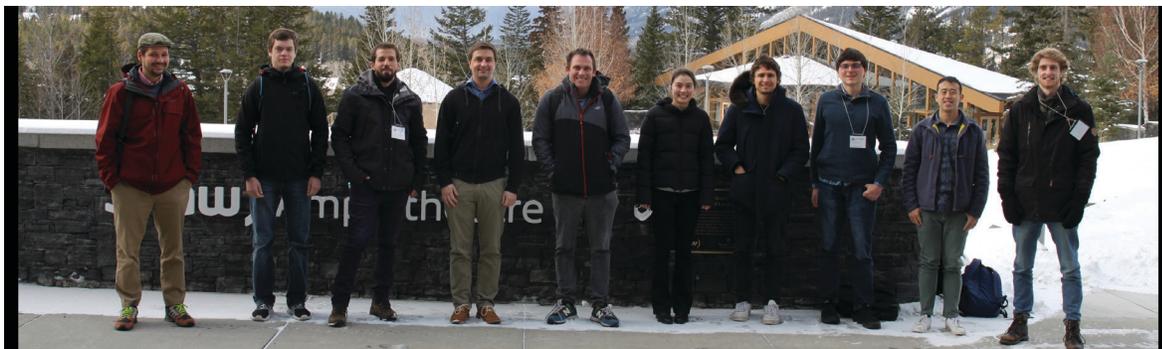
New Directions in Geometric Flows

November 7 - 12, 2021

Organizers:

Robert Haslhofer (University of Toronto)
Richard Bamler (University of California, Berkeley)

Jeff Streets (University of California, Irvine)
Gang Tian (Beijing University)



Geometric evolution equations describe physical phenomena ranging from a child's soap bubble to the evolution of the cosmos. The famous, Fields Medal winning work of Grigory Perelman used the "Ricci flow" equation to give a complete understanding of geometry in three dimensions. This was a huge leap forward in our understanding of these equations, and set off a firestorm of activity in the ensuing years. This workshop brought together researchers working in this exciting area to discuss recent developments and push towards new horizons.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5504>

Participants:

Apostolov, Vestislav (Université du Québec à Montréal)
Bahuaud, Eric (Seattle University)
Bamler, Richard (University of California, Berkeley)
Burkhardt-Guim, Paula (NYU Courant)
Cabezas-Rivas, Esther (University of Valencia)
Chau, Albert (University of British Columbia)
Chen, Jingyi (University of British Columbia)

Chen, Shuli (Stanford)
Chodosh, Otis (Stanford University)
Choi, Kyeongsu (Korea Institute for Advanced Study)
Choi, Beomjun (POSTECH)
Collins, Tristan (Massachusetts Institute of Technology)
Conlon, Ronan (University of Texas at Dallas)
Daniels-Holgate, Joshua (Warwick)

Daskalopoulos, Panagiota (Columbia University)
Deruelle, Alix (Sorbonne Universite)
Du, Wenkui (University of Toronto)
Garcia-Fernandez, Mario (Universidad Autónoma de Madrid)
Giga, Yoshikazu (University of Tokyo)
González Molina, Raúl (ICMAT)
Guo, Bin (Rutgers University - Newark)
Harvie, Brian (National Taiwan University)
Haslhofer, Robert (University of Toronto)
Hershkovits, Or (Hebrew University)
Huisken, Gerhard (Universitaet Tuebingen)
Iliashenko, Anton (University of Waterloo)
Isenberg, Jim (University of Oregon)
Jordan, Joshua (UCI)
Kleiner, Bruce (New York University)
Knopf, Dan (The University of Texas at Austin)
Kopfer, Eva (Hausdorff Center for Mathematics - Bonn)
Kotschwar, Brett (Arizona State University)
Lai, Yi (Stanford University)
Lavoyer De Miranda, Lucas (Warwick)
Lee, King Leung (UAM)
Litzinger, Florian (Otto-von-Guericke-University Magdeburg)
Liu, Jiawei (Otto-von-Guericke-University Magdeburg)
Lotay, Jason (University of Oxford)
Lott, John (UC Berkeley)
Mahmoudian, Hamidreza (Rutgers)
Marx-Kuo, Jared (Stanford)
Munteanu, Ovidiu (University of Connecticut)
Naff, Keaton (MIT)
Najafi Ivaki, Mohammad (University of Toronto)
Oliveira, Manuel (University of British Columbia)
Park, Jiewon (Yale)
Payne, Alec (Duke University)
Picard, Sebastien (UBC)
Schulze, Felix (University of Warwick)
Sesum, Natasa (Rutgers University)
Simon, Miles (University of Magdeburg)
Sobnack, Arjun (Warwick)
Song, Jian (Rutgers University)
Stolarski, Maxwell (Arizona State University)
Streets, Jeff (University of California, Irvine)
Sturm, Karl-Theodor (University of Bonn)
Tian, Gang (Beijing University)
Topping, Peter (Warwick)

Basic Functions, Orbital Integrals, and Beyond Endoscopy (Online) November 14 - 19, 2021

Organizers:

Julia Gordon (University of British Columbia)

James Arthur (University of Toronto)

Tasho Kaletha (University of Michigan)



The Functoriality conjectures, formulated by Langlands in 1967, have been a driving force behind much of the work in both Number theory and Representation theory in the last 50 years. This workshop explored a relatively new approach to the conjectures stemming from Langlands' recent proposal called "Beyond Endoscopy". This proposal has since blossomed in the work of many mathematicians and has produced very interesting recent results in several areas of mathematics from algebraic geometry through representation theory to analytic number theory.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5228>

Participants:

Adler, Jeffrey (American University)
Adrian, Moshe (CUNY)
Arthur, James (University of Toronto)
Asgari, Mahdi (Oklahoma State University)
Atobe, Hiraku (Hokkaido University)
Aubert, Anne-Marie (Centre National de la Recherche Scientifique)
Bernstein, Joseph (Tel Aviv University)
Bernstein, Joseph (Tel Aviv University)
Beuzart-Plessis, Raphael (CNRS Aix-Marseille Université)
Bourgeois, Adele (University of Ottawa)
Casselman, Bill (University of British Columbia)
Chaudouard, Pierre-Henri (IMJ-PRG Université de Paris)
Chen, Tsao-Hsien (University of Minnesota)
Chen, Cheng (University of Minnesota)
Chen, Rui (John Hopkins University)
Choiy, Kwangho (Southern Illinois University)
Ciubotaru, Dan (University of Oxford)
Clozel, Laurent (Université Paris-Sud)
Cogdell, James (Ohio State University)
Constantin, Hannah (University of Toronto)
Cunningham, Clifton (University of Calgary)
Dalal, Rahul (Johns Hopkins University)
Daniels, Patrick (University of Michigan)
DeBacker, Stephen (University of Michigan)
del Castillo, Héctor (Universidad de Santiago de Chile)
Delorme, Patrick (Institut de Mathématiques de Marseille)
Dillery, Peter (University of Michigan)
Emory, Melissa (University of Toronto)
Espinosa Lara, Malors (University of Toronto)
Feigon, Brooke (The City College of New York (CUNY))
Fintzen, Jessica (Duke University)
Friedberg, Solomon (Boston College)
Gan, Wee Teck (National University of Singapore)
Getz, Jayce (Duke University)
Glazer, Itay (Northwestern University)
Glubokov, Andrey (Purdue University)
Goldberg, David (Purdue University)
Goresky, Mark (Institute for Advanced Study)
Gourevitch, Dmitry (Weizmann Institute of Science)
Grobner, Harald (Universität Wien)
Gu, Miao (Pam) (Duke University)
Hahn, Heekyoung (Duke University)
Haines, Thomas (University of Maryland)

Hakim, Jeffrey (American University)
Hales, Thomas (University of Pittsburgh)
Haley, Jacob (Penn State)
Harris, Michael (Columbia University)
Hazan, Zahi (Tel Aviv University)
Heiermann, Volker (Université d'Aix-Marseille)
Hendel, Yotam (Northwestern University)
Henniart, Guy (Université Paris-Sud Orsay)
Hong, Serin (University of Michigan)
Hsu, Chun-Hsien (Duke University)
Ichino, Atsushi (Kyoto University)
Jacquet, Herve (Columbia University)
Jiang, Dihua (University of Minnesota)
Johnstone, Daniel (University of Toronto)
Kaletha, Tasho (University of Michigan)
Kang, Taeyeoup (POSTECH)
Kaplan, Eyal (Bar-Ilan University)
Kim, Ju-Lee (MIT)
Kim, Yeansu (Chonnam National University)
Koziol, Karol (University of Michigan)
Krishna, Rahul (Brandeis University)
Krishnamurthy, Muthu (University of Iowa)
La Rosa, Alfio Fabio (University of Luxembourg)
Labesse, Jean-Pierre (Institut de Mathématiques de Marseille)
Lansky, Joshua (American University)
Lee, Chung-Ru (Duke University)
Leslie, Spencer (Duke University)
Li, Wen-Wei (Peking University)
Liu, Baiying (Purdue University)
Loeser, Francois (Sorbonne Université)
Lomeli, Luis (Pontificia Universidad Católica de Valparaíso)
Luo, Zhilin (University of Chicago)
Luo, Wenzhi (Ohio State University)
Mahendraker, Siddharth (Boston College)
Maiti, Ayan (Oklahoma State University)
Manderscheid, David (University of Tennessee, Knoxville)
Marshall, Simon (University of Wisconsin)
Martin, Kimball (University of Oklahoma)
Matthew Sunohara, Matthew Sunohara (University of Toronto)
Matz, Jasmin (University of Copenhagen)
Meli, Alexander Bertoloni (University of Michigan)
Mezo, Paul (Carleton University)
Minguez, Alberto (University of Vienna)
Mishra, Manish (IISER Pune)
Moisan-Roy, Patrice (University of Toronto)

Murnaghan, Fiona (University of Toronto)
Nevins, Monica (University of Ottawa)
Ngo, Bao Chau (University of Chicago)
Nguyen, Athena (Langara College)
Offen, Omer (Brandeis University)
Opdam, Eric (University of Amsterdam)
Patnaik, Manish (University of Alberta)
Paul, Annegret (Western Michigan University)
Pollack, Aaron (University of California, San Diego)
Prasad, Dipendra (Indian Institute of Technology, Bombay)
Rud, Thomas (University of British Columbia)
Sachdeva, Gunja (BITS Pilani K. K. Birla Goa Campus)
Sakellaris, Yiannis (Johns Hopkins University)
Sarah, Dijols (MPIM Bonn)
Sarnak, Peter (Princeton University)
Savin, Gordan (University of Utah)
Sawin, Will (Columbia University)
Sayag, Eitan (Ben Gurion U)
Schwein, David (Cambridge University)
Shahidi, Freydoon (Purdue University)
Shin, Sug Woo (University of California, Berkeley)
Solleveld, Maarten (Radboud Universiteit Nijmegen)
Speh, Birgit (Cornell University)
Spice, Loren (Texas Christian University)
Stevens, Shaun (University of East Anglia)
Tadic, Marko (University of Zagreb)
Takeda, Shuichiro (University of Missouri)
Tsai, Cheng-Chiang (Academia Sinica, Taiwan)
Vignerat, Marie-France (Jussieu Paris 7)
Vogan, David (MIT)
Wan, Chen (Rutgers University-Newark)
Wong, Tian An (University of Michigan-Dearborn)
Xu, Bin (Tsinghua University)
Yang, Liyang (Princeton University)
Yun, Zhiwei (MIT)
Zelinger, Elad (Yale)
Zhang, Lei (National University of Singapore)
Zhang, Wei (MIT)
Zhang, Robin (Columbia University)
Zhang, Zhiyu (MIT)

Derived, Birational, and Categorical Algebraic Geometry

November 14 - 19, 2021

Organizers:

David Favero (University of Alberta)
Matthew Ballard (University of South Carolina)

Nitin Kumar Chidambaram (Max Planck Institute for Mathematics)



Birational geometry is a classical mathematic subject dating back to the late 1800s. It aims to classify geometric shapes by looking at the majority of their points and asks “if I remove some points from shape A and some other points from shape B, do they become the same shape?”. This turns out to be a surprisingly difficult and fundamental mathematical question. Perhaps more surprising is that the classification of geometric shapes from birational geometry is related to the classification of abstract mathematical gadgets called derived categories, a formal language developed by prominent mathematicians in France in the 1960s. However, the relationship between derived categories and birational geometry remains unproven.

One avenue to pursue this connection is through a modern mathematical subject known as “derived algebraic geometry”. This workshop brought together experts in birational geometry, derived categories, and derived algebraic geometry in an effort to connect the disciplines and more thoroughly understand this deep mathematical phenomenon.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5509>

Participants:

Abellán García, Fernando (University of Hamburg)
Addington, Nicolas (University of Oregon)
Almousa, Ayah (University of Minnesota)
Anno, Rina (Kansas State University)

Antolín Camarena, Omar (UNAM)
Artan Sheshmani, Artan (Harvard University Center for Mathematical sciences and Applications)
Ballard, Matthew (University of South Carolina)

Baranovsky, Vladimir (University of California Irvine)
Barbacovi, Federico (UCL)
Bayer, Arend (University of Edinburgh)
Belmans, Pieter (University of Luxembourg)
Berenstein, Arkady (University of Oregon)
Bertram, Aaron (University of Utah)
Bhaduri, Anirban (University of South Carolina)
Bodzenta, Agnieszka (University of Warsaw)
Bondal, Alexey (Steklov Mathematical Institute of Russian Academy of Sciences)
Booth, Matt (University of Antwerp)
Brambila-Paz, Leticia (CIMAT)
Brinzanescu, Vasile (Institute of Mathematics IMAR)
Brion, Michel (Institut Fourier, Université de Grenoble)
Broomhead, Nathan (University of Plymouth)
Brown, Michael (Auburn University)
Caldararu, Andrei (University of Wisconsin, Madison)
Cascini, Paolo (Imperial College London)
Cautis, Sabin (University of British Columbia)
Chen, Qile (Boston College)
Chen, Dawei (Boston College)
Chidambaram, Nitin Kumar (Max Planck Institute for Mathematics)
Chiodo, Alessandro (Sorbonne Université)
Comaschi, Gaia (Universidade Estadual de Campinas)
Cooper, Susan (University of Manitoba)
Coskun, Izzet (UIC)
Cruz Morales, John Alexander (Universidad Nacional de Colombia)
Dey, Papri (University of Missouri)
Dhillon, Ajneet (University of Western Ontario)
Doran, Charles (University of Alberta)
Duncan, Alexander (University of South Carolina)
Erman, Daniel (University of Wisconsin-Madison)
Fan, Yu-Wei (University of California, Berkeley)
Fang, Tingting (University of Wisconsin-Madison)
Farman, Blake (University of Louisiana Monroe)
Favero, David (University of Alberta)
Flapan, Laure (Michigan State University)
Frei, Sarah (Rice University)
Fujita, Naoki (University of Tokyo)
Garay López, Cristhian (CIMAT)
Glubokov, Andrey (Purdue University)
Grieve, Nathan (Royal Military College of Canada, Carleton University and L'Université du Québec à Montréal)
Guere, Jeremy (Fourier Institute, University of Grenoble)
Halpern-Leistner, Daniel (Cornell University)
Hara, Wahei (Glasgow University)
Heath, Bailey (UofSC)
Heuts, Gijs (Utrecht University)
Hirano, Yuki (Kyoto University)
Honigs, Katrina (Simon Fraser University)
Huang, Jesse (University of Alberta)
Huang, Shengyuan (University of Birmingham)
Huizenga, Jack (Pennsylvania State University)
Jabbusch, Kelly (University of Michigan - Dearborn)
Jardim, Marcos (University of Campinas)
Kamnitzer, Joel (University of Toronto)
Kaplan, Daniel (University of Birmingham)
Katzarkov, Ludmil (University of Miami)
Kawamata, Yujiro (The University of Tokyo)
Keel, Sean (University of Texas, Austin)
Keller, Bernhard (University of Paris)
Kim, Bumsig (Korea Institute for Advanced Study)
Kopper, John (Penn State)
Koseki, Naoki (University of Edinburgh)
Kovács, Sándor (University of Washington)
Kulkarni, Rajesh (Michigan State University)
Lamarche, Alicia (University of Utah)
Lank, Pat (University of South Carolina)
Lieblch, Max (University of Washington)
Lin, Kuei-Nuan (Penn State University, Greater Allegheny)
Lin, Xun (Yau MSC Tsinghua U)
Lindenstrauss, Ayelet (Indiana University)
Logvinenko, Timothy (Cardiff University)
Lozano Huerta, César (CONACYT - UNAM)
Lunts, Valery (Indiana University)
Macri, Emanuele (Université Paris-Saclay)
Maher, Rob (University of Birmingham)
Malter, Aimeric (University of Birmingham)
Mathew, Akhil (University of Chicago)
McFaddin, Patrick (Fordham University)
Munoz, Vicente (Universidad de Malaga)
Neumann, Frank (University of Leicester)
Nikolaev, Nikita (University of Sheffield)
Nisse, Mounir (Xiamen University Malaysia)
Nuer, Howard (Technion)
Orendain, Juan (UNAM)
Ottem, John (University of Oslo)
Paucar Rojas, Rina Roxana (Instituto de Matemáticas y Ciencias Afines)
Pérez Buendía, Jesús Rogelio (CIMAT)
Perry, Alex (University of Michigan)
Pertusi, Laura (Università degli studi di Milano)
Pirutka, Alena (New York University)
Popov, Vladimir (Steklov Mathematical Institute, Russian Academy of Sciences)
Priddis, Nathan (Brigham Young University)
Prokhorov, Yuri (Steklov Mathematical Institute of Russian Academy of Sciences)
Pronk, Dorette (Dalhousie University)
Rajchgot, Jenna (University of Saskatchewan)
Rayan, Steven (University of Saskatchewan)
Reichstein, Zinovy (University of British Columbia)
Rennemo, Jørgen (University of Oslo)
Rincón Hidalgo, Alejandra (Abdus Salam International Centre for Theoretical Physics)
Roa Leguizamon, Leonardo (Universidad Michoacana de San Nicolas de Hidalgo, UMSNH)
Romo, Mauricio (Tsinghua University)
Ruddat, Helge (Mainz & Hamburg)
Scherotzke, Sarah (University of Luxembourg)
Schuett, Matthias (Leibniz University Hannover)
Segal, Ed (University College London)
Shah, Jay (WWU Münster)
Sharma, Shreya (University of South Carolina)
Sharpe, Eric (Virginia Tech)
Shinder, Evgeny (University of Sheffield)
Shramov, Constantin (Steklov Mathematical

Institute of Russian Academy of Sciences and HSE)
Smith, Jonathan (UofSC)
Soibelman, Yan (Kansas State University)
Stellari, Paolo (Università degli Studi di Milano)
Taggart, Niall (Utrecht University)
Tanimoto, Sho (Nagoya University)
Tirabassi, Sofia (Stockholm University)
Toda, Yukinobu (University of Tokyo)
Topaz, Adam (University of Alberta)
Torres, Sebastian (ICMS - Sofia)
Trotman, David (Aix Marseille University)
Tschinkel, Yuri (Courant Institute NYU and Simons Foundation)
Turchet, Amos (Roma Tre University)
Uehara, Hokuto (Tokyo Metropolitan University)
VandeBogert, Keller (University of Notre Dame)
Vandermolen, Robert (Saint Mary-of-the-Woods College)
Villarreal, Rafael (Center of Investigations and Advanced Studies IPN)
Vooyo, Geoff (Dalhousie University)
Wemyss, Michael (University of Glasgow)
Whitcher, Ursula (Mathematical Reviews (American Mathematical Society))
Xu, Chenyang (Princeton)
You, Fenglong (University of Oslo)
Yu, Tony Yue (California Institute of Technology)
Yui, Noriko (Queen's University)
Zhao, Gufang (University of Melbourne)

Algebraic Dynamics and its Connections to Difference and Differential Equations

November 14 - 19, 2021

Organizers:

Dang Khoa Nguyen (University of Calgary)
Thomas Scanlon (University of California, Berkeley)

Jason Bell (University of Waterloo)



The field of algebraic dynamics has emerged over the past two decades at the confluence of algebraic geometry, discrete dynamical systems, and diophantine geometry. In recent work, striking connections have been observed between algebraic dynamics and much older theories of difference and differential equations. This meeting brought together mathematicians with expertise in such diverse fields as ring theory, complex dynamics, differential and difference algebra, combinatorics and algebraic geometry. New work towards the dynamical Mordell-Lang and dense orbit conjectures as well as theorems on hypertranscendence and functional independence proven by connecting difference Galois theory, algebraic dynamics and other algebraic approaches to the study of functional equations were presented at this meeting.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5512>

Participants:

Adamo, Maria Stella (University of Rome “La Sapienza”)
Albayrak, Seda (University of Waterloo)
Athreya, Jayadev (University of Washington)
Barrera, Gerardo (University of Helsinki)

Barroero, Fabrizio (Università degli studi Roma 3)
Bell, Jason (University of Waterloo)
Burgos, Juan Manuel (Cinvestav)
Cantat, Serge (CNRS -- Université de Rennes)
Capuano, Laura (Università degli Studi Roma Tre)

Chatzidakis, Zoe (CNRS - ENS Paris)
Chen, Shaoshi (Chinese Academy of Sciences)
Cortés Poza, Yuriria (IIMAS, UNAM-Yucatan)
Deshalit, Ehud (Hebrew University of Jerusalem)
Di Vizio, Lucia (Universite de Versailles-St Quentin)
Diaz, Juan Pablo (Universidad Autónoma del Estado de Morelos)
Diller, Jeffrey (University of Notre Dame)
Dreyfus, Thomas (Universite de Strasbourg)
Dujardin, Romain (Sorbonne Université)
Fatoyinbo, Hammed Olawale (Massey University)
Favre, Charles (CNRS - Ecole Polytechnique)
Feng, Ruyong (Chinese Academy of Sciences)
Fili, Paul (Oklahoma State University)
Freitag, James (University of Illinois at Chicago)
García-Ramos, Felipe (Universidad Autonoma de San Luis Potosi)
Ghioca, Dragos (University of British Columbia)
Glubokov, Andrey (Purdue University)
Gunn, Keira (University of Calgary)
Hast, Daniel (Boston University)
Henson, Ward (University of Illinois)
Herrera-Valdez, Marco Arieli (UNAM)
Hindes, Wade (Texas State University)
Hsia, Liang-chung (National Taiwan Normal University)
Hu, Fei (University of Oslo)
Huang, Keping (Michigan State University)
Ih, Su-ion (University of Colorado at Boulder)
Ingram, Patrick (York University)
Jones, Gareth (University of Manchester)
Jonsson, Mattias (University of Michigan)
Juul, Jamie (Colorado State University)
Kamensky, Moshe (Ben Gurion University)
Kawaguchi, Shu (Doshisha University)
Kim, Kyounghee (Florida State University)
Kowalski, Piotr (Uniwersytet Wrocławski)
Krieger, Holly (University of Cambridge)
Leon Sanchez, Omar (University of Manchester)
Looper, Nicole (Brown University)
Maldonado Ahumada, Cesar (Instituto Potosino de Investigación Científica y Tecnológica)
Manes, Michelle (University of Hawaii at Manoa)
Matsuzawa, Yohsuke (Rikkyo University)
Mavraki, Myrto (University of Basel)
Meretzky, David (The University of Notre Dame)
Mishna, Marni (Simon Fraser University)
Moosa, Rahim (University of Waterloo)
Moreno Rocha, Monica (Centro de Investigación en Matemáticas)
Mosunov, Anton (University of Waterloo)
Nagloo, Joel (University of Illinois at Chicago)
Nasserden, Brett (Western)
Nguyen, Dang Khoa (University of Calgary)
Okuyama, Yusuke (Kyoto institute of technology)
Ovchinnikov, Alexey (CUNY Queens College)
Pakovich, Fedor (Ben Gurion University)
Pérez Buendía, Jesús Rogelio (CIMAT)
Petersen, Karl (University of North Carolina)
Petsche, Clayton (Oregon State University)
Pohl, Anke (Universität Bremen)
Reichstein, Zinovy (University of British Columbia)
Saleh, Sina (University of British Columbia)
Satriano, Matthew (University of Waterloo)
Scanlon, Thomas (University of California, Berkeley)
Schmidt, Harry (University of Basel)
Shen, Zhongwei (University of Alberta)
Singer, Michael (North Carolina State University)
Vicaria, Mariana (University of California at Berkeley)
Walker, Roland (University of Illinois at Chicago)
Wang, Yiqian (Nanjing University)
Wibmer, Michael (Graz University of Technology)
Wood, Carol (Wesleyan University)
Xie, Junyi (BICMR of Pekin University)
Yasufuku, Yu (Nihon University)
Zhang, De-Qi (National University of Singapore)
Zhang, Shou-Wu (Princeton University)

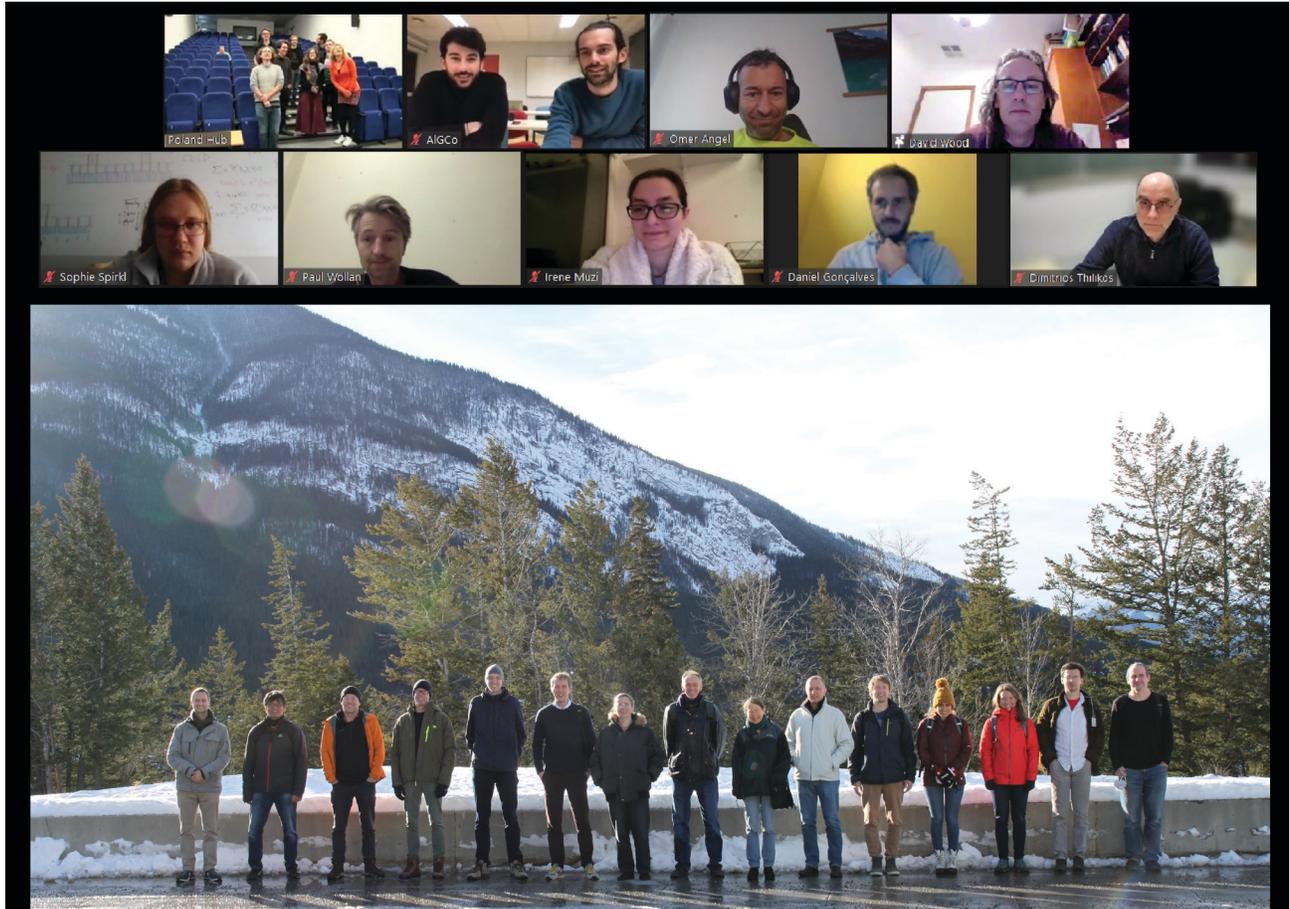
Graph Product Structure Theory

November 21 - 26, 2021

Organizers:

Pat Morin (Carleton University)
Vida Dujmović (University of Ottawa)

Sergey Norin (McGill University)
David Wood (Monash University)



Graphs are the standard mathematical model of many real-world entities: computer networks, road and highway networks, drainage systems, river networks, electrical networks, and so on. In some cases, these highly-complicated graphs are contained in the product of two or more much simpler graphs. In a recent breakthrough, it was shown that this is the case for planar or near-planar graphs like those that model river, road, and highway networks; any such graph is contained in the product of a simple tree-like graph and a path. This product structure gives deep insight into these graphs and their properties, allowing a host of mathematical and algorithmic tools to be applied to these graphs. This workshop continued the search for product structure in more general classes of graphs as well as to find new methods to exploit such product structure mathematically and algorithmically, when it is present.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5235>

Participants:

Abdi, Davoud (University of Calgary)
Ahn, Jungho (KAIST and Institute for Basic Science (IBS))
Angel, Omer (University of British Columbia)
Bazargani, Saman (Carleton University)
Biedl, Therese (University of Waterloo)
Bonamy, Marthe (Laboratoire Bordelais de Recherche en Informatique)

Bonnet, Edouard (LIP, ENS Lyon)
Bose, Prosenjit (Carleton University)
Briański, Marcin (Jagiellonian University)
Campbell, Rutger (Institute for Basic Science)
Chudnovsky, Maria (Princeton University)
Cook, Linda (Institute for Basic Science)
Daniel, Quiroz (Universidad de Valparaíso)
Davies, James (Waterloo)

Distel, Marc (Monash University)
Dujmović, Vida (University of Ottawa)
Dvorak, Zdenek (Charles University)
Eppstein, David (Univ. of California, Irvine)
Esperet, Louis (CNRS)
Fomin, Fedor (University of Bergen)
Gavoille, Cyril (University of Bordeaux)
Glubokov, Andrey (Purdue University)
Gollin, Pascal (Institute for Basic Science)
Gonçalves, Daniel (LIRMM - Univ Montpellier)
Hajebi, Sepehr (University of Waterloo)
Hatzel, Meike (TU Berlin)
Haxell, Penny (University of Waterloo)
Hendrey, Kevin (Institute for Basic Science)
Hickingbotham, Robert (Monash University)
Hlineny, Petr (Masaryk University)
Houdrouge, Hussein (Carleton University)
Huynh, Tony (Monash University)
Irsic, Vesna (Simon Fraser University)
Javarsineh, Mehrnoosh (Carleton University)
Joret, Gwenaël (Université Libre de Bruxelles)
Jungeblut, Paul (Karlsruhe Institute of Technology)
Kamčev, Nina (University of Zagreb)
Kierstead, Hal (Arizona State University)
Kundgen, Andre (California State University San Marcos)
Kwon, O-joung (Incheon National University)
Lahiri, Abhiruk (Charles University)
Liu, Chun-Hung (Texas A&M University)
Lugosi, Gabor (ICREA & Pompeu Fabra University)
McCarty, Rose (University of Waterloo)
Merker, Laura (Karlsruhe Institute of Technology)
Micek, Piotr (Jagiellonian University)
Mohar, Bojan (Simon Fraser University)
Moore, Benjamin (Charles University)
Morin, Pat (Carleton University)
Morrison, Natasha (University of Victoria)
Muzi, Irene (TU Berlin)
Nadara, Wojciech (University of Warsaw)
Nesetril, Jaroslav (Charles University, Prague)
Noel, Jonathan (University of Victoria)
Norin, Sergey (McGill University)
Odak, Saeed (Carleton University)
Ossona de Mendez, Patrice (Ecole des Hautes Etudes en Sciences Sociales)
Oum, Sang-il (Institute for Basic Science)
Pilipczuk, Michał (University of Warsaw)
Pilipczuk, Marcin (University of Warsaw)
Postle, Luke (University of Waterloo)
Protopapas, Evangelos (LIRMM)
Ranganathan, Arjun (Indian Institute of Science Education and Research (IISER), Pune)
Samal, Robert (Charles University)
Scott, Alex (University of Oxford)
Sereni, Jean-Sebastien (CNRS)
Seweryn, Michal (Jagiellonian University)
Seymour, Paul (Princeton)
Sidiropoulos, Anatasios (University of Illinois at Chicago)
Siebertz, Sebastian (University of Bremen)
Spirkl, Sophie (University of Waterloo)
Stamoulis, Giannos (LIRMM, Univ Montpellier, CNRS)
Thilikos, Dimitrios (LIRMM, Univ Montpellier, CNRS)
Trotter, Tom (Georgia Institute of Technology)
Ueckerdt, Torsten (Karlsruhe Institute of Technology)
Van den Heuvel, Jan (The London School of Economics and Political Science)
Walczak, Bartosz (Jagiellonian University)
Wei, Fan (Princeton University)
Wollan, Paul (University of Rome)
Wood, David (Monash University)
Worley, David (Carleton University)
Yepremyan, Liana (London School of Economics)
Zhu, Xuding (Zhejiang Normal University)

Moving Frames and their Modern Applications

November 21 - 26, 2021

Organizers:

Francis Valiquette (Monmouth University)
Irina Kogan (North Carolina State University)

Peter Olver (University of Minnesota -- Twin Cities)
Alexander Bihlo (Memorial University of Newfoundland)



Originally introduced by Martin Bartels in the early nineteenth century, and then extensively developed by Élie Cartan in the first half of the twentieth century, the method of moving frames is a powerful tool for studying the geometry of curves, surfaces, and, more generally, submanifolds under the action of a group of transformations. In 1999, a new and more general formulation of moving frame was introduced by Fels and Olver which led to a dramatic resurgence of interest in the method accompanied by a striking extension of the range of applications. The workshop brought together a diverse group of experts with the goal of exploring existing and emerging applications of the moving frame method to differential equations and integrable systems in physics, to computer vision and object recognition, medical imaging, broken object reconstruction, discrete and differential-difference equations, geometric numerical integration, and much more.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5505>

Participants:

Arnaldsson, Orn (University of Iceland)
Basquerotto, Cláudio (Universidade Federal do Sul e Sudeste do Pará)
Bihlo, Alexander (Memorial University of Newfoundland)
Boutin, Mireille (Purdue University)
Calini, Annalisa (College of Charleston)
Cheh, Jeongoo (University of Toledo)
Chun, Sehun (Yonsei University)
Clelland, Jeanne (University of Colorado, Boulder)
Fels, Mark (Utah State University)
Geiger, Eric (Yale University)
Glubokov, Andrey (Purdue University)
Gün Polat, Gülden (Gebze Technical University)
Hayes, Illia (Utah State University)
Hickman, Mark (University of Canterbury)
Hoff, Daniel (Independent)
Hubert, Evelyne (INRIA Sophia Antipolis France)
Hydon, Peter (University of Kent)
Ivey, Thomas (College of Charleston)
Jackaman, James (NTNU)
Jensen, Gary (Washington University in St. Louis)
Kamran, Niky (McGill University)
Kogan, Irina (North Carolina State University)
Kruglikov, Boris (UiT the Arctic University of Norway)
Lewis, Debra (University of California - Santa Cruz)
Lychagin, Valentin (University of Tromsø)
Mari-Beffa, Gloria (University of Wisconsin-Madison)
Memoli, Facundo (The Ohio State University)
Milson, Robert (Dalhousie University)
Mo, Hanlin (University of Oulu)
Morozov, Oleg (AGH University of Science and Technology)
Munthe-Kaas, Hans (University of Bergen Norway)
Muriel Patino, Maria Concepción (University of Cadiz)
Musso, Emilio (Politecnico of Turin)
Needham, Tom (Florida State University)
Olver, Peter (University of Minnesota -- Twin Cities)
Peng, Linyu (Keio University)
Pohjanpelto, Juha (Oregon State University)
Popovych, Roman (University of Vienna)
Porter, Curtis (Duke University)
Qu, Changzheng (Ningbo University)

Revelle, John (North Carolina State University)
Rock, Peter (University of Colorado - Boulder)
Ruddy, Michael (University of San Francisco)
Ruiz, Adrián (Universidad de Cádiz)
Sabzevari, Masoud (Shahrekord University)
Schneider, Eivind (University of Hradec Králové)
Seiler, Werner (Kassel University)
Sergyeyev, Artur (Silesian University in Opava)
Shakiban, Chehrzad (University of St. Thomas)
Shemyakova, Ekaterina (University of Toledo)
Smirnov, Roman (Dalhousie University)
Stern, Ari (Washington University in St. Louis)
The, Dennis (UiT The Arctic University of Norway)
Thompson, Rob (Carleton College)
Valiquette, Francis (Monmouth University)
Wang, Jing Ping (University of Kent)

Mathematical Statistics and Learning

November 28 - December 3, 2021

Organizers:

Gabor Lugosi (ICREA & Pompeu Fabra University)

Luc Devroye (McGill University)



The workshop focused on the novel mathematical challenges of statistics and machine learning. The spectacular success of machine learning in a wide range of applications opens many exciting theoretical challenges in a number of mathematical fields, including probability, statistics, combinatorics, optimization, and geometry. BIRS will bring together researchers of machine learning and mathematical statistics to discuss these problems. The principal topics included combinatorial statistics, online learning, and deep neural networks.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5070>

Participants:

Addario-Berry, Louigi (McGill University)
Arias-Castro, Ery (UCSD)
Austern, Morgane (Harvard University)
Bandeira, Afonso (ETH Zurich)
Bartlett, Peter (UC Berkeley)
Ben-David, Shai (University of Waterloo)
Bose, Prosenjit (Carleton University)
Boucheron, Stéphane (Université de Paris)
Bubeck, Sebastien (Microsoft Research)
Devroye, Luc (McGill University)
Diakonikolas, Ilias (University of Wisconsin-Madison)
Dujmović, Vida (University of Ottawa)
Jog, Varun (University of Cambridge)
Kamath, Gautam (University of Waterloo)
Kaufmann, Emilie (CNRS & Université de Lille)
Lugosi, Gabor (ICREA & Pompeu Fabra University)
Mendelson, Shahar (University of Warwick)
Montanari, Andrea (Stanford University)
Morin, Pat (Carleton University)
Neu, Gergely (Universitat Pompeu Fabra)

Nobel, Andrew (University of North Carolina at Chapel Hill)
Oliveira, Roberto Imbuzeiro (IMPA)
Polyanskiy, Yury (Massachusetts Institute of Technology)
Racz, Miklos (Princeton University)
Rush, Cynthia (Columbia University)
Schramm, Tselil (Stanford University)
Szepesvari, Csaba (University of Alberta)
Wu, Yihong (Yale University)
Yu, Bin (University of Berkeley)
Zhivotovskiy, Nikita (ETH Zurich)
Zwiernik, Piotr (Universitat Pompeu Fabra)

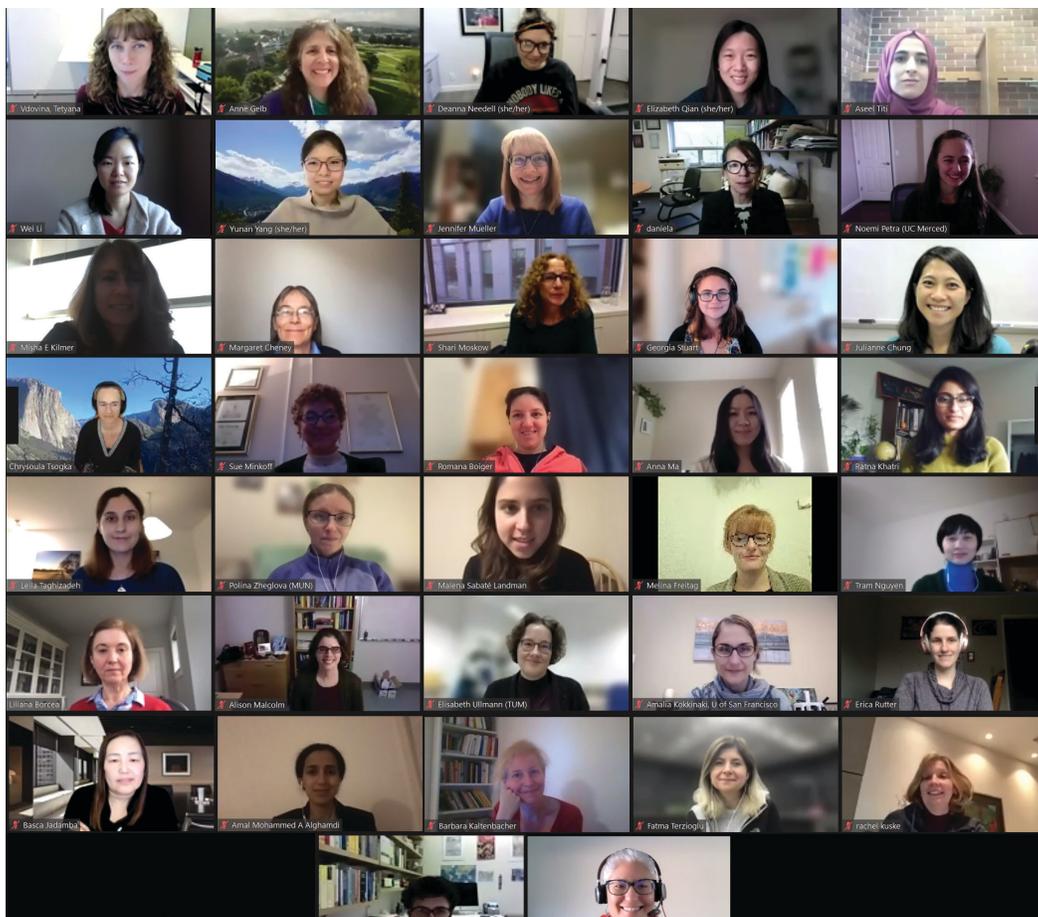
Women in Inverse Problems (Online)

December 5 - 10, 2021

Organizers:

Chrysoula Tsogka (University of California Merced)

Liliana Borcea (University of Michigan)



Inverse Problems are at the heart of scientific research and technological development. In general, any endeavor to extract knowledge from data, can be viewed as an inverse problem. From the mathematical point of view inverse problems lie at the interface between optimization, partial differential equations, probability, and statistics. They find applications in diverse areas such as medical imaging, characterization of the Earth's interior, remote sensing, glaciology, non-destructive testing of materials, etc.

This workshop brought together women in the broad and vibrant field of Inverse Problems. Both established as well as early career researchers came together to discuss their recent research achievements. This workshop facilitated professional networking and create mentoring opportunities for women researchers. The ultimate goal is to help broaden female participation in research careers in particular in the field of Inverse Problems, as well as to create new research collaborations.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5035>

Participants:

Alghamdi, Amal (Denmark Technical University)
Arnold, Andrea (Worcester Polytechnic Institute)
Beretta, Elena (NYU Abu Dhabi)
Boiger, Romana (Paul Scherrer Institut)
Borcea, Liliana (University of Michigan)
Cakoni, Fioralba (Rutgers University)

Calvetti, Daniela (Case Western Reserve University)
Cheney, Margaret (Colorado State University)
Chung, Julianne (Virginia Tech)
Dashti, Masoumeh (University of Sussex)
de Wiljes, Jana (University of Potsdam)

Dubinkina, Svetlana (VU Amsterdam)
Espanol, Malena (Arizona State University)
Freitag, Melina (University of Potsdam)
Gelb, Anne (Dartmouth College)
Graff, Marie (University of Auckland)
Jadamba, Baasansuren (Rochester Institute of Technology)
Kaltenbacher, Barbara (University of Klagenfurt Austria)
Khatri, Ratna (U.S. Naval Research Laboratory)
Kilmer, Misha (Tufts)
Kokkinaki, Amalia (University of San Francisco)
Krupchyk, Katya (University of California, Irvine)
Kuske, Rachel (Georgia Tech)
Li, Wei (DePaul University)
Liao, Wenjing (Georgia Tech)
Ma, Anna (University of California Irvine)
Malcolm, Alison (Memorial University)
Minkoff, Susan (University of Texas at Dallas)
Moskow, Shari (Drexel University)
Mueller, Jennifer (Colorado State University)
Muller, Kaitlyn (Villanova University)
Needell, Deanna (UCLA)
Ou, M. Yvonne (University of Delaware)
Pasha, Mirjeta (Arizona State University)
Pathiraja, Sahani (University of Potsdam)
Petra, Noemi (University of California - Merced)
Qian, Elizabeth (Caltech)
Resmerita, Elena (Alpen-Adria Universitaet)
Rutter, Erica (University of California Merced)
Sabaté Landman, Malena (University of Cambridge)
Schönlieb, Carola-Bibiane (University of Cambridge)
Stuart, Georgia (University of Texas at Austin)
Taghizadeh, Leila (Technical University of Munich)
Tarvainen, Tanja (University of Eastern Finland)
Terzioglu, Fatma (University of Chicago)
Thi Ngoc Nguyen, Tram (University of Graz)
Titi, Aseel (Wichita State University)
Tsogka, Chrysoula (University of California Merced)
Uilmann, Elisabeth (Technical University of Munich)
Vdovina, Tetyana (Exxon Mobil)
Xiao, Jingni (Rutgers University)
Yang, Yunan (University of California Berkeley)
Zheglova, Polina (Memorial University)

Women in Operator Algebras II

December 5 - 10, 2021

Organizers:

Maria Grazia Viola (Lakehead University)
Zahra Afsar (University of Sydney)

Sarah Reznikoff (Kansas State University)



The area of operator algebras is overwhelmingly male-dominated: less than 17% of researchers in operator algebras are women. We intended to join the global movement to increase the presence and visibility of women in mathematics.

This workshop provided an environment for female operator algebraists to collaborate on pioneering research projects. The workshop also aimed to develop the network of women in operator algebras and foster collaboration, support, and mentoring between its members. The participants have worked in small groups of 4--6 members each led by one or two leaders. To maximize the productivity at the workshop, preliminary work will be done by the group members prior to the event.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/5-day-workshops/21w5199>

Participants:

Adamo, Maria Stella (University of Rome "La Sapienza")
an Huef, Astrid (Victoria University of Wellington)
Anshu, Anshu (National Institute of Science Education and Research)

Archey, Dawn (University of Detroit Mercy)
Arici, Francesca (Leiden University)
Armstrong, Becky (University of Münster)
Azzali, Sara (Universität Greifswald)
Brooker, Samantha (Arizona State University)

Browne, Sarah (University of Kansas)
Chatterji, Indira Lara (University of Nice)
Clark, Lisa Orloff (Victoria University of Wellington)
Courtney, Kristin (University of Münster)
Duwenig, Anna (University of Wollongong)
Fabre Sehnem, Camila (Victoria University of Wellington)
Farsi, Carla (University of Colorado - Boulder)
Forough, Marzieh (Czech Academy of Science)
Ganesan, Priyanga (Texas A&M University)
Georgescu, Magdalena (none)
Ghandehari, Mahya (University of Delaware)
Gillaspy, Elizabeth (University of Montana)
Gomez-Aparicio, Maria Paula (University Paris Saclay)
Griesenauer, Erin (Eckerd College)
Jeong, Ja A (Seoul National University)
Kang, Eun Ji (Hanyang University)
Landry, Therese-Marie (University of California Riverside)
Larsen, Nadia S. (University of Oslo)
Lin, Ying-Fen (Queen's University Belfast)
Mikkelsen, Sophie Emma (University of Southern Denmark)
Packer, Judith (University of Colorado)
Pagani, Chiara (Universita' di Trieste)
Plavnik, Julia (Indiana University)
Plosker, Sarah (Brandon University)
Pooya, Sanaz (Stockholm University)
Reznikoff, Sarah (Kansas State University)
Strung, Karen (Czech Academy of Science)
Tan, Hui (University of California San Diego)
Tatarko, Kateryna (University of Waterloo)
Viola, Maria Grazia (Lakehead University)
Wang, Hang (East China Normal University)
Werner, Elisabeth (Case Western Reserve University)
Xia, Runlian (University of Glasgow)
Yang, Dilian (University of Windsor)

Banff International Research Station

2021

2-Day Workshops

Geometry: Education, Art, and Research (Online)

February 19 - 21, 2021

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 have 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 educators and artists to push the boundaries of contemporary geometry.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/2-day-workshops/21w2240>

Participants:

Abo, Stephanie (University of Waterloo)
Adams, Henry (Colorado State)
Ahmed, Maliha (University of Waterloo)
Al-Hawaj, Mariam (University of Toronto)
Alagic, Mara (Wichita State University)
Alalabi, Ala' (University of Waterloo)
Ali, Danish (Institute of Business Administration Karachi)
Athreya, Jayadev (University of Washington)
Bell, Thomas (University of Waterloo)
Bier, Carol (Graduate Theological Union)
Brewer, Sarah (The Alabama School of Mathematics and Science)
Cefali, Leslie (Teacher)
Charbonneau, Benoit (University of Waterloo)

Chow, Amenda (York University)
Dear, Leila (Independent researcher & Artist)
Delcourt, Michelle (Ryerson)
DeVleming, Kristin (University of California San Diego)
Dickenstein, Alicia (Universidad de Buenos Aires)
Engel, Reinout (@Geomicon)
Fairchild, Samantha (University of Washington)
Farris, Frank A. (Santa Clara University)
Fisher, Gwen (Gwenbeads)
Forrest, Brian (University of Waterloo)
Forrest, Barbara (University of Waterloo)
Gerofsky, Susan (University of British Columbia)
Glynn-Adey, Parker (University of Toronto Mississauga)

Greenwald, Sarah (Appalachian State University)
Hinojosa, Ricardo “Kamikyodai” (Independent researcher and freelance artist)
Hoffmann, Max (Paderborn University)
Hollabaugh, Jeanne (Geometry and Art Student)
Johnston, Nancy (University of Toronto Scarborough)
Jungic, Veselin (Simon Fraser University)
Kaplan, Craig (University of Waterloo)
Karimianpour, Camelia (University of Toronto)
Kassab, Lara (Colorado State University)
Katz, Brian (California State University, Long Beach)
Kigami, Jun (Kyoto University)
Kupers, Alexander (University of Toronto)
Mamolo, Ami (Ontario Tech)
Markle, Josh (University of Calgary)
McEachern, Andrew (York University)
Mian, Samira (Samira Mian Islamic Geometry)
Movaseghi, Katayoun (University of Toronto)
Mukerji, Meenakshi (Origamee.net)
Myroshnychenko, Sergii (University of Alberta)
Nasar, Audrey (Fashion Institute of Technology)
O’Rourke, Joseph (Smith College)
Plosker, Sarah (Brandon University)
Raut, Richa (Rachana Sansad’s Academy of Architecture)
Richter, David A. (Western Michigan University)
Robertson, S. Brackett (public-math.org)
Sajid, Mohammad (Qassim University)
San, ev (Mathematics Teacher)
Schaffer, Karl (MoveSpeakSpin and also De Anza College)
Segerman, Henry (Oklahoma State University)
Shahbazi, Zohreh (University of Toronto Scarborough)
Shammari, Khan (University of Toronto (alumni))
Silver, Sam (University of Maryland)
Sinclair, Nathalie (Simon Fraser University)
Smith, Kathleen (UTSC)
Taimina, Daina (Cornell University)
Tatarko, Kateryna (University of Alberta)
Treviño, Rodrigo (University of Maryland)
Tucker, Dawn (Independent Researcher)
Uzun, Gülten (Gebze Technic University)
Werner, Elisabeth (Case Western Reserve University)

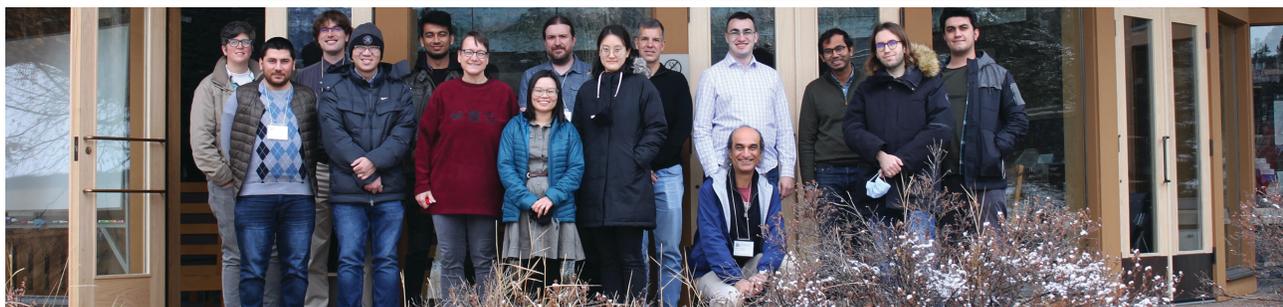
Alberta Number Theory Days XIII

November 5 - 7, 2021

Organizers:

Renate Scheidler (University of Calgary)
Ha Tran (Concordia University of Edmonton)

Habiba Kadiri (University of Lethbridge)



Number theory is a broad and central area of research with many connections and applications to other areas of mathematics and science. It is also an extremely active and diverse area of research. In recent years there have been significant advances in both analytic and algebraic number theory. The subject may be divided into several subdisciplines that range from pure mathematics to more applied areas such as computational number theory and mathematical physics. Some of the pure mathematics subdisciplines are algebraic number theory, arithmetic geometry, analytic number theory, automorphic forms and representation theory. All of these fields are well represented among the Albertan number theorists from Calgary, Edmonton and Lethbridge and other institutions in the province.

The annual Alberta Number Theory Days allowed for the exchange of knowledge. New connections are made and old associations are renewed. It is also an ideal forum for young talent in the Alberta number theory landscape to showcase their work and support them to continue in research. Faculty and students from under-represented categories in mathematics were invited to showcase their accomplishments and all felt comfortable to learn and confront ideas without any prejudice.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2021/2-day-workshops/21w2505>

Participants:

Akbary, Amir (University of Lethbridge)
Aygin, Zafer Selcuk (Northern Lakes College)
Bagshaw, Christian (University of Calgary)
Baker, Zackary (University of Calgary)
Balodis, Kristaps (University of Calgary)
Bassett, Theran (University of Northern British Columbia)
Bauer, Mark (University of Calgary)
Benesh, Joel (University of Lethbridge)
Benli, Kubra (Institut Élie Cartan de Nancy)
Bhattacharjee, Sreerupa (University of Lethbridge)
Bhattacharjee, Sandipan (Birla Institute of Technology Mesra)
Bolvardizade, Solaleh (University of Lethbridge)
Bouchard, Vincent (University of Alberta)
Buckingham, Paul (University of Alberta)
Bui, Khoa (Concordia University of Edmonton)
Cameron, Alex (University of Calgary)
Caranay, Perlas (University of Calgary)
Creutzig, Thomas (University of Alberta)
Cunningham, Clifton (University of Calgary)
Das, Sourabh (University of Waterloo)
de Waal, André (University of Calgary)
Docherty, Austin (University of Calgary)
Dutour, Mathieu (University of Alberta)
Fakhari, Milad (University of Lethbridge)
Feaver, Amy (Gordon College)
Fiori, Andrew (University of Lethbridge)
Fong, Jason (University of Toronto)
Fujikawa, Shohei (University of Calgary)
Gagnier, Damara (University of British Columbia)
Gannon, Terry (University of Alberta)
Gaulhiac, Sylvain (University of Alberta)
Ge, Qi (University of Alberta)
George, Joshua (University of Alberta)
Gill, Brandon (University of Alberta)
Guinn, Gavin (University of Calgary)
Gunn, Keira (University of Calgary)
Ha, Minh Dat (University of Calgary)
Hamieh, Alia (University of Northern British Columbia)
Hasanalizade, Elchin (University of Lethbridge)
Heiter, Nina (Portland State University)
Holmes, Erik (University of Calgary)
Jacobson, Jr., Michael (University of Calgary)
Jalalvand, Fatemeh (University of Calgary)
Jiang, Christopher (University of Calgary)
Joseph, Robert (University of Alberta)
Joshi, Aniket (University of Alberta)
Kadiri, Habiba (University of Lethbridge)
Kouklanfar, Leili (University of Calgary)
Kurzenhauser, Bela (Portland State University)
Le, Nam (VNUHCM-University of Science)
Le, Trinh (Ho Chi Minh City University of Education)
Leem, Sumin (University of Calgary)
Liu, Ti (Portland State University)
Lumley, Allysa (Université de Montréal)
Markham, Taylor (University of Calgary)
Marquis, David (University of Calgary)
Martin, Greg (University of British Columbia)
Moon-Keca, Nicole (Concordia University of Edmonton)
Morrill, Ryan (University of Calgary)
Mosunov, Anton (University of Waterloo)
Needham, Lauryn (University of Northern British Columbia)
Ng, Nathan (University of Lethbridge)
Nguyen, Dang Khoa (University of Calgary)
Nguyen, Hang (Ho Chi Minh City University of Education)
Pacheco Castan, Edgar (University of Calgary)
Patnaik, Manish (University of Alberta)
Polavarapu, Achintya (University of Alberta)
Priestman, Cole (University of Calgary)
Ray, Mishty (University of Calgary)
Reyes, Stephanie (Loyola University)
Riddlesden, Connor (University of Lethbridge)
Roettger, Eric (Mount Royal University)
Satpathy, Punya Plaban (University of Alberta)
Saunders, J. C. (University of Calgary)
Scheidler, Renate (University of Calgary)
Shahabi, Majid (University of Calgary)
Shen, Quanli (University of Lethbridge)
Simpson, Reginald (University of British Columbia)
Singh, Supragyapal (Concordia University of Edmonton)
Smolcic, Josip (University of Waterloo)
Sobrevilla Moreno, Pedro (University of Calgary)
Srivastava, Aviral (University of Hyderabad)
Steele, James (University of Calgary)
Swidinsky, Joshua (Simon Fraser University)
Tien Phan, Ngoc (York University)
Tlili, Mohamed (University of Calgary)
Topaz, Adam (University of Alberta)
Totani, Yash (University of Waterloo)
Tran, Ha (Concordia University of Edmonton)
Tran, Dat (VNUHCM-University of Science)
Trí, Nguyễn Phạm (Ho Chi Minh City University of Education)
Tripathi, Nikita (University of Calgary)
Troupe, Lee (Mercer University)
Webster, Jonathan (Butler University)
Whiting, Blake (University of Calgary)
Wong, Peng-Jie (National Center for Theoretical Sciences)
Yee, Randy (University of Calgary)
Yip, Chi Hoi (University of British Columbia)
Zvengrowski, Peter (University of Calgary)

Banff International Research Station

2021

Cancelled 5-Day Workshops

Continuum Models and Optimisation for Deep Neural Networks January 10 - 15, 2021(Cancelled)

Organizers:

Carina Geldhauser (University of Sheffield)
Gitta Kutyniok (LMU Munich)
Carola Schönlieb (University of Cambridge)

Banff's new workshop on Continuum models and optimisation for deep neural networks brings together scientists to discuss the foundations of our digital revolution, and to investigate the reliability of their results. As often, mathematics is the fundamental tool to examine today's challenges. Mathematics structures knowledge and identifies the strengths and limitations of deep learning algorithms. A better understanding of the maths behind deep learning helps us to develop more efficient algorithms and to put safety critical industrial areas such as autonomous driving on a firm ground.

A special feature of this workshop is its femininity - it is organized by three women at different stages in their lives and careers, and it is probably the first regular Banff workshop with a majority of female speakers.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5143>

Adaptive Modelling and Discretization Error Control January 17 - 22, 2021(Cancelled)

Organizers:

Stefan Sauter (University of Zurich)
Mark Ainsworth (Brown University)
Nilima Nigam (Simon Fraser University)
Ricardo Nochetto (University of Maryland)

Uncertainty and inaccuracy arises from the facts that a) these computer simulations involve the solution of complicated mathematical equations: partial differential equations and integral equations and b) the result of the simulation is only an approximation of the physical phenomenon where the quality of approximation depends on the accuracy of the data measurements, the chosen model (e.g. the decision whether one has to take into account shear winds for the construction of a bridge or whether this effect is negligible) and the precision how the final equations are solved.

Hence, it is of utmost importance not only to carry out the simulation but also to compute its accuracy, i.e., the "error bars" as the physicists are naming it, by an additional computation. This step involves deep mathematics and is called "a posteriori error control". The computer simulation together with the a posteriori error bounds finally make a simulation result reliable and ready for practical applications and decision.

It is the goal of this workshop to bring together the leading experts in various fields of a posteriori error control to create synergies for combining the separated know-how towards the ultimate goal of efficient and reliable modelling of complex physical phenomena and real-world applications.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5214>

Driving Global Inference for New Physics with Machine Learning, Big Data and Large-scale Statistical Simulation January 24 - 29, 2021(Cancelled)

Organizers:

Matthias Danninger (Simon Fraser University)

Jonathan Cornell (University of Cincinnati)

Anders Kvellestad (University of Oslo)

Pat Scott (University of Queensland)

The physical sciences have entered the era of big data, and particle physics is no exception. Extremely powerful particle colliders, telescopes observing light across the energy spectrum, and precise underground experiments have been running for years and have produced remarkably detailed and complex data sets. While no definitive signal of new physics has yet emerged from these experiments, it is quite possible that hints of new phenomena are hidden in these results, only missed due to the limitations of our analysis methods. In this workshop, we will bring together statisticians and physicists to discuss novel methods of data analysis, with a focus on machine learning, in which computers are programmed to think in ways akin to humans. We will launch the development of new computer tools that will allow us to overcome current computational limitations and fully test particle physics theories against all available data, potentially leading to discoveries that will shed light on some of the most profound questions in physics.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5233>

Quantum Chaos and Holography February 14 - 19, 2021(Cancelled)

Organizers:

Moshe Rozali (University of British Columbia)

Hong Liu (Massachusetts Institute of Technology)

Anatoli Polkovnikov (Boston University)

In recent years some remarkable interconnections have been found among a number of fields, previously only remotely connected, which include quantum gravity, black holes, quantum information, nuclear physics, condensed matter and atomic physics. It has been found that many-body systems from these vastly different disciplines often exhibit similar behavior, indicating that they may be governed by a set of universal, yet still unknown, underlying physical principles. A possible dynamical mechanism for such universality is chaos.

This five-day workshop provided an intensive exchange of ideas between string theorists, condensed matter physicists, atomic physicists and researchers with other areas of expertise actively working on theory and applications of quantum chaos. The main goals of the workshop was both to introduce researches from different communities to key models and results and to outline unresolved problems actively investigated by these different communities. Such a meeting should allow us to consolidate new ways of quantifying many-body quantum chaos and highlight their implications for important questions of different disciplines.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5008>

Geometry, Topology and their Applications in Control System Design February 21 - 26, 2021(Cancelled)

Organizers:

Mohamed Ali Belabbas (University of Illinois, Urbana-Champaign)
Anthony Bloch (University of Michigan)
Xudong Chen (University of Colorado at Boulder)

While geometric and topological ideas in engineering have led to some technological breakthrough throughout the years, the use of more advanced mathematical tools in engineering is not yet as commonplace as it is in, say, physics. The goal of this workshop is to bring together scientists working either in these areas or at their intersection to further the exchange and integration of ideas.

This workshop will have a special focus on control theory and control systems. Control theory deals with the problem of shaping the behavior of “systems”, where a system can be an engineered object, such as a robot or a train, or a natural one, such as a flock of birds or even the brain. The basic driving questions are how to actuate, and how to design, the system to get it to perform as desired.

Due to the wide variety of physical systems that control theory handles, the use of more abstract mathematical tools is very well suited to this field, and has already proven useful many instances, such as the study of system stability or optimal design of control system.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5224>

Astrostatistics in Canada and Beyond February 28 - March 5, 2021(Cancelled)

Organizers:

Pauline Barmby (Western University)
Gwendolyn Eadie (University of Toronto)
Gregory Siavkoff (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 2021 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: <http://www.birs.ca/events/2021/5-day-workshops/21w5160>

Mathematical and Statistical Methods for Pathogen Genomics

March 21 - 26, 2021(Cancelled)

Organizers:

Caroline Colijn (Simon Fraser University)

Jukka Corander (University of Oslo)

Lauren Cowley (University of Bath)

Jesse Shapiro (University of Montreal/McGill University)

Technological advances have revolutionized our ability to observe the evolution of infections that are posing major global health challenges. However, using these new and high-resolution sources of data to improve health requires new theory -- new mathematical structures to understand patterns of ancestry and evolution in infectious diseases, new ways to map how antibiotic resistance emerges and spreads and new methods to combine data, modelling, inference and machine learning. This workshop will bring together mathematicians and statisticians, methods developers and biologists gathering state-of-the-art large datasets in pathogen genomics. The aims are to share not only mathematics and methods, but upcoming challenges and aims, and to ensure that large genomic datasets and the people that gather them have a voice in shaping methods and models towards the questions of the highest importance for pathogen evolution and ultimately for health.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5227>

Algebraic Aspects of Matroid Theory

March 28 - April 2, 2021(Cancelled)

Organizers:

Matthew Baker (Georgia Tech)

June Huh (Stanford University)

Kris Shaw (University of Oslo)

The researchers participating in this workshop come from several mathematical subdisciplines, including combinatorics, algebraic geometry, and theoretical computer science. Their work and common interest here is 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 will provide an opportunity to work together more intensively. Several recent mathematical breakthroughs will be 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: <http://www.birs.ca/events/2021/5-day-workshops/21w5165>

Dynamics of Hénon Maps: Real, Complex and Beyond **April 4 - 9, 2021(Cancelled)**

Organizers:

Jasmin Raissy (Institut de Mathématiques de Toulouse)

Tanya Firsova (Kansas State University)

Gabriel Vigny (Université de Picardie-Jules Verne)

In the past forty years, Hénon maps have been extensively studied, from different perspectives:

- in real dynamics with the existence of strange attractor.
- in complex dynamics, in the point of view of ergodic theory and bifurcation phenomena.
- in algebraic dynamics with the construction of dynamical height to understand arithmetic phenomena.

Recently, the study of Hénon maps has undergone new exciting developments, like the recent proof of the existence of wandering domain for complex Hénon maps. This result was achieved by mixing techniques from different parts of dynamics, namely real and complex. In this workshop we intend to pursue this trend by bringing together experts on real, complex and non-archimedean dynamics to get new perspectives in the study of Hénon maps.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5085>

Advances in Stein's Method and its Applications in Machine Learning and Optimization **April 11 - 16, 2021(Cancelled)**

Organizers:

Murat Erdogan (University of Toronto)

Krishnakumar Balasubramanian (University of California Davis)

Larry Goldstein (University of Southern California)

Lester Mackey (Microsoft Research)

Recently a variety of state-of-the-art methods in machine learning and artificial intelligence have been developed motivated by techniques from Stein's method, a successful tool from the field of probability theory. These methods have enabled efficient analysis of the large amounts of data being produced in several scientific fields, like neuroscience, information technology, and finance. Motivated by this success, there has been an ever increasing interest in exploring further connections between Stein's method and machine learning. The focus of this workshop is to consolidate isolated efforts and develop a theoretically principled inferential and computational framework via Stein's method for analyzing increasingly complex models and data objects. This workshop is intended to bring together prominent and promising young and diverse researchers working on Stein's method and machine learning, and to charter the path for future development in the field.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5213>

Big Data Inverse Problems **April 18 - 23, 2021(Cancelled)**

Organizers:

Matthias Chung (Virginia Tech)
Johnathan Bardsley (University of Montana)
Carola Schönlieb (University of Cambridge)

In recent years, big data has become a major challenge for the state of the art computational methods and algorithms that are used for extracting meaningful information. This dilemma stimulates the exchange of ideas necessary to generate new directions in big data inverse problems. This workshop intends to provide a platform for researchers from diverse backgrounds to discuss novel techniques for big data inverse problems with benefits to various fields of data science.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5079>

Efficient Simulation Algorithms for Viscoelastic and Viscous non-Newtonian Fluids **May 2 - 7, 2021(Cancelled)**

Organizers:

Patrick Farrell (University of Oxford)
Scott MacLachlan (Memorial University of Newfoundland)
Niall Madden (National University of Ireland Galway)
Josef Málek (Charles University, Faculty of Mathematics and Physics)

The mathematical description of the behaviour of typical fluids, like water at room temperature, was one of the great scientific breakthroughs of the 19th century. Understanding and applying the equations that describe these fluid drove many developments in mathematics for the next 100 years. Later, with the advent of modern computing, new fields of mathematics emerged devoted to designing algorithms to simulate these flows. This simulation capability has revolutionised many fields of engineering: no car, aeroplane, bridge, or stent is built without it. But, just as the limitations of classical mechanics gave way to quantum mechanics in the 20th century, we now realise that many fluids are not “typical”. Glaciers do not flow in the same way as tap water, and neither does blood, or magma, or DNA. At large and small scales, new algorithms for simulating these “non-Newtonian” fluids are needed. This workshop will bring together experts from disparate fields to assess recent progress, and to plot a course to meeting the new and pressing challenges posed by the simulation of non-Newtonian flows.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5164>

Applications of Stochastic Control to Finance and Economics May 9 - 14, 2021(Cancelled)

Organizers:

Dylan Possamaï (ETH Zürich)
Jakša Cvitanić (California Institute of Technology)
George Georgiadis (Northwestern University)
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 reunite 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: <http://www.birs.ca/events/2021/5-day-workshops/21w5116>

Single Cell Plus – Data Science Challenges in Single Cell Research May 23 - 28, 2021(Cancelled)

Organizers:

Jean Yee Hwa Yang (The University of Sydney)
Sara Mostafavi (University of Washington)
Xuegong Zhang (Tsinghua University)
Hongyu Zhao (Yale University)

Cells are the fundamental building blocks of life. Recent advancement in biotechnology has allow us to peek inside this every cell to better understand of biology and human disease. Single cell technology also generates big and complex data and brings about new data science challenges of 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 an collaborative atmosphere to develop collaborative capacity that will tackle various underlying data science challenges in single cell research.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5212>

Modeling Fluid-Driven Fracture — at the Crossroads of Applied Mathematics, Earth Science, and Earth Resources Engineering June 6 - 11, 2021(Cancelled)

Organizers:

Andrew Bunger (University of Pittsburgh)
Egor Dontsov (W.D. VonGonten Laboratories LLC)
Dmitry Garagash (Dalhousie University)
Anthony Peirce (University of British Columbia)

Fluid-driven crack propagation is the process by which pressurized fluid drives cracks through solid materials. Such a process is not only central to hydraulic fracture stimulation of oil and gas wells, but also it describes movement of molten rock through the Earth's crust and water through the subsurface of glacial ice sheets. Hence, there is significant, and hitherto relatively untapped, potential for multidisciplinary investigation. Furthermore, the underlying mathematical problem is challenging even for simple propagation geometries and ignoring variability in material properties of the rock and/or ice sheet. When realistic variability and complexity is considered, the problem exceeds the capabilities of current computer simulation tools. To address these concerns, the objective of this workshop is to convene a BIRS Workshop of Applied Mathematicians, Geo-Scientists, and Engineers from Academia and Industry to accelerate the development of the state-of-the-art tools to analyze the evolution of fluid-driven cracks that propagate in complex solid media.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5096>

Systematic Effects and Nuisance Parameters in Particle Physics Data Analyses June 27 - July 2, 2021(Cancelled)

Organizers:

Olaf Behnke (DESY Hamburg)
Richard Lockhart (Simon Fraser University)
Louis Lyons (Imperial College London & Oxford U)

Particle Physicists study matter at its smallest scale and try to reveal how the physical world is constructed from elementary particles and the forces acting between them. 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 metres high and 45 metres 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: <http://www.birs.ca/events/2021/5-day-workshops/21w5083>

Fundamental Groups and their Representations in Arithmetic Geometry

July 4 - 9, 2021(Cancelled)

Organizers:

Adam Topaz (University of Alberta)

Anna Cadoret (Sorbonne Université)

Florian Pop (University of Pennsylvania)

In arithmetic geometry, one studies solutions to polynomial equations defined with arithmetically interesting coefficients, such as integers or rational numbers. One way to study such objects, which has seen tremendous success in the last several decades, is by investigating their symmetries. Quite surprisingly, in several interesting situations, many of the geometric and arithmetic properties of the objects in question are actually controlled by the object's symmetries.

Unfortunately, it is usually impossible to study these symmetries directly with current technology. To get around this, mathematicians working in this area often study simplified (often linearized) versions of the symmetries in question, which still capture a significant amount of information about the given object. This workshop will bring together both senior and junior researchers, including graduate students, postdocs, and leading experts, who study objects of geometric and arithmetic origin from the point of view of their symmetries and their linearized variants.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5210>

Arithmetic Aspects of Deformation Theory

July 18 - 23, 2021(Cancelled)

Organizers:

Patrick Allen (UIUC)

Chandrashekhhar Khare (UCLA)

Preston Wake (Michigan State University)

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 will investigate 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: <http://www.birs.ca/events/2021/5-day-workshops/21w5131>

Diophantine Methods in Algebraic Dynamics August 1 - 6, 2021(Cancelled)

Organizers:

Holly Krieger (University of Cambridge)
Thomas Tucker (University of Rochester)
Nicole Looper (Brown University)
Dang Khoa Nguyen (UBC and PIMS)

Algebraic dynamics is the study of discrete dynamical systems on algebraic varieties. It has its origins in complex dynamics, where one studies self-maps of complex varieties, and now encompasses dynamical systems defined over global fields.

In recent years, researchers have fruitfully investigated the latter by applying number-theoretic techniques, particularly those of Diophantine approximation and geometry, subfields which study the metric and geometric behavior of rational or algebraic points of a variety. The depth of this connection has allowed the mathematical arrow between the two fields to point in both directions; in particular, arithmetic dynamics is providing new approaches to deep classical Diophantine questions involving the arithmetic of abelian varieties. This workshop will focus on communicating and expanding upon the connections between algebraic dynamics and Diophantine geometry. It will bring together leading researchers in both fields, with an aim toward synthesizing recent advances and exploring future directions and applications.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5190>

Random Growth Models and KPZ Universality September 12 - 17, 2021(Cancelled)

Organizers:

Firas Rassoul-Agha (University of Utah)
Ivan Corwin (Columbia University)
Jeremy Quastel (University of Toronto)
Benedek Valko (University of Wisconsin - Madison)

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.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5175>

Modeling, Learning and Understanding: Modern Challenges between Financial Mathematics, Financial Technology and Financial Economics (Online) September 12 - 17, 2021(Cancelled)

Organizers:

Antonis Papapantoleon (National Technical University of Athens)

Agostino Capponi (Columbia University)

Christoph Frei (University of Alberta)

Ronnie Sircar (Princeton University)

Thaleia Zariphopoulou (The University of Texas at Austin)

This 5-day research workshop at the Banff International Research Station is motivated by the need to better understand, quantify and regulate the risk of financial markets in the face of massive technological and economic changes. In order to discuss and assess these new developments, the workshop brings together experts from the fields of financial mathematics, financial technology (FinTech), and mathematical economics. The focus lies on the following three topics which are at different levels of modeling development and technical complexity: (i) interbank markets, valuation adjustments and clearinghouses, (ii) energy and commodity markets, (iii) FinTech and high-frequency trading.

With active participation from women and other underrepresented groups in mathematics and its applications, the workshop's success is based on diversity and inclusion. By inviting young researchers to participate, the workshop aims at encouraging PhD students and postdoctoral fellows to direct their research efforts towards these important mathematical applications of finance and economics, with a clear impact on society.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5507>

Multiscale Models for Complex Fluids: Modeling and Analysis September 12 - 17, 2021(Cancelled)

Organizers:

Miroslav Bulicek (Charles University)

Agnieszka Świerczewska-Gwiazda (University of Warsaw)

Complex fluids are ubiquitous in nature and in various fields of human activity. Blood circulates in the human body, all kinds of foams, suspensions and emulsions are encountered in pharmaceutical and food industry, paints are met everywhere in mechanical and civil engineering. It is a challenging task to describe the behaviour of such fluids, as it depends heavily on the small-scale structures inside the fluid. Given the complexity and diversity of problems in this field, there is hardly any opportunity for researchers to meet and exchange ideas.

The current workshop is designed to bring together experts in mathematical and numerical analysis as well as mathematical modeling and to create a well-focused environment in which they can discuss recent problems, models and methods developed in their respective fields.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5510>

New Directions in Statistical Inference on Networks and Graphs September 19 - 24, 2021(Cancelled)

Organizers:

Sharmodeep Bhattacharyya (Oregon State University)
Liza Levina (University of Michigan)
Tianxi Li (University of Virginia)
Carey E Priebe (Johns Hopkins University)

Advances in data collection and social media have led to network and graph data becoming available in many areas, including social sciences, biological sciences, and engineering. Understanding and modeling network structure, as well as conducting rigorous statistical inference to assess uncertainty, can provide crucial insights into the dynamics and interaction mechanisms of the system. Statistical network analysis to date has largely focused on the setting where a single network is observed as a noisy version of some underlying structure of interest. This setting in itself is challenging, requiring adaptation of existing statistical frameworks to networks and bridging the gap between theoretically optimal performance and computational feasibility. The workshop will start by covering recent advances in this setting.

An even bigger and more important challenge for the field of statistical network analysis is transitioning from a single network to more complicated network data structures and inference questions motivated by new applications. The field is on the cusp of this transition, motivated by questions emerging from new data and applications which require new techniques. The workshop's focus is on three such new themes: the setting of multiple and dependent networks; the interplay between network estimation from multivariate data and network inference; and network data analysis with additional information. These problems stem from a wide range of motivating applications, especially in neuroscience and biology, as well as the social sciences. The workshop will bring researchers from theory, computation, and different applications together, across several disciplines that study networks, to help theoreticians and methodologists focus on real problems, and to alert application researchers to the newest developments in methods.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5186>

Foundations for a Distributed Ledger December 5 - 10, 2021(Cancelled)

Organizers:

Valerie King (University of Victoria)
Maurice Herlihy (Brown University)
Jared Saia (University of New Mexico)
Elaine Shi (Cornell University)

Significant money and human effort is now being poured into the development of Blockchain technology. Blockchains are currently used, most notably, for the creation and maintenance of digital currencies (e.g., bitcoin). There are also efforts to apply them to many other domains, ranging from “smart” contracts to documenting art provenance. A key goal of these systems is to maintain a distributed ledger, a record of events and transactions between users, and to do so in a way that avoids reliance on a central authority. Instead, these systems depend on the interactions among their many users to come to agreement on what events to enter in the ledger.

The distributed ledger problem is still far from understood. There is no consensus on basic definitions and assumptions of the models, which impedes progress in providing reliability guarantees. There are scaling problems, including the need to spend large amounts of energy, and the small transaction processing rate for current blockchain systems. Interestingly, solving these problems seems to require expertise from several diverse research areas including: cryptography, distributed computing, game theory and public policy. This workshop will bring together experts from these areas to establish and explore the theoretical foundations of Blockchain.

For details, please refer to the workshop webpage: <http://www.birs.ca/events/2021/5-day-workshops/21w5506>



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).

Contact Us:

Scientific Director: Dr. Malabika Pramanik
Phone: 604-822-1649 Fax: 604-822-0883
Email: birs-director@birs.ca

Administrator: Danny Fan
Phone: 604-822-1844 Fax: 604-822-0883
Email: birs-administrator@birs.ca

Program Coordinator: Ali Hauschildt
Phone: 604-822-5213 Fax: 604-822-0883
Email: birs@birs.ca

Program Assistant: Dominique Vaz
Phone: 604-822-1694 Fax: 604-822-0883
Email: birs-secretary@birs.ca

Station Manager: Linda Jarigina-Sahoo
Phone: 403-763-6999 Fax: 403-763-6990
Email: birmsgr@birs.ca

Station Facilitator: Jacob Posacki
Phone: 403-763-6996 Fax: 403-763-6990
Email: birs-facilitator@birs.ca

Technology Manager: Brent Kearney
Phone: 403-763-6997 Fax: 403-763-6990
Email: brentk@birs.ca

BIRS Mailing Address in Vancouver:

Banff International Research Station
University of British Columbia
4176-2207 Main Mall
Vancouver, BC V6T 1Z4 CANADA

BIRS Mailing Address in Banff:

Banff International Research Station
c/o The Banff Centre
Room 103, TransCanada Pipelines Pavilion
107 Tunnel Mountain Drive
Box 1020, Stn 48
Banff, AB T1L 1H5 CANADA

Web: <http://www.birs.ca>

Twitter: [@BIRS_Math](https://twitter.com/BIRS_Math)