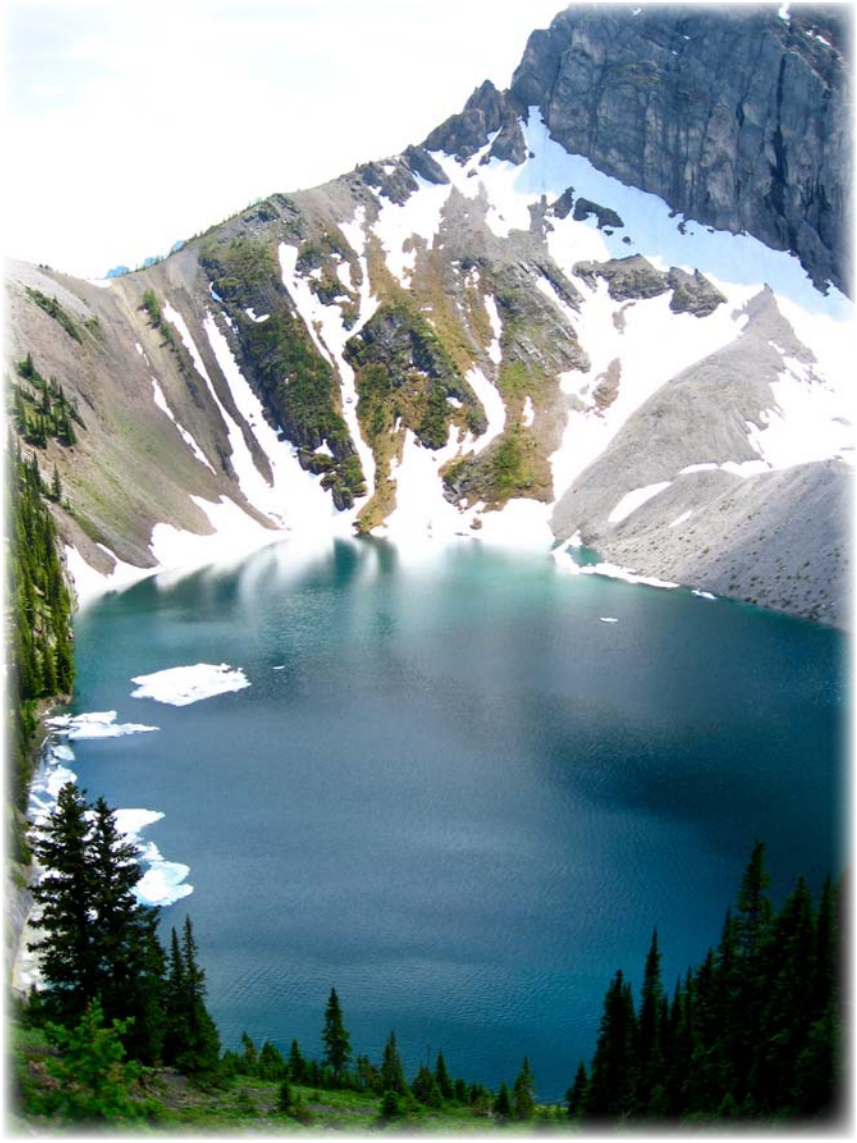
Banff International Research Station
for Mathematical Innovation and Discovery

BIRS 2007/2008 Scientific Report



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Preface

The Banff International Research Station (BIRS) is now a collaborative Canada-US-Mexico venture that will continue to provide for the world's scientific community an environment for creative interaction and the exchange of ideas, knowledge and methods within the Mathematical Sciences and with related sciences and industry. In 2007, BIRS reached its full potential, hosting over 2,000 scientists from more than 40 countries by running 48 weeks of programming (up from 44 weeks in 2006 and 40 weeks in 2005). In spite of this substantial expansion of opportunities at BIRS, the extraordinary response of the world's scientific community continues unabated to contribute extremely high quality submissions, with over 300 proposed activities competing for the 96 available weeks in 2007 and 2008.

During 2007 and 2008, BIRS was once again home to a dazzling array of scientific activities. Besides the tremendously successful 5-day Workshops and Research-in-Teams programs, BIRS hosted Focused Research Groups, Collaborative Research Teams, leadership retreats, gatherings for women in mathematics, First Nations math education, mentoring for engineering academia, summer schools in emerging areas, students' modeling camps, workshops on industrial mathematics, and training sessions for Math Olympiads teams.

The BIRS program touched on every aspect of the mathematical sciences, but also offered opportunities for highly innovative themes such as *Mathematics Education via the Arts, Mathematical Methods in Philosophy, First Nations Math Education,* and *Modeling the Impact of Policy Options during Public Health Crises.*

Front and centre were topics dealing with some of the most pressing issues of modern society: *Data Mining and Machine Learning; Complex Data Structures in the Health, Social and Environmental Sciences; Statistical Methods for High-throughput Genetic Data, Stochastic Dynamical Systems and Climate Modeling; Mathematics and the Environment: Energy Risk, Environmental Uncertainty and Public Decision Making.*

At BIRS, traditional barriers between the various sciences are all but forgotten. Workshops such as the one on *The Mathematics of Knotting and Linking in Polymer Physics and Molecular Biology* essentially involves all the basic sciences, while engineering and the applied sciences are well represented by topics such as *Mathematical Methods for Medical Image Analysis,* and *Physics-Based Mathematical Models of Low-Dimensional Semiconductor Nano-structures.*

Last but not least, I should mention the extremely successful summer school on *The Stable Trace Formula, Automorphic Forms, and Galois Representations*, led by James Arthur (University of Toronto), Michael Harris (Université de Paris VII), and Eric Urban (Columbia University). This was a high-calibre gathering that built on the so-called "Paris Project" which is expected to produce four books, the last of which is still almost completely open in anticipation of contributions from the new generation of number theorists present at the 2008 BIRS school.

Many thanks to the over two hundred organizers and the more than 4,000 participants who have made the last two years of BIRS such an unqualified success.

Nassif Ghoussoub, FRSC
Scientific Director, Banff International Research Station
Distinguished University Scholar, University of British Columbia
Adjunct Professor, University of Alberta

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Jun 03	Jun 08	Modular Forms: Arithmetic and Computation
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Apr 13	Apr 15	Symbolic Computer Algebra in Theoretical Physics
Apr 20	Apr 22	Math Fair Workshop
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Jun 22	Jun 24	Dynamical Systems and Applications
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Jul 27	Jul 29	Diversity in the Mathematics and Scientific Community I and II
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Sep 07	Sep 09	Mathematical Modelling of Water Resource Allocation Strategies
Sep 14	Sep 16	Affine Schubert Calculus Workshop: Design and Implementation of Research Tools in MuPAD-Combinat

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Jul 10	Jul 22	2007 Summer IMO Training Camp

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Mar 04	Mar 11	Quasiconformal Homogeneity: Energy Methods and Sharp Bounds
Mar 25	Apr 01	The Xi-transform
May 06	May 13	Stochastic Models of Influenza Dynamics
May 20	May 30	Global Attraction to Solitary Waves in Nonlinear Dispersive Hamiltonian Systems
Jun 17	Jun 24	Mathematics and Pedagogy Project
Jul 22	Jul 29	Integrability, Gauge Fields and Strings

Banff International Research Station

2007

5-Day Workshops

Mathematical Programming in Data Mining and Machine Learning
January 14 - 19, 2007

Organizers:

Michael Jordan (UC-Berkeley)
Jiming Peng (University of Illinois at Urbana-Champaign)
Tomaso Poggio (MIT)
Katya Scheinberg (IBM TJ Watson Research Center)
Dale Schuurmans (University of Alberta)
Tamás Terlaky (McMaster University

This workshop brought together outstanding researchers from the fields of mathematical programming, data mining and statistical machine learning to ignite new collaborations and expose each side to the possibilities available in each field. The purpose was to identify the new problems and to match them with potential solution approaches.

This workshop triggered new collaboration, raised awareness to the optimizers of the exciting new opportunities in the application of learning and expose researches in learning to the rich collection of suitable mathematical programming tool. Needless to say, this workshop presented excellent possibilities for PhD student and young researchers to get in touch with the challenging, exciting developments of optimization methods and their applications in data mining and machine learning, to meet with leading experts of both fields.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5078/

Participants:

Altun, Yasemin (Toyota Technological Institute)
Aybat, Serhat (Columbia University)
Bach, Francis (Centre of Mathematical Morphology)
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d'Aspremont, Alexandre (Princeton University)
Dhillon, Inderjit (University of Texas)
Ghosh, Joydeep (University of Texas)
Goldfarb, Donald (Columbia University)
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Joachims, Thorsten (Cornell University)
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Langford, John (Yahoo! Inc.)
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Meila, Marina (University of Washington)
Mittelmann, Hans (Arizona State University)
Pang, Jong-Shi (Rensselaer Polytechnic Institute)
Pardalos, Panos (University of Florida)
Peng, Jiming (University of Illinois at Urbana-Champaign)
Rosset, Saharon (IBM Research)
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Scheinberg, Katya (IBM TJ Watson Research Center)
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Zhang, Tong (Yahoo! Inc.)
Zhu, Xiaojin (University of Wisconsin-Madison)
Zhu, Jiaping (McMaster University)

Innovations in Mathematics Education via the Arts
January 21 - 26, 2007

Organizers:

George Hart (Stony Brook University)
Gerda de Vries (University of Alberta)
Reza Sarhangi (Towson University)

Our primary objective was to bring together a diverse body of mathematically trained professionals who individually incorporate the arts in their educational activities. As a group, we brainstormed to identify promising areas and techniques for a wider movement of math education via the arts. We then strategized by sketching proposal ideas, considering possible funding means, making detailed proposals, and assembling focused teams to implement the results appropriately.

We incubated a range of projects in which the participants engage in development and dissemination that ultimately transferred ideas to educators, students, and the public. This included traditional means—such as exhibits, books, websites, workshops, videos, and special sessions at education conferences—but also included novel ideas as well.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5062/

Participants:

Alagic, Mara (Wichita State University)
Atela, Pau (Smith College)
Bier, Carol (Mills College)
Bosch, Robert (Oberlin College)
Burkholder, Doug (Lenoir-Rhyne College)
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Fisher, Gwen (Cal Poly)
Friedman, Nathaniel (University at Albany-SUNY)
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Greenfield, Gary (University of Richmond)
Hart, George (Stony Brook University)
Hartshorn, Kevin (Moravian College)
Higginson, William (Queens University)
Huylebrouck, Dirk (Hogeschool Wetenschap en Kunst)
Kaplan, Craig (University of Waterloo)
Klotz, Gene (Swarthmore College)
Mellor, Blake (Loyola Marymount University)
Rappaport, David (Queen's University)
Richter, David A. (Western Michigan University)
Rimmington, Glyn (Wichita State University)
Sarhangi, Reza (Towson University)
Schattschneider, Doris (Moravian College)
Sequin, Carlo (University of California, Berkeley)
Taimina, Daina (Cornell University)
Toussaint, Godfried (McGill University)
Wagner, Philip (The Fusion Project)
Yackel, Carolyn (Mercer University)

Nonholonomic Dynamics and Integrability
January 28 - February 02, 2007 Half Workshop

Organizers:

Boris Khesin (University of Toronto)

Sergei Tabachnikov, (Penn State University)

Nonholonomic mechanics describes the motion of systems subordinated to nonholonomic constraints, i.e. systems whose restrictions on velocities do not arise from the constraints on the configuration space. The best known examples of such systems are a sliding skate, a rolling ball and the Chaplygin sleigh, as well as their numerous generalizations. These systems usually exhibit very peculiar, often counter-intuitive, behavior.

The integrability vs. chaos dichotomy in such systems was one of the workshops main points of interest, which is yet to be better understood. Furthermore, a more profound understanding of the relation between several competing paradigms in nonholonomic mechanics, the applications to control theory, as well as the similarities with Hamiltonian systems would be very important for further progress in the theory. This workshop was an opportunity to bring specialists in these domains together and foster interactions between researchers with diverse and often complimentary backgrounds in nonholonomic mechanics and in the adjacent areas, including sub-Riemannian geometry, Hamiltonian systems, billiard theory sub-elliptic operators, and others.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5029/

Participants:

Agrachev, Andrei (International School for Advanced Studies)
Baryshnikov, Yuliy (Bell Laboratories)
Bates, Larry (University of Calgary)
Bloch, Anthony (University of Michigan)
de León, Manuel (Instituto de Matemáticas y Física Fundamental)
Fedorov, Yuri (Universitat Politechnica de Catalunya)
Garcia-Naranjo, Luis (University of Arizona)
Jurdevic, Velimir (University of Toronto)
Khesin, Boris (University of Toronto)
Lee, Paul (University of Toronto)
Levi, Mark (PennState University)
Montgomery, Richard (UC-Santa Cruz)
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Ruina, Andy (Cornell University)
Sachkov, Yuri (University of Pereslavl)
Sniatycki, Jedrzej (University of Calgary)
Tabachnikov, Sergei (Penn State University)
Tokieda, Tadashi (Cambridge University)
Zenkov, Dmitry (North Carolina State University)
Zharnitsky, Vadim (University of Illinois in Urbana-Champaign)

Numerical Analysis of Multiscale Computations
January 28 - February 02, 2007 Half Workshop

Organizers:

Bjorn Engquist (University of Texas at Austin)
Olof Runborg (Royal Institute of Technology)
Steve Ruuth (Simon Fraser University)
Richard Tsai (University of Texas at Austin)

With the efficiency of modern computers and the maturity of numerical methods for solving differential equations and linear systems, the focus of scientific computation has recently been shifting towards more difficult problems where classical single physics models are not accurate enough, and a coupling of multiple physics models needs to be considered. In particular, there is an emergence of methods that replace heuristics and empirical observations in coarse scale single physics models by direct numerical simulations of more accurate models defined on finer scales. The models describing each scale can be of different types: e.g. PDEs, ODEs, integral equations, or stochastic processes. This workshop addressed the numerical analysis of such multiscale approaches.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5069/

Participants:

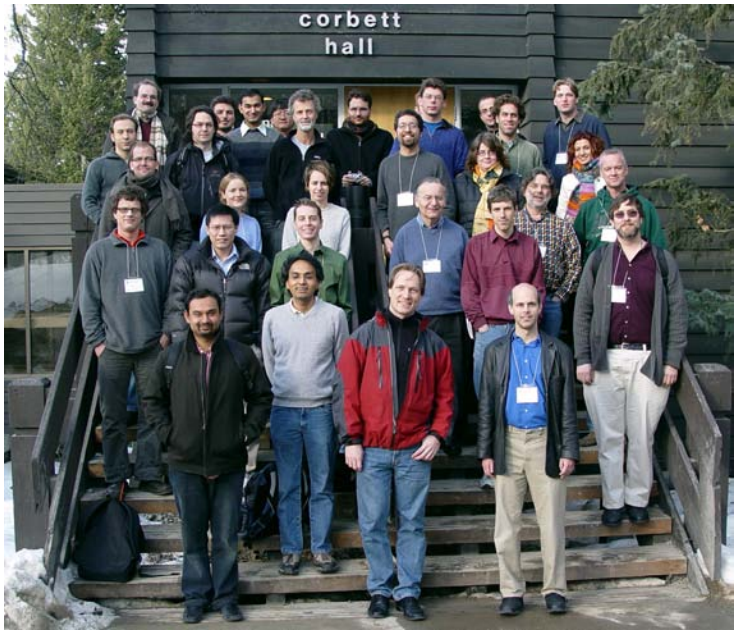
Ariel, **Gil** (University of Texas)
Bold, Katy (Princeton University)
Engquist, Bjorn (University of Texas at Austin)
Gamba, Irene (University of Texas at Austin)
Gilbert, Anna (University of Michigan)
Iwen, Mark (University of Michigan)
LeBris, Claude (ENPC)
Luskin, Mitchell (University of Minnesota)
Ren, Weiqing (New York University)
Runborg, Olof (Royal Institute of Technology)
Ruuth, Steve (Simon Fraser University)
Sharp, Richard (University of Texas at Austin)
Souganidis, Panagiotis (University of Texas at Austin)
Sun, Yi (New York University)
Szepessy, Anders (Royal Institute of Technology KTH)
Tharkabhuhanam, Sri Harsha (University of Texas at Austin)
Tsai, Richard (University of Texas at Austin)
Vanden-Eijnden, Eric (New York University)

Explicit Methods for Rational Points on Curves
February 04 - 09, 2007

Organizers:

Nils Bruin (Simon Fraser University)

Bjorn Poonen (University of California at Berkeley)



Many problems in mathematics are concerned with describing the solutions to an equation in which the variables are constrained to represent integers (like -34 or 7) or rational numbers (like -5/3 or 2/7). An example is Fermat's last theorem, proved in the 1990s: it states that the equation x^n+y^n=z^n has no solutions if n>2 and the variables are constrained to be positive integers.

For most equations, determining all the integer or rational solutions turns out to be very hard. No method we know of has been proved to find all solutions reliably. But we do have a large toolkit of methods that happen to work in many particular situations. Many of these are based on geometric ideas.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w 07w5063/

Participants:

Baran, Burcu (University of Rome Tor Vergata)
Berbec, Ioan (University of California at Berkeley)
Bright, Martin (University of Bristol)
Broker, Reinier (University of Calgary)
Brown, David (University of California at Berkeley)
Burhanuddin, Iftikhar (University of Southern California)
Carls, Robert (University of Leiden)
Chen, Imin (Simon Fraser University)
Cohen, Henri (Universite Bordeaux 1)
Coleman, Robert (University of California Berkeley)
Couveignes, Jean-Marc (Université Toulouse II)
Dokchitser, Tim (Cambridge)
Ellenberg, Jordan (University of Wisconsin)
Hain, Richard (Duke University)
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Kedlaya, Kiran (Massachusetts Institute of Technology)
Kim, Minhyong (University of Arizona and Purdue University)
Kumar, Abhinav (Microsoft Research)
Logan, Adam (University of Waterloo)
McCallum, William (University of Arizona)
O'Neil, Catherine (Barnard College, Columbia University)
Paulhus, Jennifer (University of Illinois at Urbana-Champaign)
Schaefer, Ed (Santa Clara University)
Schoof, Rene (University of Rome II)
Siksek, Samir (University of Warwick)
Stein, William (University of Washington)
Stoll, Michael (Jacobs University Bremen)
van Luijk, Ronald (PIMS, SFU, UBC)
Voight, John (University of Minnesota)
Watkins, Mark (University of Bristol)
Wetherell, Joseph (Center for Communications Research)
Wickelgren, Kirsten (Stanford University)

Operator Structures in Quantum Information Theory
February 11 - 16, 2007

Organizers:

David Kribs (University of Guelph)

Mary Beth Ruskai (Tufts University)

The realization that quantum computers could crack widely used encryption schemes and that quantum particles can be used for new ways of transmitting and safeguarding information has led to an explosion of activity in quantum information theory in the past decade. This work has led to many interesting new questions in mathematics. This workshop focused on those that involve operator structures, including operator spaces and operator algebras.

This was the first workshop anywhere on the globe to bring together experts from the world of abstract operator spaces and scientists working in quantum information theory. Many of the top people from both fields are coming to Banff to discuss the challenging mathematical questions about the operator structures that arise in quantum information theory.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5119/

Participants:

Alicki, Robert (University of Gdansk)
Audenaert, Koenraad (Imperial College London)
Beny, Cedric (University of Waterloo)
Bodmann, Bernhard (University of Waterloo)
Choi, Man-Duen (University of Toronto)
Cross, Andrew (Massachusetts Institute of Technology)
Dupuis, Frederic (University of Montreal)
Effros, Edward (University of California)
Eisert, Jens (Imperial College)
Hayden, Patrick (McGill University)
Holbrook, John (University of Guelph)
Jencova, Anna (Mathematical Institute of the Slovak Academy of Sciences)
Junge, Marius (University of Illinois)
King, Christopher (Northeastern University)
Klappenecker, Andreas (Texas A&M University)
Kretschmann, Dennis (TU Braunschweig)
Leifer, Matthew (Perimeter Institute)
Leung, Debbie (University of Waterloo)
Matsumoto, Keiji (National Informatics Institute)
Michalakis, Spyridon (University of California)
Mosonyi, Milan (Tohoku University)
Nachtergaele, Bruno (University of California)
Neufang, Matthias (Carleton University)
Paulsen, Vern (University of Houston)
Perez-Garcia, David (Universidad Rey Juan Carlos)
Rezakhani, Ali (University of Calgary)
Roetteler, Martin (NEC Laboratories America)
Seiler, Ruedi (Technische Universitat Berlin)
Smith, Graeme (California Institute of Technology)
Spronk, Nico (University of Waterloo)
Szarek, Stanislaw (Case Western Reserve University)
Szkola, Arleta (Max Planck Institute for Mathematics in the Sciences)
Vestraete, Frank (California Institute of Technology)
Weder, Ricardo (UNAM)
Werner, Reinhard F. (TU Braunschweig)
Wiebe, Nathan (University of Calgary)
Winter, Andreas (University of Bristol)
Wolf, Michael (Max-Planck-Institut fuer Quantenoptik)
Zyczkowski, Karol (Jagiellonian University)

Mathematical Methods in Philosophy
February 18 - 23, 2007

Organizers:

Aldo Antonelli (University of California-Irvine)
Alasdair Urquhart (University of Toronto)
Richard Zach (University of Calgary)

There is a long tradition of applying formal mathematical methods to philosophical problems. Philosophers use formal models to test the implications of their theories in tractable cases. But often formal work done by philosophers finds applications in other areas: for instance, formal systems originally developed to deal with philosophical concepts such as possibility, obligation, and knowledge are now widely used in computer science and linguistics. Philosophical inquiry can also uncover new mathematical structures and problems, as with recent work on paradoxes about truth. This workshop focused on recent advances in established areas of research such as modal logic and theories of truth, but also in emerging fields such as formal epistemology. It brought together forty researchers from North America, Europe, and Australia.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/ 07w5060/

Participants:

Awodey, Steve (Carnegie Mellon University)
Ballarin, Roberta (University of British Columbia)
Beall, JC (University of Connecticut)
Blanchette, Patricia (University of Notre Dame)
DeVidi, Dave (University of Waterloo)
Easwaran, Kenny (University of California Berkeley)
Ebert, Philip (University of St. Andrews, Arche)
Fara, Delia (Princeton University)
Feferman, Solomon (Stanford University)
Fitelson, Branden (University of California-Berkeley)
Friedman, Harvey (Ohio State University)
Glanzberg, Michael (University of California-Davis)
Halbach, Volker (New College, Oxford)
Jennings, Ray (Simon Fraser University)
Kalyvianaki, Eleni (University of Athens)
Ketland, Jeffrey (University of Edinburgh)
Kracht, Marcus (University of California)
Landry, Elaine (University of Calgary)
Leitgeb, Hannes (University of Bristol)
Mancosu, Paolo (University of California-Berkeley)
Manne, Kate (Massachusetts Institute of Technology)
Mints, Grigori (Stanford University)
Moschovakis, Yiannis (University of California)
Moschovakis, Joan Rand (University of California-Los Angeles)
Pacuit, Eric (University of Amsterdam)
Priest, Graham (University of Melbourne)
Rayo, Agustin (Massachussetts Institute of Technology)
Restall, Greg (University of Melbourne)
Roush, Sherrilyn (University of California-Berkeley)
Russell, Gillian (Washington University St. Louis)
Shapiro, Stewart (Ohio State University)
Sieg, Wilfried (Carnegie-Mellon University)
Tait, Bill (University of Chicago)
Urbaniak, Rafal (University of Calgary)
Uzquiano Cruz, Gabriel (Oxford University)
Wehmeier, Kai (University of California-Irvine)
Williamson, Timothy (Oxford University)
Yap, Audrey (University of Victoria)
Yi, Byeong-Uk (University of Toronto)

Topology
February 25 - March 02, 2007

Organizers:

Ian Hambleton (McMaster University)
Matthias Kreck (University of Heidelberg)
Stern Ronald (University of California)

The purpose of this meeting was to bring together a broad selection of researchers from many flourishing areas of current work in topology, in order to promote awareness of new developments across the whole field. The expectation was that the break-throughs in one part of topology will catalyse progress in another.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5070/

Participants:

Adem, Alejandro (University of British Columbia)
Asok, Aravind (University of Washington)
Baird, Tom (University of Toronto)
Bartels, Arthur (Universität Münster)
Behstock, Jason (University of Utah)
Bryan, Jim (University of British Columbia)
Cantarero-Lopez, Jose Maria (University of British Columbia)
Davis, Jim (Indiana University)
Doran, Brent (IAS)
Ebert, Johannes (Muenster)
Galatius, Soren (Stanford University)
Ghiggini, Paolo (Université du Québec à Montréal)
Grodal, Jesper (Chicago/Copenhagen)
Hanke, Bernhard (University of Munich)
Hausmann, Jean-Claude (L'Université de Genève)
Hedden, Matthew (Massachusetts Institute of Technology)
Ji, Lizhen (University of Michigan)
Juan-Pineda, Daniel (Universidad Nacional Autonoma de Mexico)
Lueck, Wolfgang (Universitat Munster)
Lurie, Jacob (Harvard University)
Morel, Fabien (Ludwig-Maximilians-Universität Munich)
Morgan, John (Columbia)
Olbermann, Martin (University of Heidelberg)
Pedersen, Erik (University of Copenhagen)
Ranicki, Andrew (University of Edinburgh)
Rosenthal, David (St. Johns University)
Sauer, Roman (University of Chicago)
Schommer-Pries, Chris (Berkeley)
Symington, Margaret (Mercer University)
Taylor, Laurence (Notre Dame)
Unlu, Ozgun (McMaster University)
Varisco, Marco (Binghamton University)
Vogtmann, Karen (Cornell University)
Wahl, Nathalie (University of Copenhagen)
Williams, Bruce (University of Notre Dame)

North American Workshop on Tropical Geometry
March 04-09, 2007

Organizers:

Ilia Itenberg (University of Strasbourg)
Grigory Mikhalkin (University of Toronto)
Yan Soibelman (Kansas State University)

World-leading experts in different areas of mathematics will gather in Banff to discuss recent advances and new perspectives in this young branch of Geometry built on the (max,+) arithmetics. By now Tropical Geometry has already contributed powerful tools that helped to solve a number of classical problems in Real and Complex Geometry. The focus of the workshop will be inner foundations of this new subject, its Mathematical applications as well as connections with Physics.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5055/

Participants:

Abouzaid, Mohammed (University of Chicago)
Alexeev, Valery (University of Georgia)
Berkovich, Vladimir (Weizmann Institute)
Castano-Bernard, Ricardo (Kansas State University)
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Eliashberg, Yakov (Stanford University)
Hori, Kentaro (University of Toronto)
Itenberg, Ilia (University of Strasbourg)
Katz, Eric (Duke University)
Kennaway, Kristian (University of Toronto)
Kenyon, Richard (Brown University)
Kerber, Michael (University of Kaiserslautern)
Kharlamov, Viatcheslav (Strasbourg)
Khovanskii, Askold (University of Toronto)
Lopez de Medrano, Lucia (UNAM)
Losev, Andrei (ITEP Moscow)
Markwig, Hannah (Kaiserslautern)
Mikhalkin, Grigory (University of Toronto)
Mnev, Nikolai (PDMI St Petersburg)
Nishinou, Takeo (Kyoto University)
Oh, Yong-Geun (University of Wisconsin, Madison)
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Passare, Mikael (Stockholm University)
Schoenfield, Eric (Stanford University)
Shaw, Kristin (University of Toronto)
Shustin, Eugenii (Tel Aviv University)
Soibelman, Yan (Kansas State University)
Viro, Oleg (Uppsala universitet)
Zelevinsky, Andrei (Northeastern University)
Zharkov, Ilia (Harvard University)

Mathematical Developments around Hilbert's 16th Problem
March 11-16, 2007

Organizer:

Christiane Rousseau (Universite de Montreal)

The purpose of the workshop is to bring together a group of researchers making significant contributions to domains of differential equations related to Hilbert's 16th problem. The focus will be on the following subjects: (i) singularities of differential equations and complex foliations, and related normal forms, (ii) bifurcations of differential equations and finite cyclicity problems, (iii) algebro-geometric techniques in differential equations.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5021/

Participants:

Arriagada, Waldo (Université de Montréal)
Artes, Joan C. (Universitat Autonòma de Barcelona)
Bonckaert, Patrick (Hasselt University)
Caubergh, Magdalena (Hasselt University)
Costin, Rodica (Ohio State University)
Dumortier, Freddy (Hasselt University)
Etoua, Remy (Université de Montréal)
Firsova, Tatiana (University of Toronto)
Gasull, Armengol (Universitat Autonòma de Barcelona)
Glutsyuk, Alexey (École normale supérieure de Lyon)
Kaloshin, Vadim (Pennsylvania State University)
Lambert, Caroline (Université de Montréal)
Llibre, Jaume (Universitat Autonòma de Barcelona)
Mardesic, Pavao (Université de Bourgogne)
Mourtada, Abderaouf (Université de Bourgogne)
Novikov, Dmitry (Weizmann Institute)
Paul, Emmanuel (Université Paul-Sabatier)
Prohens, Rafel (Universitat de les Illes Balears)
Ribón Herguedas, Javier (IMPA)
Roussarie, Robert (Université de Bourgogne)
Rousseau, Christiane (Universite de Montreal)
Schäfke, Reinhard (Université Louis-Pasteur)
Teyssier, Loïc (Université Louis-Pasteur)
Villadelprat, Jordi (Universitat Rovira i Virgili)
Yoccoz, Jean-Christophe (Collège de France)
Zhu, Huaiping (York University)

Contemporary Schubert Calculus and Schubert Geometry
March 18-23, 2007

Organizers:

James Carrell (University of British Columbia)

Frank Sottile (Texas A&M University)

Schubert calculus originally meant the calculus of enumerative geometry, which is the art of counting geometric figures determined by given incidence conditions. This was developed in the 19th century and presented in the classic treatise “Kälkul der abzählanden Geometrie” by Herman Cäser Hannibal Schubert in 1879. Schubert, Pieri, and Giambelli subsequently developed algorithms to solve enumerative geometric problems concerning linear subspaces of vector spaces, which we now understand to be computations in the cohomology ring of a Grassmannian. Their vision and technical skill exceeded the foundations of this subject, and Hilbert, in his 15th problem, asked for a rigorous foundation. This was largely completed by the middle of the 20th century, a centerpiece being the cohomology of Grassmannians.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5112/

Participants:

Belkale, Prakash (University of North Carolina)
Billey, Sara (University of Washington)
Buch, Anders (Rutgers University)
Carrell, James (University of British Columbia)
Chen, Linda (Ohio State University)
Coskun, Izzet (Massachusetts Institute of Technology)
Elizondo, E. Javier (Instituto de Matematicas, U.N.A.M)
Firsova, Tatiana (University of Toronto)
Goldin, Rebecca (George Mason University)
Harada, Megumi (McMaster University)
Hering, Milena (Institute for Mathematics and its Applications)
Hillar, Christopher (Texas A&M University)
Holm, Tara (University of Connecticut)
Ikeda, Takeshi (Okayama University of Science)
Jones, Brant (University of Washington)
Kamnitzer, Joel (American Institute of Mathematics)
Kaveh, Kiumars (University of Toronto)
Knutson, Allen (University of California, San Diego)
Kuttler, Jochen (University of Alberta)
Lam, Thomas (Harvard University)
Lenart, Cristian (SUNY Albany)
Maclagan, Diane (Rutgers University)
Magyar, Peter (Michigan State University)
Marchisotto, Elena Anne (California State University Northridge)
Mare, Augustin-Liviu (University of Regina)
Mihalcea, Leonardo Constantin (Duke University)
Mitchell, Steve (University of Washington)
Mukhin, Evgeny (University-Purdue University Indianapolis)
Naruse, Hiroshi (Okayama University)
Perrin, Nicolas (Institut de Mathématiques de Jussieu)
Purbhoo, Kevin (University of British Columbia)
Richmond, Edward (University of North Carolina)
Ruffo, James (Texas A & M University)
Shimozono, Mark (Virginia Tech)
Sottile, Frank (Texas A&M University)
Tamvakis, Harry (University of Maryland)
Thomas, Hugh (University of New Brunswick)
Tymoczko, Julianna (University of Michigan)
Varchenko, Alexander (University of North Carolina)
Verschelde, Jan (University of Illinois at Chicago)
Woo, Alexander (University of California Davis)
Yong, Alexander (University of Minnesota/University of Toronto)

Interactions of Geometry and Topology in Low Dimensions
March 25 - 30, 2007

Organizers:

Denis Auroux (Massachusetts Institute of Technology)
Hans Boden (McMaster University)
Olivier Collin (Université du Québec à Montréal)
John Etnyre (Georgia Institute of Technology)

For topologists, any space with four or fewer dimensions is considered to be low-dimensional. Because high-dimensional space has lots of ``room to move", algebraic techniques can be used to effectively answer many of the fundamental questions in dimensions five and higher. Ironically, in dimensions three and four, including our physical world (space) and Einstein's universe (space-time), these techniques break down and many fundamental questions remain unanswered. For example, four dimensional space supports infinitely many ``exotic" smooth structures, which are self-consistent yet inequivalent ways of interpreting physical laws and understanding particle movement in space-time. The workshop will focus on new discoveries about the shape of space and knotted objects sitting in space. The workshop will feature several talks about new exotic smooth structures on four-manifolds and results on slicing knots. Inspiration for many of these results comes from ideas in mathematical physics such gauge theory, and symplectic and contact geometry. This event is organized by Professors Denis Auroux of Massachusetts Institute of Technology, Hans Boden of McMaster University, Olivier Collin of Université du Québec à Montréal, and John Etnyre of Georgia Institute of Technology.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5033/

Participants:

Baldridge, Scott (Louisiana State University)
Baykur, Inanc (Michigan State University)
Boden, Hans (McMaster University)
Boyer, Steve (Université du Québec à Montréal)
Chantraine, Baptiste (Université du Québec à Montréal)
Collin, Olivier (Université du Québec à Montréal)
Friedl, Stefan (Université du Québec à Montréal)
Ghiggini, Paolo (Université du Québec à Montréal)
Gordon, Cameron (University of Texas)
Grigsby, Julia Elisenda (Columbia University)
Hedden, Matthew (Massachusetts Institute of Technology)
Herald, Chris (University of Nevada - Reno)
Himpel, Benjamin (University of Bonn)
Honda, Ko (University Southern California)
Hutchings, Michael (University of California Berkeley)
Jabuka, Stanislav (University of Nevada-Reno)
Kim, Hee Jung (McMaster University)
Kirby, Robion (University of California - Berkeley)
Kirk, Paul (Indiana University)
Lee, Yi-Jen (Purdue University)
Mark, Thomas (University of Virginia)
Matic, Gordana (University of Georgia)
Ng, Lenny (Duke University)
Owens, Brendan (Louisiana State University)
Park, B. Doug (University of Waterloo)
Park, Jongil (Seoul National University)
Perutz, Tim (Cambridge University)
Plamenevskaya, Olga (State University of New York at Stony Brook)
Saveliev, Nikolai (University of Miami)
Sena-Dias, Rosa (Massachusetts Institute of Technology)
Stern, Ronald (University of California, Irvine)
Sullivan, Michael (University of Massachusetts)
Van Horn-Morris, Jeremy (University of Texas, Austin)
Wendl, Chris (Massachusetts Institute of Technology)
Wu, Hao (University of Massachusetts)

Discrete Geometry and Topology in Low Dimensions
April 01-06, 2007

Organizers:

Karoly Bezdek (University of Calgary)
Herbert Edelsbrunner (Duke University)
Robert Connelly (Cornell University)

Voronoi cells are widely used in mathematics as well as in many areas of science. Voronoi cells and diagrams can be applied to quite a number of problems and this character of them is a result of the large list of impressive combinatorial, geometric as well as topological properties known today. This workshop focused on some of the most challenging issues on Voronoi cells that are still open today and have the potential to influence significantly the research efforts on many Voronoi cell related applications. In connection with the mathematical theory of Voronoi cells particular emphases was given to understand the combinatorial, geometric and topological properties of intersections as well as of unions of balls. On one hand, intersections of spherical balls generalize the concept of convex polyhedra fundamental to many parts of today's science on the other hand, unions of spherical balls not only extend the concept of polyhedra but are highly interesting from the point of view of applications including computational biology when dealing with space-filing diagrams of molecules. This branch of the workshop is connected also to computer science via geometrically motivated data analysis in high dimensional spaces.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5111/

Participants:

Alexandrov, Victor (Sobolev Institute of Mathematics)
Alfakih, Abdo (University of Windsor)
Aliev, Iskander (University of Edinburgh)
Attali, Dominique (CNRS Grenoble)
Bachoc, Christine (Université Bordeaux 1)
Belk, Maria (Texas A&M University)
Bezdek, Karoly (University of Calgary)
Bezdek, Andras (Auburn University)
Chazal, Frederic (University Bourgogne)
Cohen-Steiner, David (INRIA Sophia-Antipolis)
Cohn, Henry (Microsoft Research)
Connelly, Robert (Cornell University)
Csikos, Balazs (Eotvos University, Institute of Mathematics)
de Silva, Vin (Pomona College)
Edelsbrunner, Herbert (Duke University)
Erdahl, Robert (Queens University)
Frosini, Patrizio (University of Bologna)
Koehl, Patrice (University of California Davis)
Lieutier, Andre (Dassault Systeme Provence)
Mileyko, Yuriy (Duke University)
Morgan, Frank (Williams College)
Morozov, Dmitriy (Duke University)
Musin, Oleg (Moscow State University)
Ordine, Andrei (Scotiabank)
Rybnikov, Konstantin (University of Massachusetts)
Schlenker, Jean-Marc (Université Paul Sabatier)
Schuermann, Achill (University of Magdeburg)
Smale, Stephen (Toyota Technological Institute at Chicago)
Streinu, Ileana (Smith College)
Toth, Csaba (Massachusetts Institute of Technology)
Vallentin, Frank (Centrum voor Wiskunde en Informatica)

Complex Data Structures in the Health, Social and Environmental Sciences
April 08-13, 2007

Organizers:

James Berger (Duke Univerisity)
David Brillinger (University of California, Berkeley)
Christian Léger (Université de Montreal)
Jim Ramsay (McGill University)
James Stafford (University of Toronto)
Henry Wynn (London School of Economics & Political Science)

Quantitative tools are an essential component of research in environmental, health and social sciences where the nature of the data that can now be obtained in these fields means that well established and standard research methods and statistical summaries are not adequate. The result has been an explosion of interest in these sciences in obtaining statistical expertise to tackle data analysis problems of substantial complexity, and in training health and environmental researchers in the concepts and methods of advanced statistical analysis. All statisticians and biostatisticians in Canada are familiar with the nearly endless opportunities for collaborative research in these and other areas of science. The dramatic change that is taking place now through NPCDS is the emergence of networks of statistical scientists working on large-scale projects with researchers in the environmental, health and social sciences. This moves well beyond the model of interdisciplinary research at a single university, to a model of national efforts brought to bear on problems of national importance. The NPCDS has been an important catalyst in this transformation. It has altered the cultural environment of Canada's statistical sciences by providing expertise, encouragement, and funding for approaching research collaborations in a national context and by developing international links with statistical research institutes in the US and the EU.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5067/

Participants:

Berger, James (Duke Univerisity)
Bingham, Derek (Simon Fraser University)
Braun, John (Willard) (University of Western Ontario)
Bryan, Jennifer (University of British Columbia)
Carrillo Garcia, Ivan (University of Waterloo)
Chipman, Hugh (Acadia University)
Dean, Charmaine (Simon Fraser University)
Dowd, Mike (Dalhousie University)
Fan, Guangzhe (University of Waterloo)
Fraser, Don (University of Toronto)
Greenwood, Celia (University of Toronto)
Gustafson, Paul (University of British Columbia)
Hooker, Giles (Cornell University)
Hu, Joan (Simon Fraser University)
Kovacevic, Milorad (Statistics Canada)
Kustra, Rafal (University of Toronto)
Léger, Christian (Université de Montreal)
Lu, Wilson W. (Acadia University)
Martell, David (University of Toronto)
Mills, Shirley (Carleton University)
Murdoch, Duncan (University of Western Ontario)
Nadon, Robert (McGill University)
Nielsen, Jason (Simon Fraser University)
Reid, Nancy (University of Toronto)
Routledge, Rick (Simon Fraser University)
Sitter, Randy (Simon Fraser University)
Song, Peter (University of Waterloo)
Stafford, James (University of Toronto)
Steele, Russ (McGill University)
Tang, Boxin (Simon Fraser University)
Tymstra, Cordy (Sustainable Resource Development)
Woolford, Doug (University of Toronto)
Wu, Changbao (University of Waterloo)
Wynn, Henry (London School of Economics & Political Science)
Young, Stan (National Institute of Statistical Sciences)
Zhu, Mu (University of Waterloo)

Stochastic Dynamical Systems and Climate Modeling
April 15-20, 2007

Organizers:

Jinqiao Duan (Illinois Institute of Technology)
Boualem Khouider (University of Victoria)
Richard Kleeman (Courant Institute, New York University)
Adam Monahan (University of Victoria)

A group of mathematicians and geoscientists from around the globe met at The Banff Centre for a workshop on recent developments in Stochastic Dynamics and Climate Modeling. The workshop focused on the newest results in Stochastic Dynamics and their interactions with climate dynamics.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5007/

Participants:

Berner, Judith (European Centre for Medium-Range Weather Forecasts)
Bessaih, Hakima (University of Wyoming)
Caraballo, Tomas (Universidad de Sevilla)
Chen, Baohua (Illinois Institute of Technology)
Chu, Peter (Naval Postgraduate School)
Craig, George (DLR Germany)
Culina, Joel (University of Victoria)
Davoudi, Jahanshah (University of Toronto)
DelSole, Timothy (Center for Ocean-Land-Atmosphere Studies)
Duan, Jinqiao (Illinois Institute of Technology)
Franzke, Christian (NCAR, USA)
Ge, Fanghua (Chinese Academy of Sciences)
Gentz, Barbara (University of Bielefeld)
Godlovitch, Dan (University of Victoria)
Khouider, Boualem (University of Victoria)
Kleeman, Richard (Courant Institute, New York University)
Lu, Kening (Brigham Young University)
Majda, Andrew (NYU - Courant Institute of Mathematical Sciences)
Monahan, Adam (University of Victoria)
Moradifam, Amir (University of British Columbia)
Mu, Mu (Chinese Academy of Sciences)
Nadiga, Balasubramanya (Los Alamos National Laboratory)
Namazi, Maryam (University of Victoria)
Onu, Kristjan (University of Illinois at Urbana-Champaign)
Penland, Cecile (NOAA/Earth Systems Research Lab/Physica Science Div.)
Restrepo, Juan (University of Arizona)
Ross, Ian (University of Bristol)
Sardeshmukh, Prashant (Climate Diagnostics Center, CIRES/University of Colorado)
Schmalfuss, Bjorn (University of Paderborn)
Smith, Leslie (University of Wisconsin)
Stechmann, Sam (UCLA)
Sura, Philip (NOAA-CIRES Climate Diagnostics Center)
Tang, Youmin (University of Northern British Columbia)
Timofeyev, Ilya (University of Houston)
Vallis, Geoff (Geophysical Fluid Dynamics Laboratory)
Williams, Paul (University of Reading)

The Many Strands of the Braid Groups
April 22-27, 2007

Organizers:

Joan Birman (Barnard College, Columbia University),
Patrick Dehornoy (University of Caen)
Roger Fenn (University of Sussex)
Vaughan Jones (UC-Berkeley)
Dale Rolfsen (University of British Columbia)

This workshop brought together many of the world's top experts in braid theory. Braid theory, which combines algebra and topology, is an offshoot of knot theory and has applications to all branches of mathematics and theoretical physics, and even such diverse fields as cryptography, molecular biology and polymer chemistry. It will consider recent advances in the theory and applications. The organizers have made a special effort to include many young researchers and female mathematicians among the participants.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5104/

Participants:

Bachman, David (Pitzer College)
Bessis, David (DMA - Ecole normale supérieure)
Birman, Joan (Barnard College, Columbia University)
Boileau, Michel (Universite Paul Sabatier)
Budden, Stephen (University of Auckland)
Castel, Fabrice (University of Bourgogne)
Clay, Adam (University of British Columbia)
Dehornoy, Patrick (University of Caen)
Digne, François (Université de Picardie Jules-Verne)
Fenn, Roger (University of Sussex)
Gebhardt, Volker (University of Western Sydney)
Gonzalez-Meneses, Juan (University of Seville)
Guaschi, John (Université Paul Sabatier)
Humphries, Stephen (Brigham Young University)
Kamada, Naoko (Osaka City University)
Kamada, Seiichi (Hiroshima University)
Kania-Bartoszynska, Joanna (National Science Foundation)
Kawamuro, Keiko (Rice University)
Kin, Eiko (Tokyo Institute of Technology)
Kohno, Toshitake (University of Tokyo)
Krammer, Daan (University of Warwick)
Lee, Sang-Jin (Konkuk Univ)
Lee, Eon-Kyung (Sejong University)
Lescop, Christine (University of Grenoble)
Lima Goncalves, Daciberg (Universidade de Sao Paulo)
Marche, Julien (University Paris 6)
Margalit, Dan (University of Utah)
Marin, Ivan (University Paris 7)
Matsuda, Hiroshi (Columbia University)
Menasco, William (University at Buffalo)
Michel, Jean (University Paris 7)
Morrison, Scott (University of California, Berkeley)
Morton, Hugh (University of Liverpool)
Murakami, Hitoshi (Tokyo Institute of Technology)
Przytycki, Jozef (George Washington University)
Rolfsen, Dale (University of British Columbia)
Thurston, Dylan (Barnard College, Columbia University)
Watson, Liam (L'Université du Québec à Montréal)
Wiest, Bert (University Rennes)
Yurasovskaya, Ekaterina (University of British Columbia)
Zhang, Gengyu (Tokyo Institute of Technology)

Mathematics and the Environment: Energy Risk, Environmental Uncertainty and Public Decision Making
May 08-13, 2007

Organizers:

Ulrich Horst (Humboldt University Berlin)

Peter Imkeller (Institut fur Mathematik Humboldt Universitat zu Berlin)

In a time of growing environmental concerns and the chance to enhance the development of effective mathematical methods and techniques to model climate risks and public decision making in the presence of environmental uncertainty is truly compelling. This workshop brought together economics, mathematics and social scientists to discuss recent progress in the modeling and managing climate and weather related risk factors.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5502/

Participants:

Aid, Rene (EDF R&D)
Ankirchner, Stefan (Humboldt University Berlin)
Barrieu, Pauline (London School of Economics)
Barth, Andrea (University of Oslo)
Buckwar, Evelyn (Technical University Berlin)
Carmona, Rene (Princeton University)
Dallagi, Anes (University of Alberta)
Delbaen, Freddy (ETH Zurich)
Ekeland, Ivar (University of British Columbia)
Fehr, Max (ETH Zurich)
Gollier, Christian (University of Toulouse)
Hinz, Juri (ETH Zurich)
Imkeller, Peter (Institut fur Mathematik Humboldt Universitat zu Berlin)
Krol, Katja (Humboldt University Berlin)
Kupper, Michael (ETH Zurich)
L'Espérance, Bruno (University of British Columbia)
Ludkovski, Mike (University of Michigan)
Lyle, Matt (University of Calgary)
Malverde, José Luis (Universidad de Chile)
Mandel, Antoine (University Paris I)
Moreno, Santiago (University of British Columbia)
Muehlenbachs, Lucija (University of Maryland)
Nunes dos Reis, Gonçalo Jose (Humboldt University Berlin)
Petrou, Evangelia (Humboldt University Berlin)
Porchet, Arnaud (Princeton University)
Ramirez Cabrera, Hector (University of Chile)
Sougoufara, Ibnou (TransCanada Pipeline)
Sumaila, Rashid (University of British Columbia)
Taschini, Luca (Zurich University)
Tuchscherer, Travis (Direct Energy Marketing Limited)

New Applications and Generalizations of Floer Theory
May 13-18, 2007

Organizers:

Octav Cornea (Universite de Montreal)
Viktor Ginzburg (University of California Santa Cruz)
Ely Kerman (University of Illinois at Urbana-Champaign)
Francois Lalonde (Universite de Montreal)

Since its introduction by Andreas Floer in the late nineteen eighties, Floer theory has had a tremendous influence on many branches of mathematics including geometry, topology and dynamical systems. The development of new Floer theoretic tools continues at a remarkable pace and underlies many of the recent breakthroughs in these diverse fields. The workshop will allow researchers to present the current state of their respective programs in extended sessions. It will also provide a forum meant to foster interaction between various research groups and facilitate discussions on the direction of future research in the area.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5010/

Participants:

Abbas, Casim (Michigan State University)
Albers, Peter (New York University)
Bourgeois, Frédéric (Université Libre de Bruxelles)
Cornea, Octav (Universite de Montreal)
Damian, Mihai (IRMA, Universite Louis Pasteur, Strasbourg)
Entov, Michael (Technion)
Fabert, Oliver (University of Munich)
Frauenfelder, Urs (Ludwig-Maximillians-Universitat)
Fukaya, Kenji (Kyoto)
Ginzburg, Viktor (University of California Santa Cruz)
Gurel, Basak (CRM/University of Montreal)
Hind, Richard (Notre Dame)
Hofer, Helmut (New York University)
Hu, Shengda (Université de Montréal)
Hutchings, Michael (University of California)
Hyvrier, Clement (University of Montreal)
Johns, Joe (Courant Institute)
Kerman, Ely (University of Illinois at Urbana-Champaign)
Leclercq, Remi (University of Montreal)
Lee, Yi-Jen (Purdue University)
Lerman, Eugene (University of Illinois Urbana-Champaign)
Lisi, Samuel (University of Montreal)
McDuff, Dusa (Stony Brook University, Stony Brook)
Mohnke, Klaus (Humbolt-Universitat zu)
Ono, Kaoru (Hokkaido University)
Ostrover, Yaron (Massachusetts Institute of Technology)
Pinsonnault, Martin (Fields Institute)
Schlenk, Felix (Universite Libre de Bruxelles)
Schwarz, Matthias (Universitaet Leipzig)
von Bergmann, Jens (University of Notre Dame)
Wehrheim, Katrin (Massachusetts Institute of Technology)
Woodward, Chris (Rutgers New Brunswick)
Wysocki, Kris (Pennsylvania State University)
Zehnder, Eduard (ETHZ)

The Mathematics of Knotting and Linking in Polymer Physics and Molecular Biology May 20-25, 2007

Organizers:

Kenneth Millett (University of California Santa Barbara)
Eric Rawdon (University of St. Thomas)
Christine Soteros (University of Saskatchewan)
Andrzej Stasiak (University of Lausanne)
Stuart Whittington (University of Toronto)

Knotting and linking arises in living cells where it is tolerated at levels moderated by, for example, DNA topoisomerase. When this occurs in constrained environments, one observes significant differences in structure from that found in free environments. The organizers, brought together some of the leading researchers in biology, mathematics and, physics to focus on critical theoretical and experimental advances, the challenges that are illuminated by them, and the next generation of experimental, theoretical, mathematical, statistical and, computational tools that will be required to further advance understanding of fundamental processes in physics and biology.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5095/

Participants:

Arsuaga, Javier (California State University)
Atapour, Mahshid (University of Saskatchewan**)**
Buck, Dorothy (Imperial College)
Calvo, Jorge (Ave Maria University)
Cantarella, Jason (University of Georgia)
Chan, Hue Sun (University of Toronto)
Darcy, Isabel (University of Iowa)
Deguchi, Tetsuo (Ochanomizu University)
Denne, Elizabeth (Harvard University)
Diao, Yuanan (University of North Carolina)
Dietler, Giovanni (EPFL)
Duplantier, Bertrand (Centre Energie Automique / Saclay)
Ernst, Claus (Western Kentucky University)
Flapan, Erica (Pomona College)
Gerlach, Henryk (Ecole Polytechinque Federale de Lausanne)
Grosberg, Alexander (University of Minnesota)
Kephart, Thomas (Vanderbilt University)
Kusner, Rob (University of Massachusetts)
Maddocks, John (Ecole Polytechnique Federale de Lausanne)
Mann, Jennifer (Florida State University)
Micheletti, Cristian (International School for Advanced Studies)
Millett, Kenneth (University of California Santa Barbara)
Orlandini, Enzo (Università di Padova)
Pile, Angela (North Dakota State University)
Ramirez-Rosas, Teresita (University of California)
Rawdon, Eric (University of St. Thomas)
Rechnitzer, Andrew (University of British Columbia)
Scharein, Rob (Hypnagogic Software)
Simon, John (University of Iowa)
Soteros, Christine (University of Saskatchewan)
Stasiak, Andrzej (University of Lausanne)
Stella, Attilio (Universita di Padova)
Sullivan, John (TU Berlin)
Sumners, DeWitt (Florida State University)
Tesi, Maria Carla (University of Bologna)
van Rensburg, Buks (York University)
Vazquez, Mariel (San Francisco State University)
Vologodskii, Alexander (New York University)
Whittington, Stuart (University of Toronto)
Wrinkle, Nancy (Northeastern Illinois University)
Zechiedrich, Lynn (Baylor College of Medicine)

Algebraic Lie Theory
May 25- June 1, 2007

Organizers:

Gus Lehrer (University of Sydney)
Arturo Pianzola (University of Alberta)
Alexander Premet (University of Manchester)
Arun Ram (University of Wisconsin-Madison)
Gerhard Roehrle (University of Southampton)

The objective of the meeting was to bring together people to present the latest developments, and to encourage interchange of ideas and to promote interactive and interdisciplinary collaborations.

More specifically, the groups and algebras which this project seeks to address are algebraic groups, Lie groups, finite reductive groups, reflection groups, Coxeter groups, quantum groups (which are not groups, but Hopf algebras), Hecke algebras and their centralizers. The centralizer of the (Drinfeld) quantum group of classical type acting on tensor space is the Birman-Wenzl algebra which is known to have intimate connections with braids and their topology. Such connections are typical of the area. Lie groups have their origin in real analysis, particularly the study of differential equations invariant under symmetries. They now lie at the heart of several branches of mathematics and form a bridge between apparently diverse fields.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5025/

Participants:

Achar, Pramod N. (Louisiana State University)
Baur, Karin (University of Leicester)
Brown, Jonathan (University of Oregon)
Brundan, Jonathan (University of Oregon)
Cox, Anton (City University, London)
Douglass, James Matthew (University of North Texas)
Farnsteiner, Rolf (University of Bielefeld)
Gold, Daniel (University of Southampton)
Goodwin, Simon (University of Birmingham)
Gordon, Iain (University of Edinburgh)
Henderson, Anthony (University of Sydney)
Hill, David (University of Oregon)
Jantzen, Jens Carsten (University of Aarhus)
Kleshchev, Alexander (University of Oregon)
Kujawa, Jon (University of Oklahoma)
Lehrer, Gus (University of Sydney)
Letellier, Emmanuel (Concordia)
Levy, Paul (Ecole Polytechnique Federale de Lausanne)
Mathas, Andrew (University of Sydney)
McGerty, Kevin (Imperial College in London)
McNinch, George (Tufts University)
Morier-Genoud, Sophie (University of Lyon)
Nakano, Daniel K. (University of Georgia)
Parker, Alison (University of Leicester)
Pianzola, Arturo (University of Alberta)
Premet, Alexander (University of Manchester)
Ram, Arun (University of Wisconsin-Madison)
Roehrle, Gerhard (University of Southampton)
Stroppel, Catharina (University of Glasgow)
Tange, Rudolf (University of Southampton)
Terwilliger, Paul (University of Wisconsin)
Thiem, Nat (Stanford University)
Toledano Laredo, Valerio (Northeastern University)
Ubly, Glenn (University of Southampton)
Varagnolo, Michela (Universite de Cergy-Pontoise)
Vasserot, Eric (University Paris 7)
Wang, Weiqiang (University of Virginia)
Yip, Martha (University of Wisconsin)
Zhang, Ruibin (University of Sydney)

Modular Forms: Arithmetic and Computation
June 3-8, 2007

Organizers:

John Cremona (University of Nottingham)
Henri Darmon (McGill University)
Kenneth Ribet (University of California at Berkeley)
Romyar Sharifi (McMaster University)
William Stein (University of Washington)

This workshop was concerned with modular forms and the objects to which they are intricately connected, such as elliptic curves, p-adic L-functions, and Galois representations. We maintained a sharp focus on actual modular forms, as opposed to the broad variety of analogous objects. Even with this focus, the topic was broad enough to encompass a great deal of the most exciting work in arithmetic geometry today.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5065/

Participants:

Agashe, Amod (Florida State University)
Brumer, Armand (Fordham University)
Busuioc, Cecilia (Boston University)
Calegari, Frank (Northwestern University)
Charollois, Pierre (Institut de Mathématiques de Jussieu)
Cohen, Henri (Universite Bordeaux 1)
Cremona, John (University of Nottingham)
Darmon, Henri (McGill University)
Dasgupta, Samit (Harvard University)
Dembele, Lassina (University of Calgary)
Dummigan, Neil (University of Sheffield)
Elkies, Noam (Harvard University)
Emerton, Matthew (Northwestern University)
Gee, Toby (Imperial College)
Gonzalez Jimenez, Enrique (Universidad Autonoma de Madrid)
Greenberg, Matthew (Harvard University)
Greicius, Aaron (University of California at Berkeley)
Jetchev, Dimitar (University of California at Berkeley)
Johnson-Leung, Jennifer (Brandeis University)
Joyce, Adam (University of Bristol)
Kilford, Lloyd (Oxford University)
Kuehn, Ulf (Universitaet Hamburg)
Poonen, Bjorn (University of California at Berkeley)
Quer, Jordi (Universitat Politècnica de Catalunya)
Ribet, Kenneth (University of California at Berkeley)
Rotger, Victor (Universitat Politècnica de Catalunya)
Sharifi, Romyar (McMaster University)
Stein, William (University of Washington)
Taylor, Karen (University of Nottingham)
Tornaría, Gonzalo (Universidad de la República)
Torrey, Rebecca (King's College London)
Trifkovic, Mak (University of Victoria/Fordham)
Vatsal, Vinayak (University of British Columbia)
Watkins, Mark (University of Bristol)
Wiese, Gabor (University of Duisburg-Essen)
Wuthrich, Christian (Ecole Polytechnique Federale de Lausanne)
Yazdani, Soroosh (University of California at Berkeley)

Commutative Algebra and Its Interaction with Algebraic Geometry
June 10-15, 2007

Organizers:

Anthony Geramita (Queens University)
Paul Roberts (University of Utah)
Bernd Ulrich (Purdue University)

This workshop discussed a variety of different topics relating to the proposed topic:

1. Problems in positive and mixed characteristic.
2. Integral dependence and integral closures.
3. Secant varieties and Algebraic Statistics.

Thus, the Workshop provided the first opportunity to bring together these various groups. Also, since both the language of the modern understanding of these problems and the language of the conjectures which seek to solve them is the language of Commutative Algebra, a workshop which also includes experts on other aspects of the field was ideal to provide the mix that offered the best chance for solving some of these questions.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5505/

Participants:

Brenner, Holger (University of Sheffield)
Bruns, Winfried (University of Osnabruck)
Catalisano, Maria Virginia (University of Genoa)
Caviglia, Giulio (University of California at Berkeley)
Chardin, Marc (CNRS & Université Pierre et Marie Curie)
Chiantini, Luca (University of Siena)
Christensen, Lars Winther (University of Nebraska-Lincoln)
Corso, Alberto (University of Kentucky)
Cutkosky, Steven Dale (University of Missouri - Columbia)
Dao, Hai Long (University of Utah)
Ein, Lawrence (University of Illinois at Chicago)
Geramita, Anthony (Queens University)
Harbourne, Brian (University of Nebraska-Lincoln)
Kurano, Kazuhiko (Meiji University)
Kuroda, Shigeru (Tokyo Metropolitan University)
Li, Jinjia (Syracuse University)
Lyubeznik, Gennady (University of Minnesota)
Migliore, Juan (University of Notre Dame)
Miller, Claudia (Syracuse University)
Miranda, Rick (Colorado State University)
Monsky, Paul (Brandeis University)
Mustata, Mircea (University of Michigan)
Peeva, Irena (Cornell University)
Polini, Claudia (University of Notre Dame)
Roberts, Paul (University of Utah)
Rosenschon, Andreas (Fields Institute)
Sather-Wagstaff, Sean (Kent State University)
Schenck, Hal (Texas A&M University)
Schwede, Karl (University of Michigan)
Sidman, Jessica (Mt. Holyoke)
Singh, Anurag (University of Utah)
Smith, Gregory G. (Queens University)
Srinivas, Vasudevan (Tata Institue of Fundamental Research)
Stillman, Mike (Cornell University)
Striuli, Janet (University of Nebraska)
Sullivant, Seth (Harvard University)
Swanson, Irena (Reed College)
Takagi, Shunsuke (Kyushu University)
Ulrich, Bernd (Purdue University)
Van Tuyl, Adam (Lakehead University)
Veliche, Oana (University of Utah)

Geometric Inequalities
June 17 -22, 2007

Organizers:

Mark Ashbaugh (University of Missouri-Columbia)
Almut Burchard (University of Toronto)
Bernd Kawohl (University of Cologne)
Robert McCann (University of Toronto)

This workshop connected mathematicians working on geometric inequalities with each other and with colleagues interested in current and potential applications. For the methods, we focused on rearrangements, optimal transportation, and nonlinear heat flows. For applications, we concentrated on a few problems in spectral geometry and statistical mechanics. The participants included several subgroups that have worked on closely related problems with different methods, in sometimes with equivalent results. We also included several experts on geometric eigenvalue inequalities, some researchers interested in applications of optimal transportation to dissipative PDE and statistical mechanics, and a few participants with broader interests in geometric inequalities and geometric flows.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5503/

Participants:

Agueh, Martial (University of Victoria)
Ashbaugh, Mark (University of Missouri-Columbia)
Baernstein, Al (Washington University in St. Louis)
Barthe, Franck (Universite Toulouse III)
Benguria, Rafael (Universita Catolica de Chile)
Bressan, Alberto (Pennsylvania State University)
Burchard, Almut (University of Toronto)
Carbery, Anthony (University of Edinburgh)
Carlier, Guillaume (Universite Paris Dauphine)
Chiacchio, Francesco (Università degli Studi di Napoli)
Cianchi, Andrea (Università di Firenze (Italy))
Cordero-Erausquin, Dario (University of Marne-la-Vallee)
Cox, Graham (Duke University)
Denzler, Jochen (University of Tennessee, Knoxville)
Dostoglou, Stamatis (University of Missouri)
Ferone, Adele (Seconda Università di Napoli)
Frank, Rupert (KTH Stockholm (Sweden))
Fusco, Nicola (Universita di Napoli)
Ghoussoub, Nassif (BIRS)
Goldman, Dorian (University of Toronto)
Henrot, Antoine (Institut Elie Cartan [France])
Hermi, Lotfi (University of Arizona)
Hillion, Erwan (Université Paul Sabatier)
Kawohl, Bernd (University of Cologne)
Kim, Young-Heon (University of Toronto)
Kraiem, Mouna (University of Cergy-Pontoise)
Loss, Michael (Georgia Institute of Technology)
Lucia, Marcello (Universitat zu Koln)
McCann, Robert (University of Toronto)
Moradifam, Amir (University of British Columbia)
Pass, Brendan (University of Toronto)
Smith, Aaron (Queens University / Stanford)
Stephens, Benjamin (University of Toronto)
Trokhimtchouk, Maxim (University of California, Berkeley)
Valdimarsson, Stefan (University of California, Los Angeles)
Wei, Jun Cheng (Chinese University of Hong Kong)
Weth, Tobias (University of Giessen)

Statistical Methods for High-throughput Genetic Data
June 24-29, 2007

Organizers:

Jiahua Chen (University of British Columbia)
Yuejiao Cindy Fu (York University)
Mary Lesperance (University of Victoria)
David Siegmund (Stanford University)
Heping Zhang (Yale University)
Hongyu Zhao (Yale University)

From Mendel's agricultural experiments on peas to human genome projects on chromosomes, geneticists as well as the general public have been fascinated by factors that inherently define the vastly diverse characters of the living world. While only most obvious traits such as the color of flowers were observed in the old days, modern techniques enable geneticists to measure hundreds of thousands of genes of an organism on a single microarray chip. A high amount of high-throughput data are thus generated routinely. The task of identifying important genes out of tens of thousands, which are associated with traits such as cancer and diabetes, demands serious effort in designing effective statistical analysis procedures.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5023/

Participants:

Allison, David (University of Alabama at Birmingham)
Baglivo, Jenny (Boston College)
Bryan, Jennifer (University of British Columbia)
Bull, Shelley (University of Toronto)
Chen, Jiahua (University of British Columbia)
Chen, Zehua (National University of Singapore)
Chen, Hangfeng (Bowling Green State University)
Chen, Liang (University of Southern California)
Dupuis, Josee (Boston University School of Public Health)
Ewens, Warren (University of Pennsylvania, Philadelphia)
Fan, Guangzhe (University of Waterloo)
Fu, Yuejiao Cindy (York University)
He, Xuming (University of Illinois at Urbana-Champaign)
He, Wenqing (University of Western Ontario)
Horvath, Steve (University of California, Los Angeles)
Huang, Jian (University of Iowa)
Lesperance, Mary (University of Victoria)
Li, Pengfei (University of Waterloo)
Lindsay, Bruce (Pennsylvania State University)
Liu, Ching-Ti (Yale University)
Liu, Jun (Harvard University)
Liu, Lei (Yale University)
Molinaro, Annette (Yale University)
Pelizzola, Mattia (Yale University School of Medicine)
Peng, Jie (University of California, Davis)
Rao, J. Sunil (Case Western Reserves University)
Ruczinski, Ingo (Johns Hopkins University)
Shao, Yongzhao (New York University)
Siegmund, David (Stanford University)
Song, Peter (University of Waterloo)
Tu, Dongsheng (Queen's University)
Wang, Ji-Ping (Northwestern University)
Wang, Huixia (North Carolina State University)
Wang, Hsiao-Hsuan (York University)
Weeks, Daniel (Univesity of Pittsburgh)
Yakir, Benjamin (Hebrew University Mount Scopus)
Zee, Chung-Ying (Chinese University of Hong Kong)
Zhang, Heping (Yale University)
Zhang, Meizhuo (Yale Univesity, School of Public Health)
Zhao, Hongyu (Yale University)
Zou, Fei (University of North Carolina at Chapel Hill)

Bioinformatics, Genetics and Stochastic Computation: Bridging the Gap
July 01 - 06, 2007

Organizers:

Arnaud Doucet (University of British Columbia)
Raphael Gottardo (University of British Columbia)
Christian Robert (Ceremade, Universite Paris Dauphine)

The objective of this interdisciplinary workshop was to bridge the gap between the bioinformatics, genetics and statistics communities. There has been indeed an explosion of the use of complex statistical models in bioinformatics and genetics whose ultimate goals include the development of personalized medical treatments and genetic therapy. However these powerful models remain very difficult to exploit currently and require the development of powerful stochastic computation techniques. This workshop created an exceptional opportunity for exchanging ideas between the specialists of stochastic computation and scientists from bioinformatics and genetics and helped to shape the future of these disciplines.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2006/07w5079/

Participants:

Balding, David (Imperial College)
Beaumont, Mark (University of Reading)
Bornn, Luke (University of British Columbia)
Brockwell, Anthony (Carnegie Mellon University)
Caron, Francois (University of British Columbia)
Craiu, Radu (University of Toronto)
de Iorio, Maria (Imperial College)
Dobra, Adrian (University of Washington)
Doucet, Arnaud (University of British Columbia)
Fearnhead, Paul (Lancaster University)
Gottardo, Raphael (University of British Columbia)
Green, Peter (University of Bristol)
Gupta, Mayetri (University of North Carolina)
Holmes, Chris (Oxford University)
Inoue, Lurdes (University of Washington)
Jasra, Ajay (Imperial College London)
Keith, Jonathan (Queensland University of Technology)
Keles, Sunduz (University of Wisconsin, Madison)
Lewin, Alex (Imperial College, Centre for Biostatistics)
Marin, Jean Michel (Project Select INRIA Futurs)
Matsumoto, Takashi (Waseda University)
Mengersen, Kerrie (Queensland University of Technology)
Mueller, Peter (The University of Texas M. D. Anderson Cancer Center)
Murphy, Kevin (University of British Columbia)
Richardson, Sylvia (Imperial College)
Robert, Christian (Ceremade, Universite Paris Dauphine)
Sabatti, Chiara (University of California, Los Angeles)
Schmidler, Scott (Duke University)
Stephens, Matthew (University of Chicago)
Stephens, David (McGill University)
Thompson, Elizabeth (University of Washington)
Vannucci, Marina (Texas A&M University)
West, Mike (Duke University)
Wilkinson, Darren (Newcastle University)

L-functions, Ranks of Elliptic Curves, and Random Matrix Theory
July 8 - 13, 2007

Organizers:

Brian Conrey (American Institute of Mathematics)
Michael Rubinstein (University of Waterloo)
Nina Snaith (University of Bristol)

Random Matrix Theory (RMT) was largely developed by physicists studying statistical properties of the energy levels of excited nuclei. “The fact that Random Matrix Theory now serves a role in Number Theory - whose chief studies are prime numbers and whole number solutions to equations - is somewhat mind boggling,” admits Nina Snaith of the University of Bristol, a co-organizer and one of the pioneers in applying RMT to Number Theory questions. But the vast amount of computational evidence amassed in the months leading up to this workshop shows that new breakthroughs will come from combining RMT and Number Theory. The organizers and participants are hoping that by the end of the week they will have constructed several new examples of useful L-functions.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5114/

Participants:

Bui, Hung (University of Bristol)
Burhanuddin, Iftikhar (University of Southern California)
Butt, Salman (University of Texas at Austin)
Conrey, Brian (American Institute of Mathematics)
Darmon, Henri (McGill University)
Dehaye, Paul-Olivier (Merton College, Oxford)
Delaunay, Christophe (Universite Claude-Bernard)
Duenez, Eduardo (University of Texas at San Antonio)
Farmer, David (American Institute of Mathematics)
Fearnley, Jack (Concordia University)
Hanke, Jonathan (Duke University)
Hopkins, Kimberly (University of Texas at Austin)
Huynh, Duc Khiem (University of Bristol)
Imamoglu, Ozlem (ETH Zurich)
Keating, Jon (University of Bristol)
Kisilevsky, Hershy (Concordia University)
Kohnen, Winfried (Universitat Heidelberg)
Mao, Zhengyu (Rutgers University Newark)
Miller, Steven J. (Brown University)
Pacetti, Ariel (Universidad de Buenos Aires)
Rishikesh, R (University of Waterloo)
Rubin, Karl (University of California, Irvine)
Rubinstein, Michael (University of Waterloo)
Schulze-Pillot, Rainer (Universitt des Saarlandes)
Silverberg, Alice (University of California at Irvine)
Snaith, Nina (University of Bristol)
Stopple, Jeffrey (University of California, Santa Barbara)
Tornaria, Gonzalo (Universidad de la República)
Watkins, Mark (University of Bristol)
Yamagishi, Shuntaro (University of Waterloo)

Quadrature Domains and Laplacian Growth in Modern Physics
July 15-20, 2007

Organizers:

Darren Crowdy (Imperial College London)
Bjorn Gustafsson (Royal Institute of Technology Stockholm)
Mark Mineev (Los Alamos National Laboratory)
Mihai Putinar (University of California, Santa Barbara)

Imagine an oil spill in the ocean. Is it possible to locate, from the successive images of the moving boundary, the sources of oil? And vice-versa, knowing the sources, is there possible to predict the shape of the moving boundary between the two fluids? Or, starting with a given skeleton, is there a deterministic approach to model the growth of a crystal, adding one cell after the other, to the skeleton? Conversely, is it possible to model the changing shape of a freezing fluid? The point is that often growing interfaces are highly unstable and unpredictable despite of the deterministic description of the underlying process. The mathematical formulation of these phenomena is known as the Laplacian Growth. Remarkably, despite of the nonlinearity and complexity of these problems, it is often possible to solve them analytically in close form, and to identify geometric quantities which do not change in time. It has been found that exactly the same mathematical structure exists in the equations used in modeling apparently unrelated processes arising in quantum gravity and string theory - theories that are certainly not just of this earth but which purport to describe phenomena way beyond it.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5008/

Participants:

Abanov, Artem (Texas A&M University)
Arnlind, Joakim (Royal Institute of Technology-Stockholm)
Balogh, Ferenc (Concordia University)
Crowdy, Darren (Imperial College London)
Gruzberg, Ilya (University of Chicago)
Gustafsson, Bjorn (Royal Institute of Technology-Stockholm)
Harnad, John (University of Montreal)
Hoppe, Jens (Royal Institute of Technology-Stockholm)
Karp, Lavi (Ort Braude College)
Khavinson, Dmitry (University of South Florida)
King, John R. (University of Nottingham)
Makarov, Nikolai (California Institute of Technology)
Markina, Irina (University of Bergen)
Marshall, Jonathan (Imperial College London)
Mertens, Luca Philippe (SISSA)
Mineev, Mark (Los Alamos National Laboratory)
Putinar, Mihai (University of California, Santa Barbara)
Rushkin, Ilia (University of Chicago)
Saff, Edward (Vanderbilt University)
Sakai, Makoto (Tokyo Metropolitan University)
Scullard, Chris (University of Chicago)
Stylianopoulos, Nikos (University of Cyprus)
Teodorescu, Razvan (Los Alamos National Laboratory)
Tkachev, Vladimir (Kungl. Tekniska Högskolan)
Vasiliev, Alexander (Universitetet i Bergen)
Yermolaeva, Oksana (SISSA Trieste)

Mentoring for Engineering Academia II
July 22-27, 2007

Organizers:

Robert Gray (Stanford University)
Sheila Hemami (Cornell University)
Eve Riskin (University of Washington)
Rabab Ward (University of British Columbia)

Engineering faculty in North America generally do not represent the diversity of the general population. For example, among major research universities women typically comprise 10% or less of the faculty, and many departments have only one woman or none at all. Recent efforts to improve diversity among students and faculty have been unsuccessful. This trend is particularly troubling given that fewer individuals are seeking engineering careers at a time when technology is increasingly important to the economy and security of nations. Undergraduate and graduate engineering students will join junior, middle, and senior faculty for presentations and discussions on all aspects of developing successful academic careers, with an emphasis on encouraging and ensuring wide and open participation from all segments of the population. Organized by engineering professors from the University of British Columbia, the University of Washington, Cornell University, and Stanford University, the participants included a college president, the president of the Institute of Electrical and Electronics Engineers, deans, directors, department chairs, and faculty and students from a variety of engineering programs.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5030/

Participants:

Aboulnasr, Tyseer (University of Ottawa)
Brainard, Suzanne (University of Washington)
Budura, Adriana (Ecole Polytechnique de Lausanne)
Cherniavsky, Neva (University of Washington)
Contreras, Lydia (Cornell University)
Cosman, Pamela (University of California at San Diego)
Davies, Misty (Stanford University)
Ebadi, Zahra (University of British Columbia)
Effros, Michelle (California Institute of Technology)
Ferrante, Jeanne (University of California, San Diego)
Ferrer, Luciana (Stanford University)
Fortenberry, Norman (National Academy of Engineering)
George, Yolanda (American Association for the Advancement of Science)
Gray, Robert (Stanford University)
Hemami, Sheila (Cornell University)
Ho, Tracey (California Institute of Technology)
Holder, Robert (University of Md Baltimore County)
Howard, Ayanna (Georgia Institute of Technology)
Jamieson, Leah (Purdue University)
Jones, Linda (Smith College)
Klawe, Maria (Harvey Mudd College)
Ladner, Richard (University of Washington)
Lee, Stephanie (Cornell University)
Li, Jia (Pennsylvania State University)
Marincovich, Michelle (Stanford University)
McKay, Christine (University of Maryland)
Oishi, Meeko (University of British Columbia)
Ordonez, Patricia (University of Md Baltimore County)
Reimers, Tine (Cornell University)
Riskin, Eve (University of Washington)
Rutledge, Janet (University of Maryland - Baltimore)
Savari, Serap (University of Michigan)
Susstrunk, Sabine (Ecole Polytechnique Federale de Lausanne)
Tantum, Stacy (Duke University)
Wadey, Veronica (University of Toronto)
Walls, Jamie (North Carolina A&T State University)
Ward, Rabab (University of British Columbia)
Whitney, Telle (Anita Borg Institute)
Wilson, Sara Kate (Santa Clara University)
Wodin-Schwartz, Sarah (Smith College)
Wu, Min (University of Maryland)
Yuksel, Melda (Brooklyn Polytechnic University)

Topological and Geometric Rigidity
July 29-August 3, 2007

Organizers:

Jim Davis (Indiana University)

Shmuel Weinberger (University of Chicago)

This workshop dealt with the general theme that if one has microscopic information about a space (like "what blocks it is made of") and knows something about its symmetries, then one can sometimes determine the full detailed structure of the space. The exciting web of conjectures and the techniques used to verify them in special cases involve many different fields of modern mathematics. These ideas have themselves had a number of important applications, for instance, to the notion of mass in general relativity. The topics developed here have shed light on the interaction of geometric phenomena at different scales.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5094/

Participants:

Adem, Alejandro (University of British Columbia)
Bartels, Arthur (Universität Münster)
Belegradek, Igor (Georgia Tech)
Bestvina, Mladen (University of Utah)
Block, Jonathan (University of Pennsylvania)
Cappell, Sylvain (Courant Institute- NYU)
Chang, Stanley (Wellesley College)
Chen, Wen-Haw (Tunghai University)
Connolly, Frank (Notre Dame)
Davis, Jim (Indiana University)
Dranishnikov, Alexander (University of Florida)
Ferry, Steve (Rutgers University)
Fisher, David (Indiana University)
Fowler, James (University of Chicago)
Guentner, Erik (University of Hawaii, Manoa)
Higson, Nigel (Pennsylvania State University)
Ji, Lizhen (University of Michigan)
Khan, Qayum (Vanderbilt University)
Lafont, Jean-Francois (Ohio State University)
Linnell, Peter (Virginia Tech)
Melnick, Karin (Yale University)
Mineyev, Igor (University of Illinois at Urbana-Champaign)
Monod, Nicolas (Universite de Geneve)
Mozes, Shahar (Hebrew University)
Pedersen, Erik (University of Copenhagen)
Peng, Irine (University of Chicago)
Prassidis, Stratos (Canisius College)
Quinn, Frank (Virginia Tech)
Ranicki, Andrew (University of Edinburgh)
Reich, Holger (University of Dusseldorf Germany)
Roe, John (Penn State University)
Rosenthal, David (St. Johns University)
Sauer, Roman (University of Chicago)
Silberman, Lior (Harvard University)
Su, Zhixu (Indiana University)
Weinberger, Shmuel (University of Chicago)
Wortman, Kevin (Yale University)

Canada-China Workshop on Industrial Mathematics
August 5-10, 2007

Organizers:

Arvind Gupta (MITACS)
Huaxiong Huang (York University)
Gong Qing Zhang (Peking University).

It is a common perception that mathematics is a discipline that does not affect everyday life and society. In this workshop, more than 30 Canadian and Chinese mathematicians demonstrated that this widely-held belief could not be further from the truth.

The event also aims to promote collaboration between the two countries on applied mathematics problems and is sponsored by MITACS and by the Mathematical Centre of the Chinese Ministry of Education (MCME).

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5072/

Participants:

Bohun, C. Sean (University of Ontario Institute of Technology)
Brookes, Jim (Simon Fraser University)
Chen, Zengjing (Shandong University)
Cheng, Jin (Fudan University)
Crabtree, David (Precision Metrology Institute)
Davison, Matt (University of Western Ontario)
Ding, Guanghong (Fudan University)
Frigaard, Ian (University of British Columbia)
Ghoussoub, Nassif (Banff International Research Station)
Gupta, Arvind (MITACS)
Hou, Zixin (Nankai University)
Huang, Huaxiong (York University)
Kou, Hui (Sichuan University)
Kranakis, Evangelos (Carleton University)
Kurgan, Lukasz (University of Alberta)
Lewis, Gregory (University of Ontario Institute of Technology)
Luo, Mao-Kang (Sichuan University)
Marsh, Rebeccah (MITACS)
Miura, Robert (New Jersey Institute of Technology)
Nigam, Nilima (McGill University)
Peng, Shige (Shandong University)
Qazi, Sanjive (Parker Hughes Cancer Center)
Reidys, Christian (Nankai University)
Ruan, Jishou (Nankai University)
Shen, Shiyi (Nankai University)
Tan, Yongji (Fudan University)
Tuszynski, Jack (University of Alberta)
Walsh, John (University of British Columbia)
Wu, Jianhong (York University)
Yan, Ping (Public Health Agency of Canada)
Zhang, Gong Qing (Peking University)
Zhang, Pingwen (Peking University)
Zhao, Yiqiang (Carleton University)

Geometric Mechanics: Continuous and Discrete, Finite and Infinite Dimensional
August 12-17, 2007

Organizers:

Jerrold Marsden (California Institute of Technology)
Juan-Pablo Ortega (CNRS, Universite de Franche-Comte)
George Patrick (University of Saskatchewan)
Mark Roberts (University of Surrey)
Jedrzej Sniatycki (University of Calgary)
Cristina Stoica (Wilfred Laurier)

The academic scope of Geometric Mechanics is wide and interdisciplinary. Dispersed groups in Canada, the United States, and Europe, have ongoing independent collaborations. The objective of the workshop is to bring these collaborative groups together, to assist and enable their specific projects, and to encourage inter-group communication and appreciation. Another objective is to generate new projects and collaborations.
The participants for the workshop will be engaged in an ongoing collaborative work on specific, well defined projects. These projects will be interlinked, and at a rather well developed stage, when the workshop is in progress.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5068/

Participants:

Bates, Larry (University of Calgary)
Bloch, Anthony (University of Michigan)
Bou-Rabee, Nawaf (Caltech)
Buono, Luciano (University of Ontario Institute of Technology)
Chretien, Stephane (Universite de Franche Comte France)
Cushman, Richard (University of Calgary)
de León, Manuel (Instituto de Matemáticas y Física Fundamental)
Fernandes, Rui Loja (Instituto Superior Tecnico)
Gotay, Mark (University of Hawaii)
Grubits, Katalin (California Institute of Technology)
Helmuth, Tyler (University of Saskatchewan)
Hernández-Garduño, Antonio (Universidad Nacional Autonoma de Mexico)
Junge, Oliver (Munich University of Technology)
Kanso, Eva (University of Southern California)
Kirillov, Oleg (Moscow M.V. Lomonosov State University)
Krechetnikov, Rouslan (Carleton University)
Lamb, Jeroen (Imperial College London)
Lazaro, Andreu (University of Zaragoza)
Leok, Melvin (Purdue University)
Lewis, Andrew (Queens University)
Marsden, Jerrold (California Institute of Technology)
Montaldi, James (University of Manchester)
Nair, Sujit (Control and Dynamical Systems Caltech USA)
Offin, Daniel (Queen's University)
Ortega, Juan-Pablo (CNRS, Universite de Franche-Comte)
Patrick, George (University of Saskatchewan)
Plummer, Mike (University of Surrey)
Ratiu, Tudor (Ecole Polytechnique Federale de Lausanne)
Rink, Bob (Vrije Universiteit Amsterdam)
Roberts, Mark (University of Surrey)
Rodriguez-Olmos, Miguel (EPFL)
Schilder, Frank (University of Bristol)
Schmah, Tanya (Macquarie University)
Sniatycki, Jedrzej (University of Calgary)
Stern, Ari (California Institute of Technology)
Stoica, Cristina (Wilfred Laurier)
Struchiner, Ivan (UniCamp - Campinas - Brasil)
Wulff, Claudia (University of Surrey)

Operator Spaces and Group Algebras
August 19-24, 2007

Organizers:

Eberhard Kaniuth (University of Paderborn)
Anthony To-Ming Lau (University of Alberta)
Zhong-Jin Ruan (University of Illinois)

Recently, some very deep and important problems on the exactness, uniform embeddability, and Haagerup property of locally compact groups, as well as the approximation properties and QWEP (quotients of C*-algebras with weak expectation property) problems of group C*-algebras, have been stimulating in several areas of mathematics. This meeting provided an opportunity to bring the experts in the related areas together to promote this beautiful and extraordinarily rich intersection between Banach/operator algebras and locally compact groups.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5013/

Participants:

Antharaman, Claire (University of Orleans in France)
Archbold, Robert (University of Aberdeen)
Bekka, Bachir (University of Rennes France)
Blecher, David (University of Houston)
Bozejko, Marek (University of Wroclaw)
Chu, Cho-Ho (Queen Mary, University of London)
Dadarlat, Marius (Purdue University, West Lafayette, Indiana)
Dales, Harold Garth (University of Leeds)
Desaulniers, Shawn (University of Alberta)
Dykema, Ken (Texas A&M University)
Effros, Edward (University of California, Los Angeles)
Forrest, Brian (University of Waterloo)
Ghahramani, Fereidoun (University of Manitoba)
Guentner, Erik (University of Hawaii, Manoa)
Hu, Zhiguo (University of Windsor)
Ilie, Monica (Lakehead University)
Kaminker, Jerry (Univerisity of California, Davis)
Kaniuth, Eberhard (University of Paderborn)
Kirchberg, Eberhard (Humboldt University, Berlin)
Lau, Anthony To-Ming (University of Alberta)
Leinert, Michael (University of Heidelberg)
Ludwig, Jean (University of Metz)
Miao, Tianxuan (Lakehead University)
Neufang, Matthias (Carleton University)
Ozawa, Narutaka (University of Tokyo)
Paulsen, Vern (University of Houston)
Pisier, Gilles (Texas A&M University and Paris 6)
Popa, Ana-Maria (University of Illinois at Urbana-Champaign)
Ruan, Zhong-Jin (University of Illinois)
Runde, Volker (University of Alberta)
Samei, Ebrahim (Ecole Polytechnique Fédérale de Lausanne)
Sangani-Monfared, Mehdi (University of Windsor)
Smith, Roger (Texas A&M University)
Soltan, Piotr (Warsaw University)
Spronk, Nico (University of Waterloo)
Stokke, Ross (University of Winnipeg)
Turowska, Lyudmila (Chalmers University of Technology)
Ulger, Ali (Koc University)
Uygul, Faruk (University of Alberta)
Valette, Alain (Universite de Neuchatel)
Wassermann, Simon (University of Glasgow)
Zhang, Yong (University of Manitoba)

Loss of Compactness in Nonlinear PDE: Recent Trends
August 26-31, 2007

Organizers:

Pierpaolo Esposito (Universitaegli Studi Roma Tre)
Frank Pacard (Université Paris 12-val de Marne)
Gabriella Tarantello (Universita' di Roma Tor Vergata)

The conference focused on recent developments in a meaningful, active and rich research area in the study of partial differential equations. Physical phenomena can be modelled by equations involving several physical unknown quantities (depending on the model). A better understanding of these equations naturally leads to new insights in the physical models. Since the work of Ginzburg and Landau, several theories have been proposed to describe superconductivity, and other interesting models arise also in the study of biological dynamics, thermionic emission, star's evolution, gas combustion, statistical mechanics, only to quote a few. Surprisingly, similarly qualitative problems arise also in differential geometry, where the study of differential properties for surfaces dates back to Gauss. The rigorous analysis of such models leads to an existence theory and to many qualitative properties, whose profound consequences are relevant to physics, biology and geometry.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5087/

Participants:

Alama, Stanley (McMaster University)
Almaraz, Sergio (IMPA)
Davila, Juan (CMM & DIM University of Chile)
del Pino, Manuel (Universidad de Chile)
Druet, Olivier (Ecole Normale Supérieure de Lyon)
Ge, Yuxin (Université Paris XII-Val de Marne)
Ghoussoub, Nassif (BIRS)
Gladiali, Francesca (Universita' di Sassari)
Grossi, Massimo (Universita Roma I)
Li, Yan Yan (Rutgers University)
Lin, Chang-Shou (National Taiwan University)
Lucia, Marcello (Universitat zu Koln)
Malchiodi, Andrea (International School for Advanced Studies (SISSA))
Marques, Fernando Coda (IMPA)
Mazzieri, Lorenzo (Scula Normale Pisa)
Musso, Monica (Universidad Católica de Chile)
Pacard, Frank (Université Paris XII-val de Marne)
Pistoia, Angela (Universita Roma I)
Robert, Frederic (Université de Nice-Sophia Antipolis)
Sandier, Etienne (Universite Paris XII)
Shafrir, Itai (Technion-Israel Institute of Technology)
Stanczy, Robert (Uniwersytet Wroclawski)
Struwe, Michael (ETH Zentrum)
Tarantello, Gabriella (Universita' di Roma Tor Vergata)
Wei, Jun Cheng (Chinese University of Hong Kong)
Zhang, Lei (University of Florida)

Hochschild Cohomology of Algebras: Structure and Applications
September 2-7, 2007

Organizers:

Luchezar Avramov (University of Nebraska)
Ragnar-Olaf Buchweitz (University of Toronto Scarborough)
Karin Erdmann (University of Oxford)
Jean-Louis Loday (Institut de Recherche Mathématique Avancée)
Sarah Witherspoon (Texas A&M University)

No two maple leafs or snowflakes are alike, but nobody would mistake a specimen of the former for the latter. To work out what unites or differentiates structures is codified in mathematics through homological (= "look alike") theories and one of the most powerful ones is Hochschild (co-)homology, introduced more than 60 years ago but still in its infancy: current uses influence fundamental areas of research, from homological algebra, ring theory (and variations) to representations of groups, to Hilbert spaces, homotopy theory, symplectic geometry, and mathematical physics, where it is thought to represent a fundamental incarnation of the tiniest potential building blocks of nature, the "strings".

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5075/

Participants:

Avramov, Luchezar (University of Nebraska)
Benson, David (University of Aberdeen)
Bergh, Petter Andreas (NTNU)
Buchweitz, Ragnar-Olaf (University of Toronto Scarborough)
Burciu, Sebastian (Institute of Mathematics, "Simion Stoilow'' of Romanian Academy)
Burgunder, Emily (Univerite de Montpellier II)
Butler, Michael C R (University of Liverpool)
Caldararu, Andrei (University of Wisconsin, Madison)
Cibils, Claude (Université Montpellier II)
Erdmann, Karin (University of Oxford)
Eu, Ching-Hwa (Massachusetts Institute of Technology)
Farinati, Marco (Universidad de Buenos Aires)
Flenner, Hubert (University of Bochum)
Green, Ed (Virginia Tech)
Happel, Dieter (Technische Universitat, Chemnitz)
Holm, Thorsten (University of Magdeburg)
Iyengar, Srikanth (University of Nebraska, Lincoln)
Krause, Henning (Universität Paderborn)
Linckelmann, Markus (University of Aberdeen)
Lipman, Joseph (Purdue University)
Liu, Shiping (Université de Sherbrooke)
Lowen, Wendy (Vrije Universiteit Brussel/ Université Denis Diderot Paris VII)
Madsen, Dag (NTNU Trondheim)
Mastnak, Mitja (University of Waterloo)
Montarani, Silvia (Massachusetts Institute of Technology)
Neeman, Amnon (Australian National University)
Pevtsova, Julia (University of Washington)
Redondo, Maria Julia (Universidad Nacional del Sur)
Ronco, Maria (University of Valparaiso)
Saliola, Franco (Universite du Quebec a Montreal)
Schedler, Travis (University of Chicago)
Snashall, Nicole (University of Leicester)
Solberg, Oeyvind (NTNU Trondheim)
Solotar, Andrea (Universidad de Buenos Aires)
Stanley, Don (University of Regina)
Suarez-Alvarez, Mariano (Universidad de Buenos Aires)
Taillefer, Rachel (Université de St. Etienne)
Vigue-Poirrier, Micheline (Université de Paris-Nord)
Witherspoon, Sarah (Texas A&M University)
Yekutieli, Amnon (Ben Gurion University)
Zhang, James (University of Washington)

Applications of Macdonald Polynomials
September 9-14, 2007

Organizers:

Francois Bergeron (Université du Quebec a Montréal)
Jim Haglund (University of Pennsylvania)
Jeff Remmel (University of California, San Diego)

These objects are central to certain branches of theoretical mathematics and also have interpretations in statistical mechanics, a branch of physics. Macdonald introduced them in 1988 as a solution to a theoretical problem in integration, but recently much simpler expressions for them have been found. There has also been a lot of stunning progress linking them to diagonal harmonics and Cherednik Algebras, which are some of the most advanced topics at the frontier of research into algebra.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5048/

Participants:

Allen, Ed (Wake Forest University)
Assaf, Sami (University of California, Berkeley)
Bandlow, Jason (University of California, San Diego)
Bergeron, Francois (Université du Quebec a Montréal)
Bergeron, Nantel (York University)
Biagioli, Riccardo (Universite Claude Bernard Lyon I)
Can, Mahir (University of Western Ontario)
Descouens, Francois (Universite de Marne-la-Vallee)
Fishel, Susanna (Arizona State University)
Garsia, Adriano (University of California, San Diego)
Gordon, Iain (University of Edinburgh)
Haglund, Jim (University of Pennsylvania)
Hivert, Florent (University of Rouen)
Ion, Bogdan (University of Pittsburgh)
Jing, Naihuan (North Carolina State University)
Kasatani, Masahiro (Kyoto University)
Koornwinder, Tom (KdV Institute for Mathematics, University of Amsterdam)
Lam, Thomas (Harvard University)
Lapointe, Luc (Universidad de Talca)
Li, Huilan (Fields Institute)
Loehr, Nick (College of William and Mary)
Mason, Sarah (Univeristy of California, Berkeley/CRM)
Morse, Jennifer (University of Miami)
Remmel, Jeff (University of California, San Diego)
Schilling, Anne (University of California, Davis)
Schlosser, Michael (University of Vienna)
Shimozono, Mark (Virginia Tech)
Stembridge, John (University of Michigan)
Stevens, Laura (University of California, San Diego)
Stump, Christian (University of Vienna)
Suzuki, Takeshi (Okayama University)
Tevlin, Lenny (Yeshiva University)
Thiery, Nicolas M. (Univ Paris-Sud)
van Willigenburg, Steph (University of British Columbia)
Vazirani, Monica (University of California, Davis)
Woo, Alexander (University of California Davis)
Yoo, Meesue (University of Pennsylvania)
Zabrocki, Mike (York University)

Group Embeddings: Geometry and Representations
September 16-21, 2007

Organizers:

Michel Brion (Universite de Grenoble)
Stephen Doty (Loyola University Chicago)
Lex Renner (University of Western Ontario)
Ernest Vinberg (Moscow State University)

Embedding theory is an inherently interdisciplinary branch of mathematics that combines group theory, representation theory, algebraic geometry, combinatorics and topology. These forty scholars will discuss the fundamental questions of embedding theory. Embedding theory has its roots in the 19th century work of Cayley, Klein, Schubert, Cartan and Hilbert. Since then it has been infused with the more sophisticated 20th century mathematics of Chevalley, Nagata, Borel, Tits and Mumford.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5034/

Participants:

Alexeev, Valery (University of Georgia)
Andersen, Henning Haahr (Aarhus University)
Arzhantsev, Ivan (Moscow State University)
Brion, Michel (Universite de Grenoble)
Can, Mahir (University of Western Ontario)
Carrell, James (University of British Columbia)
Cupit-Foutou, Stephanie (Universitaet zu Koeln)
De Concini, Corrado (University of Rome)
Dlab, Vlastimil (Carleton University)
Donkin, Stephen (University of York)
Doty, Stephen (Loyola University Chicago)
Giaquinto, Anthony (Loyola University Chicago)
Godelle, Eddy (Universite de Caen)
Hausen, Juergen (Universitaet Tuebingen)
He, Xuhua (SUNY - Stony Brook)
Ji, Lizhen (University of Michigan)
Kato, Syu (Univeristy of Tokyo)
Kaveh, Kiumars (University of Toronto)
Kiritchenko, Valentina (Jacobs University Bremen (Germany))
Knop, Friedrich (Rutgers University)
Kujawa, Jon (University of Oklahoma)
Luna, Dominique (Fourier Institute - Grenoble)
Maffei, Andrea (Universita di Roma 1)
Mazorchuk, Volodymyr (University of Uppsala)
Mokler, Claus (Wuppertal University (BUGH))
Nakano, Daniel K. (University of Georgia)
Parker, Alison (University of Leeds)
Parshall, Brian (University of Virginia)
Putcha, Mohan (North Carolina State University)
Reichstein, Zinovy (University of British Columbia)
Renner, Lex (University of Western Ontario)
Ressayre, Nicolas (Université Montpellier II- I3M-Montpellier)
Rittatore, Alvaro (Universidad de la Republica)
Scott, Leonard (University of Virginia)
Steinberg, Benjamin (Carleton University)
Tchoudjem, Alexis (Université Lyon I)
Therkelsen, Ryan (North Carolina State University)
Timashev, Dmitri (Moscow State University)
Uma, V. (Indian Institute of Technology, Madras)

Trends in Applied Harmonic Analysis
September 23-28, 2007

Organizers:

Tony Chan (National Science Foundation)
Charles Chui (Stanford University)
Rong-Qing Jia (University of Alberta)

The past two decades have witnessed perhaps the most fascinating evolution of a popular traditional field in Mathematics, called Harmonic Analysis, in the modern history. The two exciting innovative research areas, called Wavelets Analysis and Mathematics ofImage Science, introduced only two decades ago, constitute the primary factor of this evolution, with significant involvement of another traditional research field, called Approximation Theory.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5022/

Participants:

Bittner, Kai (Ulm University)
Bresson, Xavier (University of California Los Angeles)
Cassidy, Ryan James (Stanford University)
Chang, Qianshun (University of Alberta)
Charina, Maria (University of Dortmund)
Chui, Charles (Stanford University)
Darbon, Jerome (University of California Los Angeles)
Dubuc, Serge (Universite de Montreal)
Dupuis, Catherine (University of Michigan)
Geronimo, Jeffrey (Georgia Institute of Technology)
Han, Bin (University of Alberta)
He, Wenjie (University of Missouri, St. Louis)
Hong, Don (Middle Tennessee State University)
Jia, Rong-Qing (University of Alberta)
Kutyniok, Gitta (Princeton University)
Lai, Ming-jun (University of Georgia)
Lee, Seng-Luan (National University of Singapore)
Li, Song (Zhejiang University)
Lian, Jian-ao (Prairie View A&M University)
Lucier, Bradley (Purdue University)
Maggioni, Mauro (Duke University)
Mhaskar, Hrushikesh (California State University)
Plonka, Gerlind (Universitaet Duisburg-Essen)
Prestin, Juergen (University of Luebeck)
Riemenschneider, Sherman (West Virginia University)
Shen, Zuowei (National University of Singapore)
Shen, Lixin (Syracuse University)
Stoeckler, Joachim (Universitaet Dortmund)
Sun, Qiyu (University of Central Florida)
Tai, Xue-Cheng (University of Bergen)
Wang, Jianzhong (Sam Houston State University)
Wang, Yang (Michigan State University)
Xu, Yuesheng (Syracuse University)
Yilmaz, Ozgur (University of British Columbia)
Zhao, Wei (University of Alberta)
Zhao, Hanqing (University of Alberta)
Zhou, Ding-Xuan (City University of Hong Kong)
Zhou, Haomin (Georgia Tech)
Zhuang, Xiaosheng (University of Alberta)

Entropy of Hidden Markov Processes and Connections to Dynamical Systems
September 30-October 5, 2007

Organizers:

Brian Marcus (University of British Columbia)
Karl Petersen (University of North Carolina)
Tsachy Weissman (Stanford University)

Hidden Markov Processes (HMP's) are models of a variety of phenomena observed in the presence of noise. These range from speech and optical character recognition, through target tracking, to biomolecular sequence analysis. These processes are also of great interest in error control coding for noisy communication channels and data recording systems. One fundamental problem is computation of the entropy of an HMP. The entropy is a measure of randomness or complexity of the process and expresses the degree to which the process can be compressed without losing information. While there is no known formula for the exact value of the entropy, there are good approximations.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5103/

Participants:

Anantharam, Venkat (University of California, Berkeley)
Bailey Frick, Sarah (Ohio State University)
Boyle, Mike (University of Maryland)
Cuff, Paul (Stanford University)
Glynn, Peter (Stanford University)
Guo, Donging (Northwestern University)
Han, Guangyue (University of Hong Kong)
Jacquet, Philippe (Institut National de Recherche en Informatique et Automatique)
Juang, Fred (Georgia Tech)
Kavcic, Alek (University of Hawaii)
Luo, Jun (Northwestern University)
Marcus, Brian (University of British Columbia)
Montanari, Andrea (Stanford University)
Moon, Taesup (Stanford)
Ordentlich, Erik (HP Labs)
Pavlov, Ronnie (University of British Columbia)
Peres, Yuval (Microsoft Research)
Petersen, Karl (University of North Carolina)
Pfister, Henry (Texas A&M University)
Pollicott, Mark (University of Warwick)
Quas, Anthony (University of Victoria)
Shin, Sujin (Korea Advanced Institute of Science and Technology)
Slomczynski, Wojciech (Jagiellonian University)
Szpankowski, Wojciech (Purdue University)
Ugalde, Edgardo (Universida Autonóma de San Luis Potosí)
Verbitskyi, Evgeny (Phillips Research Eindhoven)
Vontobel, Pascal (Hewlett-Packard Laboratories)
Weissman, Tsachy (Stanford University)
Williams, Susan (University of South Alabama)
Yayama, Yuki (University of North Carolina, Chapel Hill)
Zuk, Or (Weizmann Institute)

Recent Progress on Nonlinear Elliptic and Parabolic Problems and Related Abstract Methods
October 7-12, 2007

Organizers:

E. Norman Dancer (University of Sydney)
Yihong Du (University of New England)
Konstantin Mischaikow (Rutgers University)
Peter Polacik (University of Minnesota)
Xiaoqiang Zhao (Memorial University of Newfoundland)

Topics covered by this high profile workshop included partial differential equations arising from mathematical biology, chemical reaction theory, material science, water waves, and related abstract methods. The workshop focused on a selection of the most important features of the solutions to these equations, such as spatial and temporal patterns, sharp layers and spikes, blow-up, traveling waves, and the relevant techniques involved in finding these solutions. Rapid progress in research on these problems requires timely dissemination of the most recent research ideas and techniques, and the facilities and atmosphere provided at BIRS are ideal for such a purpose.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5004/

Participants:

Allegretto, Walter (University of Alberta)
Bartsch, Thomas (University of Giessen)
Bates, Peter (Michigan State University)
Berestycki, Henri (EHESS)
Dancer, E. Norman (University of Sydney)
Daners, Daniel (University of Sydney)
Du, Yihong (University of New England)
Fila, Marek (Comenius University)
Ghoussoub, Nassif (Banff International Research Station)
Grossi, Massimo (Universita Roma I)
Gui, Changfeng (University of Connecticut)
Hamel, Francois (Université Aix-Marseille III)
Hilhorst, Danielle (CNRS and Universite Paris-Sud)
Hillen, Thomas (University of Alberta)
Hur, Vera Mikyoung (Massachusetts Institute of Technology)
Jiang, Meiyue (Peking University)
Li, Congming (University of Colorado at Boulder)
Lou, Yuan (Ohio State University)
Matano, Hiroshi (University of Tokyo)
Mawhin, Jean (Université Catholique de Louvain)
Mischaikow, Konstantin (Rutgers University)
Moameni, Abbas (Queen's University)
Polacik, Peter (University of Minnesota)
Quittner, Pavol (Comenius University)
Rabinowitz, Paul (University of Wisconsin, Madison)
Shen, Wenxian (Auburn University)
Smith, Hal (Arizona State University)
Stuart, Charles (Swiss Federal Institute of Technology)
Terracini, Susanna (Università di Milano - Bicocca)
Vazquez, Juan Luis (Universidad Autonoma de Madrid (Spain))
Wei, Jun Cheng (Chinese University of Hong Kong)
Weth, Tobias (University of Giessen)
Yanagida, Eiji (Tohoku University)
Zhao, Xiaoqiang (Memorial University of Newfoundland)
Zlatos, Andrej (University of Chicago)

Infinite Graphs
October 14-19, 2007

Organizers:

Reinhard Diestel (University of Hamburg)
Gena Hahn (University of Montreal)
Bojan Mohar (Simon Fraser University)
Paul Seymour (Princeton University)
Robin Thomas (Georgia Institute of Technology)

Understanding the infinite in general and infinite graphs in particular, allows us to find structure and to discover order and beauty where at first sight only chaos reigns, even in some very down-to-earth finite problems. This workshop focused on infinite graphs both an object of study in their own right and in connection with related areas of mathematics, such as combinatorial and geometric group theory, general and algebraic topology, or model and set theory. There will be three featured series of talks, by R.Aharoni on infinite matching theory, by R.Diestel on graphs with ends from a topological perspective, and by L.Soukup on infinite combinatorial aspects of graphs.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w07w5117/

Participants:

Aharoni, Ron (Technion)
Berger, Eli (Haifa University)
Bruhn, Henning (Universität Hamburg)
Christian, Robin (University of Waterloo)
Delhomme, Christian (Univ Reunion (Maths))
DeVos, Matt (Simon Fraser University)
Diestel, Reinhard (University of Hamburg)
Erdos, Peter (Renyi Institute, Hungary)
Georgakopoulos, Agelos (Hamburg University)
Gray, Robert (Leeds (UK))
Hahn, Gena (University of Montreal)
Ille, Pierre (Institut de Mathématiques de Luminy)
Jung, Heinz A. (Technical University Berlin)
Kierstead, Hal (Arizona State University)
Komjath, Peter (Eotvos University)
Kroen, Bernhard (University of Hamburg)
Laviolette, Francois (Laval University)
Lehnert, Jorg (Goethe Universitat, Frankfurt)
Mohar, Bojan (Simon Fraser University)
Pikhurko, Oleg (Carnegie Mellon University)
Pouzet, Maurice (University Claude-Bernard, Lyon I)
Richter, Bruce (University of Waterloo)
Samal, Robert (Simon Fraser University)
Sauer, Norbert (University of Calgary)
Seifter, Norbert (University of Leoben)
Soukup, Lajos (Alfred Renyi Institute of Mathematics)
Sprussel, Philipp (Hamburg University)
Stein, Maya (Universidade de São Paulo)
Teufl, Elmar (University of Bielefeld)
Timar, Adam (University of British Columbia)
van der Holst, H. (University of Eindhoven)
Watkins, Mark E. (Syracuse University)
Wojciechowski, Jerzy (West Virginia University)
Woodrow, Robert (University of Calgary)
Yu, Xingxing (Georgia Institute of Technology)

Low-dimensional Topology and Number Theory
October 21-26, 2007

Organizers:

David Boyd (University of British Columbia)
Paul Gunnells (University of Massachusetts, Amherst)
Walter Neumann (Columbia University)
Adam Sikora (State University of New York, Buffalo)

The goal of the workshop is to bring together topologists and number theorists with the intent of exploring the above connections between low-dimensional topology and number theory. The emphasis was on interaction between these two groups of researchers, with the hopes of engendering cross-fertilization and new and unusual collaborations. All of the participants are either active in these areas or have professed interest in them. The large areas of overlap among the topics above and the research interests of the participants means that the intimate setting of Banff is ideal for such a workshop. Most of these connections between number theory and topology are recent, and to date there has never been a meeting devoted to exploring all of them. Bringing together a group of researchers in these areas will likely lead to significant breakthroughs in current research programs, and may also uncover new connections between these fields.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5052/

Participants:

Akbary, Amir (University of Lethbridge)
Akhtari, Shabnam (University of British Columbia)
Boston, Nigel (University of Wisconsin)
Calegari, Frank (Northwestern University)
Champanerkar, Abhijit (University of South Alabama)
Chinburg, Ted (University of Pennsylvania)
Culler, Marc (University of Illinois, Chicago)
Cunningham, Clifton (University of Calgary)
Gukov, Sergei (California Institute of Technology)
Gunnells, Paul (University of Massachusetts Amherst)
Hajir, Farshid (University of Massachussets)
Hironaka, Eriko (Florida State University)
Kofman, Ilya (College of Staten Island, CUNY)
Kooistra, Remkes (University of Alberta)
Lalin, Matilde (University of British Columbia / SFU)
Le, Thang (Georgia Institute of Technology)
Lewis, James (University of Alberta)
Macasieb, Melissa (University of British Columbia)
Mattman, Thomas (California State University, Chico)
Morishita, Masanori (Kyushu University)
Neumann, Walter (Columbia University)
Petersen, Kathleen (Queen's University)
Reid, Alan (University of Texas, Austin)
Rodriguez Villegas, Fernando (University of Texas, Austin)
Rogers, Mathew (University of British Columbia)
Sikora, Adam (State University of New York-Buffalo)
Silver, Daniel (University of South Alabama)
Sinclair, Christopher (University of Colorado at Boulder)
Thurston, Dylan (Barnard College, Columbia University)
Trifkovic, Mak (University of Victoria/Fordham)
Williams, Susan (University of South Alabama)
Zagier, Don (Max Planck Institute for Mathematics)
Zickert, Christian (Columbia University)

International Workshop on Robust Statistics and R
October 28-November 2, 2007

Organizers:

Claudio Agostinelli (Universita' Ca' Foscari, Venezia, Italy)
Peter Filzmoser (Vienna University of Technology)
Matias Salibian-Barrera (University of British Columbia)
Arnold Stromberg (Department of Statistics, University of Kentucky)

Robust Statistics studies methods to model and extract reliable information from data, even when these data deviate slightly from the assumed model. The main objective of this workshop was to provide modern tools to disseminate new and exciting developments in Robust Statistics by incorporating them into the powerful and versatile R computer package.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5064/

Participants:

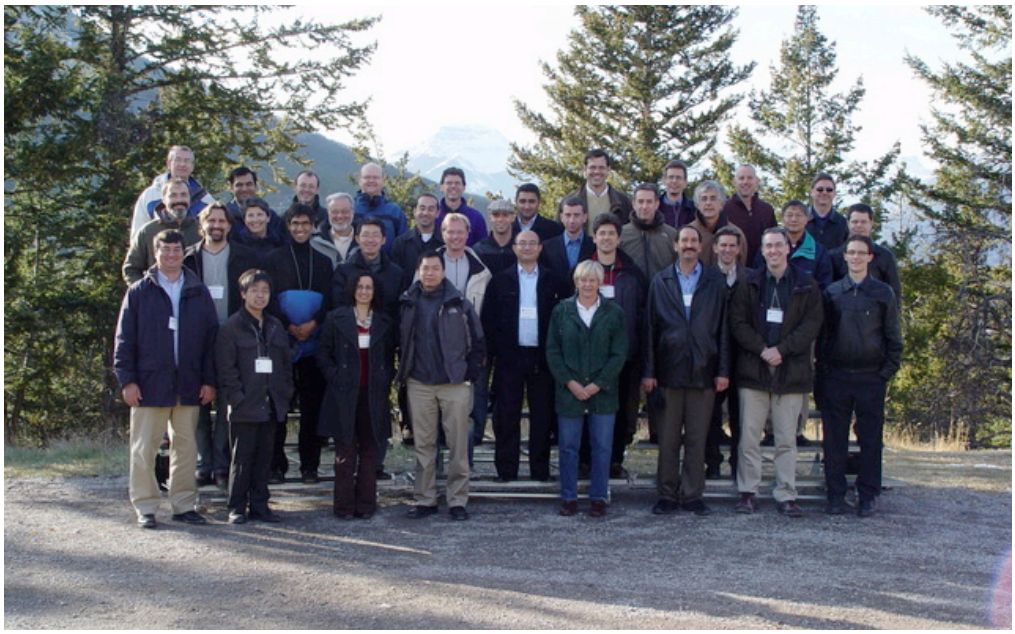
Agostinelli, Claudio (Universita' Ca' Foscari, Venezia, Italy)
Boudt, Kris (Katholieke Universiteit Leuven - Belgium)
Croux, Christophe (Katholieke Universiteit Leuven)
Dehon, Catherine (Universite Libre de Bruxelles)
Dutter, Rudolf (Vienna University of Technology)
Field, Chris (Dalhousie University)
Filzmoser, Peter (Vienna University of Technology)
Fried, Roland (Dortmund University)
Fritz, Heinrich (Vienna University of Technology)
Garcia-Escudero, Luis Angel (Universidad de Valladolid)
Gather, Ursula (Dortmund University)
Genton, Marc (University of Geneva)
Harrington, Justin (University of British Columbia)
Hennig, Christian (University College London)
Koenker, Roger (University of Illinois at Urbana-Champaign)
Konis, Kjell (University of Oxford)
Kovac, Arne (University of Bristol)
Lin, Guixian (University of Illinois at Urbana-Champaign)
Maechler, Martin (ETH Zurich)
Marazzi, Alfio (University of Lausanne)
Maronna, Ricardo (University of La Plata)
Mizera, Ivan (University of Alberta)
Ruckdeschel, Peter (University of Bayreuth)
Ruckstuhl, Andreas (Zurich University of Applied Sciences at Winterthur)
Salibian-Barrera, Matias (University of British Columbia)
Sirkiä, Seija (University of Jyväskylä)
Spangl, Bernhard (University of Natural Resources and Applied Life Sciences Vienna)
Templ, Matthias (Vienna University of Technology)
Todorov, Valentin (United Nations Industrial Development Organization (UNIDO))
Tyler, David (Rutgers University)
Van Aelst, Stefan (Ghent University)
Verbeke, Tobias (Business & Decision Benelux - Belgium)
Wei, Ying (Columbia University)
Welsch, Roy (Massachusetts Institute of Technology)
Willems, Gert (Ghent University)

Mathematical Methods for Medical Image Analysis
November 4-9, 2007

Organizers:

Rafeef Abugharbieh (University of British Columbia)

Ghassan Hamarneh (Simon Fraser University, Medical Image Analysis Lab)



This workshop focused on the latest in mathematical methods for solving problems in medical imaging including segmentation, registration, shape modeling and analysis in a multitude of imaging modalities including structural and functional data. Biomedical imaging is revolutionizing medicine in our modern society and the impact of novel computational multi-dimensional data analysis methods on enhancing healthcare is enormous where applications in clinical and biomedical settings are far reaching and include computer aided-diagnosis and intervention, therapy evaluation, monitoring and quantification of disease progression, among many others.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5115/

Participants:

Abolmaesumi, Purang (Queens University)
Abugharbieh, Rafeef (University of British Columbia)
Archip, Neculai (Harvard Medical School)
Atkins, Stella (Simon Fraser University)
Beg, Mirza Faisal (Simon Fraser University)
Boykov, Yuri (University of Western Ontario)
Celler, Anna (University of British Columbia/Vancouver Coastal Health Research Institute)
Christensen, Gary (University of Iowa)
Cootes, Tim (University of Manchester)
Ellis, Randy (Queen's University)
Flores-Mangas, Fernando (University of Toronto)
Hamarneh, Ghassan (Simon Fraser University, Medical Image Analysis Lab)
Huang, Albert (University of British Columbia)
Larsen, Rasmus (Technical University of Denmark)
Lee, Tim (BC Cancer Agency)
Lenglet, Christophe (Siemens Corporate Research Inc.)
Lorenz, Cristian (Philips-Germany)
McIntosh, Chris (Simon Fraser University)
McKeown, Martin (University of British Columbia)
Miller, Michael (John Hopkins University)
Möller, Torsten (Simon Fraser University)
Ng, Bernard (University of British Columbia)
Pizer, Stephen (University of North Carolina, Chapel Hill)
Rohling, Robert (University of British Columbia)
Rueckert, Daniel (Imperial College)
Salcudean, Tim (University of British Columbia)
Siddiqi, Kaleem (McGill University)
Sonka, Milan (University of Iowa)
Sossi, Vesna (University of British Columbia)
Staib, Lawrence (Yale University)
Styner, Martin (University of North Carolina, Chapel Hill)
Tam, Roger (Faculty of Medicine at UBC)
Ward, Aaron (Simon Fraser University)
Warfield, Simon (Children's Hospital Boston)
Westin, Carl-Fredrik (Harvard Medical School)
Whitaker, Ross T. (University of Utah)
Worsley, Keith (McGill University)

Modern Approaches in Asymptotics of Polynomials
November 11-16, 2007

Organizers:

Peter Borwein (Simon Fraser University)

Doron Lubinsky (Georgia Institute of Technology)
Ed Saff (Vanderbilt University)

This workshop focused on recent advances in investigating how polynomials behave as their degree grows to infinity. Potential theory, Riemann-Hilbert methods, and operator theory have fundamentally changed the way this topic is investigated. There are many applications: to number theory, mathematical physics, and the approximation of functions. One particularly important connection is to the theory of random matrices, which are arrays of random numbers. Random matrices play a key role in statistical physics, and are even connected to the Riemann Hypothesis, the most famous unsolved problem in mathematics.
For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5032/

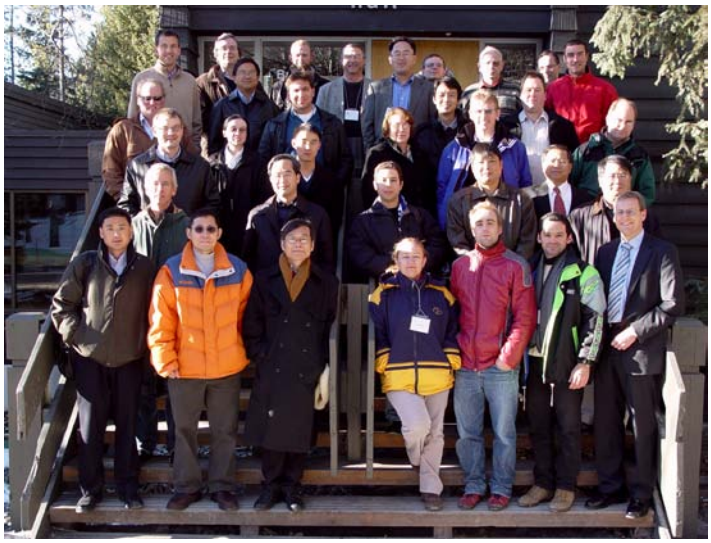
Participants:

Baik, Jinho (University of Michigan)
Baratchart, Laurent (INRIA-Sophia-Antipolis)
Benko, David (Western Kentucky University)
Blatt, Hans-Peter (Katholieke Universitate Eichstatt)
Borodachov, Sergiy (Georgia Institute of Technology)
Borwein, Peter (Simon Fraser University)
Choi, Stephen (Simon Fraser University)
Deift, Percy (Courant Institute of Mathematical Sciences)
Dilcher, Karl (Dalhousie University)
Ditzian, Zeev (University of Alberta)
Dragnev, Peter (Indiana-Purdue)
Erdelyi, Tamas (Texas A&M University)
Geronimo, Jeffrey (Georgia Institute of Technology)
Hardin, Doug (Vanderbilt University)
Killip, Rowan (University of California, Los Angeles)
Kriecherbauer, Thomas (Ruhr University Bochum)
Kroo, Andras (Alfred Renyi Institute of Mathematics)
Kuijlaars, Arno (Katholieke Universiteit Leuven)
Levin, Eli (Open University of Israel)
Li, Xin (Uinversity of Central Florida)
Lopez Lagomasino, Guillermo (Universidad Carlos III de Madrid)
Lubinsky, Doron (Georgia Institute of Technology)
Marcellan, Francisco (Universidad carlos III de Madrid)
Martinez-Finkelshtein, Andrei (University of Almeria)
McLaughlin, Ken (University of Arizona)
Mhaskar, Hrushikesh (California State University)
Miller, Peter (University of Michigan)
Mina Diaz, Erwin (Indiana-Purdue University at Fort Wayne)
Montgomery, Hugh (University of Michigan)
Nenciu, Irina (Courant Institute, NYU)
Peherstorfer, Franz (Universität Linz)
Pritsker, Igor (Oklahoma State University)
Prokhorov, Vasiliy (University of South Alabama)
Ransford, Thomas (Laval University)
Saff, Ed (Vanderbilt University)
Sidi, Avram (Technion-Israel Institute of Technology)
Simon, Barry (California Institute of Technology)
Stahl, Herbert (Technische Fachhochschule Berlin)
Stefansson, Ulfar (Georgia Tech)
Totik, Vilmos (University of Szeged and University of South Florida)
Yattselev, Maxim (Vanderbilt University)
Zhou, Ping (St. Francis Xavier University)

Physics-Based Mathematical Models of Low-Dimensional Semiconductor Nanostructures: Analysis and Computation November 18-23, 2007

Organizers:

Lok Lew Yan Voon (Wright State University)
Roderick Melnik (Wilfrid Laurier University)
Morten Willatzen (University of Southern Denmark)



Nanotechnology is the study and application of phenomena at or below the dimensions of 100 nm and has received a lot of public attention following popular accounts such as in the bestselling book by Michael Crichton, Prey. It is an area where fundamental questions of applied mathematics and mathematical physics, design of computational methodologies, physical insight and experimental techniques are meeting together in a quest for an adequate description of nanomaterials and nanostructures for applications in optoelectronics, medicine, energy-saving, bio- and other key technologies which will profoundly influence our life in the 21 century and beyond. There are already hundreds of applications in daily life such as in cosmetics and the hard drives in MP3 players (the 2007 Nobel prize in physics was recently awarded for the science that allowed the miniaturization of the drives), delivering drugs, high-definition DVD players and stain-resistant clothing, but with thousands more anticipated. The focus of this interdisciplinary workshop was on determining what kind of new theoretical and computational tools needed to advance the science and engineering of nanomaterials and nanostructures.
For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5057/

Participants:

Arakawa, Yasuhiko (University of Tokyo)
Austing, David (National Research Council of Canada)
Barettin, Daniele (Syddansk University)
Birner, Stefan (Walter Schottky Institute/Technical University of Munich)
Brown, Gail (Materials Lab/Air Force Research Lab at Wright-Patterson AFB)
Caflisch, Russel (University of California at Los Angeles)
Chrzan, Daryl (University of California at Berkeley)
Chuang, Shun Lien (University of Illinois at Urbana-Champaign)
Clarke, Edmund (Imperial College London)
Guo, Hong (McGill University)
Houmark, Jakob (Technical University of Denmark)
Huang, Hanchen (Rensselaer Polytechnic Institute)
Jauho, Antti-Pekka (Technical University of Denmark)
Johnson, Harley (University of Illinois at Urbana-Champaign)
Klimeck, Gerhard (Purdue University)
Korkusinski, Marek (National Research Council of Canada)
Kyriakidis, Jordan (Dalhousie University)
Lassen, Benny (Syddansk University)
Lew, Adrian (Stanford University)
Lew Yan Voon, Lok (Wright State University)
Li, Shaofan (University of California, Berkeley)
Melnik, Roderick (Wilfrid Laurier University)
Neophytou, Neophytos (Purdue University)
Niu, Xiaobin (University of California at Los Angeles)
O'Reilly, Eoin (Tyndall National Institute)
Park, Harold (University of Colorado)
Pedesseau, Laurent (L'INSA de Rennes - France)
Roy Mahapatra, Debiprosad (Indian Institute of Science)
Schirmer, Sonia (University of Cambridge)
Uskov, Alexander (Lebedev Physical Institute)
Vasileska, Dragica (Arizona State University)
Voss, Frands (Syddansk University)
Wang, Lin-Wang (Lawrence Berkeley National Laboratory)
Willatzen, Morten (University of Southern Denmark)
Zhang, Yong (NREL of the U.S. Department of Energy)
Zhou, Min (Georgia Tech)

Discontinuous Galerkin Methods for Partial Differential Equations November 25-30, 2007

Organizers:

Bernardo Cockburn (University of Minnesota),
Dominik Schoetzau (University of British Columbia)
Chi-Wang Shu (Brown University)

Numerical Analysis and Scientific Computation are the branch of Mathematics that is studying and developing computer methods for simulating complex phenomena in the Natural Sciences and Engineering. The discontinuous Galerkin method is one of those simulation methods. Originally devised in 1973, it experienced a significant development during the nineties which brought it to the mainstream of Computational Mathematics. Nowadays, it is being successfully used in applications as diverse as meteorology, weather-forecasting, oceanography, gas dynamics, aeroacoustics, turbomachinery, turbulent flows, granular flows, oil recovery simulation, modeling of shallow water, transport of contaminant in porous media, viscoelastic flows, semiconductor device simulation, magneto-hydrodynamics, and electro-magnetism, among many others.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5506

Participants:

Antonietti, Paola F (University of Notthingham)
Ayuso, Blanca (Universidad de Autonoma de Madrid)
Brenner, Susanne (Louisiana State University)
Celiker, Fatih (Wayne State University)
Chen, Yanlai (Brown University)
Cheng, Yingda (University of Texas at Austin)
Cockburn, Bernardo (University of Minnesota)
Dawson, Clint (University of Texas at Austin)
Djoumna, Georges (Universite Laval)
Dong, Bo (Brown University)
Gopalakrishnan, Jay (University of Florida)
Grote, Marcus (University of Basel)
Guzman, Johnny (University of Minnesota)
Hesthaven, Jan (Brown University)
Kanschat, Guido (Texas A&M University)
Li, Fengyan (Rensselaer Polytechnic Institute)
Peraire, Jaime (MIT)
Persson, Per-Olof (MIT)
Riviere, Beatrice (University of Pittsburgh)
Ryan, Jennifer (Virginia Tech)
Schoetzau, Dominik (University of British Columbia)
Sherwin, Spencer (Imperial College London)
Shu, Chi-Wang (Brown University)
Van der Vegt, Jaap (University of Twente)
Wang, Wei (Brown University)
Warburton, Timothy (Rice University)
Wei, Xiaoxi (University of British Columbia)
Wheeler, Mary (University of Texas at Austin)
Wihler, Thomas (McGill University)
Xu, Yan (University of Science and Technology of China)
Zhang, Yongtao (University of Notre Dame)
Zhang, Zhimin (Wayne State University)
Zhu, Liang (University of British Columbia)

First Nations Math Education I
December 2-4, 2007

Organizers:

Melania Alvarez (Pacific Institute for the Mathematical Sciences)
Genevieve Fox (First Nations Adult and Higher Education Consortium)
Sharon Friesen (Galileo Educational Network)
Joanne Nakonechny (Director Science Centre for Learning and Teaching)

The main goal of this workshop was to create lessons that could be used in the current mathematics curriculum which would reflect Aboriginal knowledge. Teachers learnt more mathematics through these math enrichment workshops and became more in-tune with Aboriginal cultures and traditional ways of knowledge and learning. They will be able to implement lessons in the classrooms where all children, not just Aboriginal children, can see how mathematics is used and developed, as a part of Aboriginal cultures as well. Aboriginal children will see themselves and their culture reflected in the curriculum. Math, as one of the main subjects, could be a powerful way to initiate changes in the curriculum across the provinces, where Aboriginal culture has been overlooked. The First Nations Elders can see the mathematics in their teachings and activities, and to use the new knowledge to pass onto the next generation. Mathematicians can hopefully have new insights in their own research from new ways of looking at development of mathematics. Teachers, Elders and Mathematicians benefitted from this workshop.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5504/

Participants:

Alvarez, Melania (Pacific Institute for the Mathematical Sciences)
Archibald, Tom (Mathematics, SFU)
Blood, Narcisse (Elder Kainai Nation)
Breaker, Audrey (Siksika Nation)
Brimacombe, Ryan (Saskatoon Public Schools)
Clark, Amelia (Old Sun Community College on the Siksika Reserve)
CrowChief, Rayond (First Nation Elder)
Crowshoe, Lisa (Teacher)
Cussigh, Johanna (St. Benedict School, Alberta)
Davis, Garry (Evan Hardy Collegiate)
DeForge, Kevin (Calgary)
Dogniez, Cort (Saskatoon Public Schools)
Doolittle, Edward (University of Regina)
Edney, Janne (Galileo (calgary))
Fox, Genevieve (First Nations Adult and Higher Education Consortium)
Fox, Marvin (First Nation Elder)
Friesen, Sharon (Galileo Educational Network)
Guy, Richard (University of Calgary)
Helton, Deana (Calgary Catholic School Board)
Hughes, Chris (Oilfields High School)
Kastner, Bernice (Simon Fraser University)
Kershaw, Michelle (Glendale Elementary School)
Krauss, Angela (St. Benedict School, Alberta)
Lagu, Indy (Mount Royal College)
Leeming, David (University of Victoria)
MacLean, Mark (University of British Columbia)
Martin, Judy (University of Calgary)
Martin, Barb (Galileo Educational Network)
McDougall, Mary Ruth (First Nation Elder)
McGovern, Tara (St. Benedict School (Calgary Catholic))
McLeod, Dana (Saskatoon Public School Board)
Megginson, Robert (University of Michigan)
Mountain Horse, Alvine (Kainai Nation)
Nakonechny, Joanne (Director, Science Centre for Learning and Teaching)
Russell, Caroline (Tatsikiisaapo'p Middle School)
Singer, Sandra (Kainai board of Education)
Steinhauer, Vince (First Nation Elder)
Tootosis, Joyce M. (First Nation Elder)
Weston, Harley (University of Regina)
Wingert, Shane (Bedford Road Collegiate)

First Nations Math Education II
December 4-7, 2007

Organizers:

Melania Alvarez (Pacific Institute for the Mathematical Sciences)
Genevieve Fox (First Nations Adult and Higher Education Consortium)
Sharon Friesen (Galileo Educational Network)
Joanne Nakonechny (Director Science Centre for Learning and Teaching)

The main goal of this workshop was to create lessons that could be used in the current mathematics curriculum which would reflect Aboriginal knowledge. Teachers learnt more mathematics through these math enrichment workshops and became more in-tune with Aboriginal cultures and traditional ways of knowledge and learning. They are now able to implement lessons in the classrooms where all children, not just Aboriginal children, can see how mathematics is used and developed, as a part of Aboriginal cultures as well. Aboriginal children will see themselves and their culture reflected in the curriculum. Math, as one of the main subjects, could be a powerful way to initiate changes in the curriculum across the provinces, where Aboriginal culture has been overlooked. The First Nations Elders can see the mathematics in their teachings and activities, and to use the new knowledge to pass onto the next generation. Mathematicians can hopefully have new insights in their own research from new ways of looking at development of mathematics. Teachers, Elders and Mathematicians benefitted from this workshop.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5507/

Participants:

Alvarez, Melania (Pacific Institute for the Mathematical Sciences)
Archibald, Tom (Mathematics, SFU)
Barrett, Liz (JUMP Math BC)
Blood, Narcisse (Elder Kainai Nation)
Brauer, Susan (Pacific Institute for the Mathematical Sciences)
Breaker, Edith (Siksika Nation High School)
BruisedHead, Annette (Kainai High School)
Buffalo, Kevin (Montana First Nation School- /Mes-kanahk Ka Nipa Wit/)
Campbell, Stephen (Simon Fraser University)
Chief Calf, Mary (Aahsaopi Elementary School)
CrowChief, Rayond (First Nation Elder)
Doolittle, Edward (University of Regina)
Elser, Rhonda (Calgary Catholic Separate School District)
Ferraby, Jacqui (University of British Columbia)
Fox, Genevieve (First Nations Adult and Higher Education Consortium)
Fox, Marvin (First Nation Elder)
Francis-Poscente, Krista (University of Calgary)
Friesen, Sharon (Galileo Educational Network)
Gladstone, Brenda (Galileo Educational Network)
Guy, Richard (University of Calgary)
Kastner, Bernice (Simon Fraser University)
Lagu, Indy (Mount Royal College)
Leeming, David (University of Victoria)
MacLean, Mark (University of British Columbia)
McDougall, Mary Ruth (First Nation Elder)
Megginson, Robert (University of Michigan)
Miller, Glory (St. Benedict School)
Moir, Mila (St. Benedict School)
Morven, Herbert (School District #92)
Mountain Horse, Alvine (Kainai Nation)
Nakonechny, Joanne (Director Science Centre for Learning and Teaching)
Russell, Caroline (Tatsikiisaapo'p Middle School)
Saar, Candace (University of Calgary)
Singer, Sandra (Kainai board of Education)
Spring Chief, Mary Anne (Teacher Siksika Alberta)
Steinhauer, Vince (First Nation Elder)
Stewart, Carey (School District No.92 (Nisga'a))
Thompson, Paula (Yukon Education)
Tootosis, Joyce M. (First Nation Elder)
Vistor, Sherry (Teacher Alberta)
Weston, Harley (University of Regina)
Wilson, Sharlena (School Disrict 92 (Nisga'a))

Minimal Submanifolds and Related Problems
December 9-14, 2007

Organizers:

Jingyi Chen (University of British Columbia)
Ailana Fraser (University of British Columbia)
Richard Schoen (Stanford University)
Yu Yuan (University of Washington)

This workshop focused on recent developments on minimal surfaces in 3-dimensional space and minimal submanifolds of high co-dimension such as special Lagrangian submanifolds, more general calibrated submanifolds, and J-holomorphic curves. It also included applications in general relativity and string theory. For instance, in relativity there is interest in dynamical horizons which are 3-dimensional spacelike hypersurfaces foliated by apparent horizons in a slicing of a spacetime. Apparent horizons are minimal 2-spheres in some cases, but usually solutions of a prescribed mean curvature equation of a particular type. There is also interest in higher dimensional black holes which is related to string theory. In recent years, progress has been made on the high co-dimension minimal submanifold theory. Calibrated geometry, a subfield of minimal submanifolds, also witnessed a new wave of insights. Naturally the progress found many applications to the related "physical" fields. The partial differential equations which govern calibrated minimal submanifolds, such as the special Lagrangian equations, are usually fully nonlinear ones. It is important to understand properties of these equations, so the workshop will have a substantial component in nonlinear PDE.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w5059/

Participants:

Arezzo, Claudio (University of Parma)
Bandara, Menaka Lashitha (Monash University)
Bernstein, Jacob (Massachusetts Institute of Technology)
Butscher, Adrian (University of Toronto, Scarborough)
Chen, Jingyi (University of British Columbia)
Choe, Jaigyoung (KIAS)
Clarke, Andrew (State University of New York, Stony Brook)
Colding, Tobias (University of Massachusetts)
Corvino, Justin (Lafayette College)
Eichmair, Michael (Stanford University)
Fraser, Ailana (University of British Columbia)
Galloway, Greg (University of Miami)
Guan, Bo (Ohio State University)
Guan, Pengfei (McGill University)
He, Weiyong (University of British Columbia)
Hoffman, David (Stanford University)
Ionel, Marianty (University of Toledo)
Kapouleas, Nicolaos (Brown University)
Karigiannis, Spiro (University of Oxford)
Lee, Dan (Duke University)
Lee, Yng-Ing (National Taiwan University)
Li, Jiayu (The Abdus Salem International Centre for Theoretical Physics)
Meeks, William (University of Massachusetts)
Micallef, Mario (University of Warwick)
Moore, Doug (University of California, Santa Barbara)
Noronha, M. Helena (California State University Northridge)
Rosales, Leobardo (University of British Columbia)
Schoen, Richard (Stanford University)
Spruck, Joel (Johns Hopkins University)
Tian, Gang (Princeton University)
Wang, Lu (Massachusetts Institute of Technology)
Warren, Micah (University of Washington)
Wolfson, Jon (Michigan State University)
Xin, Yuanlong (Fudan University)
Yuan, Yu (University of Washington)

Banff International Research Station

2007

2-Day Workshops

Third Northwest Functional Analysis Symposium
March 30- April 1, 2007

Organizers:

Berndt Brenken (University of Calgary)
Juliana Erlijman (University of Regina)
Alexander Litvak (University of Alberta)
John Phillips (University of Victoria)

We proposed a two-day meeting in which we had eight forty-minute talks, with plenty of time for informal discussion. Our choice of speakers emphasized young faculty, post-doctoral fellows, visitors to the area and any particularly "hot" topic.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2136/

Participants:

Al-Ahmari, Abdullah (University of Regina)
Argerami, Martin (University of Regina)
Bezdek, Karoly (University of Calgary)
Binding, Paul (University of Calgary)
Bose, Chris (University of Victoria)
Brenken, Berndt (University of Calgary)
Desaulniers, Shawn (University of Alberta)
Emerson, Heath (University of Victoria)
Erlijman, Juliana (University of Regina)
Farenick, Douglas (University of Regina)
Floricel, Remus (University of Regina)
Gessesse, Hailegebriel (University of Alberta)
Graham, Colin (University of British Columbia)
Hamilton, Ryan (University of Calgary)
Jimenez, Carlos (University of Alberta)
Laca, Marcelo (University of Victoria)
Lamoureux, Michael (University of Calgary)
Langi, Zsolt (University of Calgary)
Lau, Anthony To-Ming (University of Alberta)
Litvak, Alexander (University of Alberta)
Massey, Pedro (University of Regina)
Mwangangi, Sadia (University of Regina)
Naszodi, Marton (University of Calgary)
Nikolaev, Igor (University of Calgary)
Niu, Zhuang (Fields Institute)
Pham, Hung Le (University of Alberta)
Phelps, Robert (University of Washington)
Phillips, John (University of Victoria)
Pivovarov, Peter (University of Alberta)
Popov, Alexey (University of Alberta)
Quas, Anthony (University of Victoria)
Reznikoff, Sarah (University of Victoria)
Rivasplata, Omar (University of Alberta)
Runde, Volker (University of Alberta)
Solymosi, Jozsef (University of British Columbia)
Tcaciuc, Adi (University of Alberta)
Troitsky, Vladimir (University of Alberta)
Uygul, Faruk (University of Alberta)
Willson, Ben (University of Alberta)

Symbolic Computer Algebra in Theoretical Physics
April 13-15, 2007

Organizer:

Andrzej Czarnecki (University of Alberta)

This workshop had two main objectives: 1. To compare the potential of various approaches to symbolic computation. Further progress in determining quantum effects in subatomic physics will depend on the ability to solve very large systems of recurrence relations. This is a new problem in mathematics and various approaches are being tried. Among the new tools are Groebner bases and the so-called Baikov method involving complex representations. 2. To initiate a collaboration among various international groups.

The opening talk of the workshop was given by Matthias Steinhauser (University of Karlsruhe, Germany). It was devoted to automatic generation of Feynman diagrams and their asymptotic expansions. We had a special talk by a young and very talented PhD student, Alexey Pak. The intention of that talk was to be somewhat provocative, namely to present a number of new ideas from a newcomer to the field, how master integrals can be evaluated. Andrey Grozin (Russian Academy of Sciences, Novosibirsk) reviewed applications of Groebner bases for the reduction of Feynman integrals. The original work by Buchberger provides a prescription for a unique reduction of any multi-variable polynomial. Very recently this has been extended to handle also noncommuting objects, such as operators raising and lowering powers of terms in the integrand of a Feynman integral.

Much of the discussions at this workshop were devoted to various new ideas for evaluating master integrals. The most important outcome is an emerging collaboration between Alberta and Karlsruhe, whose purpose is to determine master integrals for the threshold production of heavy particles. We identified two promising approaches. One is based on differential equations, the other on asymptotic expansions. There is a very strong experimental motivation for this progress and we are confident that it will stimulate development of new mathematical methods.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2153/

Participants:

Czarnecki, Andrzej (University of Alberta)
Davydychev, Andrei (Moscow State University)
Dowling, Matthew (University of Alberta)
Grozin, Andrey (Budker Insitute for Nuclear Physics)
Pak, Alexey (University of Alberta)
Penin, Alexander (University of Karlsruhe)
Puchalski, Mariusz (University of Alberta)
Steinhauser, Matthias (University of Karlsruhe)

Math Fair Workshop
April 20-22, 2007

Organizers:

Tiina Hohn (Grant MacEwan College)
Ted Lewis (University of Alberta)
Andy Liu (University of Alberta)

This was the fifth annual math fair workshop in BIRS. The workshop is extremely popular with teachers, provides them with resources for their courses, and it is helping to reshape the way mathematics is being approached in the schools. This is not limited to Alberta schools and the math fair idea is now spreading around the world. Nevertheless people in the rest of Canada and other countries are looking for us for leadership. To have teachers share their valuable experiences with math fair in their own schools is the best and most useful information to the other teachers.

The purpose of the workshop was to bring together educators who are interested in using our particular type of math fair, called a SNAP math fair, to enhance the mathematics curriculum. (The name SNAP is an acronym for the guiding principles of this unconventional type of math fair: It is student-centered, noncompetitive, all-inclusive, and problem-based.) The projects at a SNAP math fair are problems that the students present to the visitors. In preparation, the students will have solved chosen problems, rewritten them in their own words, and created hands-on models for the visitors. At a SNAP math fair, all the students participate, and the students are the facilitators who help the visitors solve the problems. This process of involving students in fun, rich mathematics is the underlying vision that makes the SNAP program so unique and effective. No first prize! No arguments about judging! Everyone is a winner!".

At the BIRS workshop, the participants learn about and try math-based puzzles and games that they can use in the classroom. They have a chance to see how other teachers have organized math fairs at their schools, how the SNAP math fair fits the curriculum, and what some schools have done for follow-ups. And then they go back to their schools and change the culture of mathematics in their class-room.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2134/

Participants:

Baratta, Desiree (Edmonton Schools)
Bosscha, Angela (Edmonton Schools)
Campbell, Cathy (Talmud Torah School)
Christensen, Derek (Edmonton Public Schools)
Desaulniers, Shawn (University of Alberta)
Estabrooks, Manny (Red Deer College)
Ford, Elaine (Edmonton Schools)
Francis-Poscente, Krista (Galileo Educational Network / University of Calgary)
Friesen, Sharon (Galileo Educational Network)
Godwaldt, Terry (Edmonton Public Schools)
Guay, Kathlyn (McKernan)
Hamilton, Gordon (Masters Academy and College)
Hassenstein, Ray (Clearview Schools)
Hoekstra, Elaine (Clearview School)
Hohn, Tiina (Grant MacEwan College)
Jones, Daryl (St Mary School)
Jubenvill, Heather (Oliver)
Kim, Scott (Shufflebrain)
LeCaine, Vanessa (Edmonton Schools)
Lewis, Ted (University of Alberta)
Liu, Andy (University of Alberta)
McLaughlin, David (Grant MacEwan College)
Nichols, Ryan (Edmonton Schools)
Pasanen, Trevor (University of Alberta)
Ritchie, Bill (Thinkfun)
Shaw, Dolph (Edmonton Public Schools)
Shevalier-Lavin, Renee (Good Shepherd)
Simpson, Charlene (Edmonton Schools)
Stroud, Chris (West Point Grey Academy)
Sun, Wen-Hsien (Chiu Chang Mathematics Education Foundation)
Thompson, Tanya (Collingwood Collegiate Institute)
Timourian, Jim (University of Alberta)
Woods, Allen (Gus Wetter School)
Yen, Lily (Capilano College, BC)

Discrete-time Graph Processes and Games
May 25-27, 2007

Organizers:

Richard Brewster (Thompson Rivers University)
John Goldwasser (West Virginia University)
William Klostermeyer (University of North Florida)
Gary MacGillivray (University of Victoria)

By "discrete-time graph processes and games" we mean topics like searching and sweeping, cops and robber, the firefighter problem, security in graphs and networks, and edge-delete games. These, and related, topics have all been active areas of recent research, meaning that a substantial number of papers have appeared in the past 5 to 10 years. In general, the groups investigating these problems do not have substantial overlap, yet the problems are fairly closely related. It stands to reason that some of the methods used in one area may be applicable in another one. This two-day workshop had several goals:

1) To bring together researchers to learn about recent results, and methods that have met with success on problems related to those on which they work.
2) To help focus the broad area in terms of common themes and directions.
3) To provide an opportunity for various researchers working on the same problems to meet and exchange ideas.
4) To help develop methods, beyond standard ones, using which these and similar problems can be systematically addressed.
5) To provide a forum for the exchange of related open problems and topics for future research.
6) To provide an opportunity to develop future linkages and collaborations between groups.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2142/

Participants:

Alspach, Brian (University of Newcastle)
Bonato, Anthony (Wilfrid Laurier University)
Brewster, Richard (Thompson Rivers University)
Cai, Leizhen (Chinese University of Hong Kong)
Clarke, Nancy (Acadia University)
Cockayne, Ernie (University of Victoria)
Dukes, Peter (University of Victoria)
Dyer, Danny (Memorial University of Newfoundland)
Edwards, Michelle (University of Victoria)
Epple, Dennis D.A. (University of Victoria)
Finbow, Arthur (Saint Mary's University)
Finbow, Stephen (St. Francis Xavier University)
Fitzpatrick, Shannon (University of Prince Edward Island)
Goldwasser, John (West Virginia University)
Guy, Richard (University of Calgary)
Hahn, Gena (University of Montreal)
Hanson, Denis (University of Victoria)
Hartnell, Bert (St. Mary's University)
King, Andrew (McGill University)
Klostermeyer, William (University of North Florida)
MacGillivray, Gary (University of Victoria)
Mynhardt, Kieka (University of Victoria)
Nowakowski, Richard (Dalhousie University)
Raspaud, Andre (University of Bordeaux 1)
Seyffarth, Karen (University of Calgary)
Zhu, Xuding (National Sun Yat-Sen University)

Stochasticity in Biochemical Reaction Networks
June 15-17, 2007

Organizers:

Eric Klavins (University of Washington)

Erik Winfree (California Institute of Technology)

Timeliness, relevance and importance: Understanding the dynamics biochemical reaction networks is crucial for elucidating the mechanisms involved in organism development, cancer, disease and drug discovery. Recent advances in flow cytometry, fluorescence microscopy, and other single cell measurement techniques have emphasized that these dynamics are intrinsically stochastic and that this stochasticity may be both regulated and exploited. Furthermore, explaining data from single-cell experiments requires new mathematical models and techniques. An increased understanding of these systems will help explain newly observed phenomena and may suggest methods by which new behaviors can be engineered.

The main goal of this workshop was to suggest new research directions and new synergies between researchers in complementary fields. To this end, the workshop was organized around the following questions, in approximately the order given below. The sequence of questions begins and ends with experimental evidence, in recognition of the main application of theory.

Approximately one third of the participants have performed experiments quantifying the effects of intrinsic noise on small-volume biochemical reaction networks. Their insight into the experimental results is the starting point of the workshop. The experimentalists represented here are unique in their ability to use quantitative methods and to speak the languages of mathematics, computation and control.

Modeling systems with enormous numbers of components in a tractable manner is by no means understood. Several of the workshop participants are pioneers in the use of stochastic processes, dynamical systems and multi-scale methods to model biochemical reaction networks.

The signaling network in the cell is vast and only approximately known. Another third of the participants represent the forefront of control systems theory as applied to such interconnected systems. They have developed new ways to address control, stability, robustness, adaptability and uncertainty in this setting.

We fully expect that one of the main outcomes of this workshop will be to suggest new experiments that validate new theoretical results in this area. The combination of theoretical and applied approaches represented in this workshop makes this a particularly exciting question.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2139/

Participants:

Adleman, Len (University of Southern California)
Doyle, John (California Institute of Technology)
El-Samad, Hana (University of California at San Francisco)
Este, Bob (University of Calgary)
Gillespie, Dan (Dan T. Gillespie Consulting)
Gopalkrishnan, Manoj (University of Southern California)
Hespanha, Joao (University of California at Santa Barbara)
Ingalls, Brian (University of Waterloo)
Ingolia, Nick (University of California at San Francisco)
Kaern, Mads (University of Ottowa)
Kauffman, Stuart (University of Calgary, Institute for Biocomplexity and Informatics)
Khammash, Mustafa (University of California, Santa Barbara)
Klavins, Eric (University of Washington)
Mabuchi, Hideo (California Institute of Technology)
Madhani, Hiten (University of California at San Francisco)
Murray, Richard (California Institute of Technology)
Petzold, Linda (University of California, Santa Barbara)
Qian, Hong (University of Washington)
Rathinam, Muruhan (University of Maryland)
Reishus, Dustin (University of Southern California)
Shahrezaei, Vahid (McGill University)
Soloveichik, David (California Institute of Technology)
Surette, Michael (University of Calgary)
Swain, Peter (McGill University)
Van Oudenaarden, Alexander (Massachusetts Institute of Technology)
Winfree, Erik (California Institute of Technology)

Dynamical Systems and Applications
June 22-24, 2007

Organizers:

Bernard Brooks (Rochester Institute of Technology)
Harold Hastings (Hofstra University)
Herbert Kunze (Guelph University)
Michael A. Radin (Rochester Institute of Technology)

This exciting workshop had set forth to achieve several objectives:

* To give the participants an opportunity to interact with each other and share their interests.

* To establish future collaborations.

* To see how each participant can extend and apply his/her research in different applications and directions.

* To stimulate many discussions on applications, different approach(es) to solve a particular problem, and share the new ideas too.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2001/

Participants:

Bar-Eli, Kedma (Tel Aviv University)
Billings, Lora (Montclair State University)
Brooks, Bernard (Rochester Institute of Technology)
Field, Dick (University of Montana)
Harkin, Anthony (Rochester Institute of Technology)
Hastings, Harold (Hofstra University)
Kunze, Herbert (Guelph University)
La Torre, Davide (Università degli Studi di Milano)
Landsman, Alexandra (Naval Research Laboratory)
Levere, Kim (University of Guelph)
Morgan, David (Harvard Medical School)
Radin, Michael A. (Rochester Institute of Technology)
Sander, Evelyn (George Mason University)
Schwartz, Ira B. (US Naval Research Laboratory)
Sobel, Sabrina (Hofstra University)
Thurston, George (Rochester Institute of Technology)
Wiandt, Tamas (Rochester Institute of Technology)

Statistical Science for `omic Research in Canada
June 29-July 1, 2007

Organizers:

Mayi Arcellana-Panlilio (University of Calgary)
Jennifer Bryan (University of British Columbia)
Robert Gentleman (Fred Hutchinson Cancer Research Center)
Karen Kopciuk (University of Calgary)

The first objective of this workshop was to bring together Canadian researchers to discuss their current and future directions in `omic research. Researchers working on diverse problems are purposely included in the list of proposed invitees.

The second workshop objective was to focus on practical aspects of conducting `omic research in Canada. This more practical aim focused on issues such as funding opportunities, attracting students, teaching courses and developing collaborations with biological and medical researchers.

These workshop objectives are more relevant and critical to the success of genomic research than ever before. Problems such as the lack of replicability (a fundamental cornerstone of the scientific method), rapid development of new high throughput technologies, and accumulation of complex biological information from different perspectives demand more powerful and sophisticated statistical methods. `Omic research generates numerous challenging problems for statistical researchers that require novel and complex solutions. However, statistical genomic research does not fit the mandate of most genomic research funding agencies and traditional statistical funding agencies do not provide sufficient funds to carry out the necessary empirical validation. Thus, strategies to improve the funding environment are sorely needed now.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2140/

Participants:

Arcellana-Panlilio, Mayi (University of Calgary)
Brettschneider, Julia (Queen's University)
Briollais, Laurent (Mount Sinai Hospital)
Bryan, Jennifer (University of British Columbia)
Bull, Shelley (University of Toronto)
Chandler, Graham (Independent Writer)
Chen, Jiahua (University of British Columbia)
Gottardo, Raphael (University of British Columbia)
Graham, Jinko (Simon Fraser University)
He, Wenqing (University of Western Ontario)
Kopciuk, Karen (University of Calgary/Alberta Cancer Board)
Lesperance, Mary (University of Victoria)
McNemey, Brad (Simon Fraser University)
Nadon, Robert (McGill University)
Ouellette, Francis (Ontario Institute for Cancer Research)
Stephens, David (McGill University)
Surette, Michael (University of Calgary)
Turinsky, Andrei (University of Calgary)
Wasserman, Wyeth (University of British Columbia)
West, Sherry (University of Calgary)

Diversity in the Mathematics and Scientific Community I and II
July 27-29, 2007

Organizers:

Petra Bonfert-Taylor (Wesleyan University)
Rachel Kuske (University of British Columbia)
Nilima Nigam (McGill University)
Kyewon Koh Park (Ajou University)
Suani Pinho (Universidade Federal da Bahia)
Edward Taylor (Wesleyan University)

This workshop had three intended goals:

The first goal follows up on two related workshops at BIRS. The 2-day BIRS workshop in 2005, "Connecting Women in Math across Canada" was focussed on topics in graduate and early career support and in understanding the changing culture in the mathematical community, both in academia and in industry. The second 5-day BIRS workshop will bring together individuals at all levels from across Canada, US and Mexico, providing opportunities for i) networking and interaction through panels, break-out groups, and informal discussions and engaging in scientific exchanges. ii) examining the activities of the institutes and professional organizations, and drafting a strategic document for guidelines and recommendations for future initiatives for the support of women in mathematics.

The second goal was to strengthen these initiatives by interaction with related fields. Here we identified similarities and differences on the challenges and environment in the different fields. Then we applied this understanding in addressing diversity in both communities, seeking opportunities where the communities could work together to support diversity. In this way we look for ways to combine rather than duplicate efforts in the science and engineering communities, leading to better efficiency and efficacy.

The third goal was to find opportunities to support women in math through programs which collaborate internationally. Again we look for similarities and differences across cultures and countries in order to identify ways in which the strengths of each could be used across international borders. The recently formed PRIMA (Pacific Rim Mathematics Association) provides an ideal vehicle for developing international programs which place a high priority on diversity in the mathematics community.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2125/

Participants:

Aceves, Alejandro (University of New Mexico)
Adem, Alejandro (University of British Columbia)
Armour, Margaret-Ann (University of Alberta)
Bastien, Madeleine (NSERC)
Bonfert-Taylor, Petra (Wesleyan University)
Cameron, Kathie (Wilfrid Laurier University)
Clelland, Jeanne (University of Colorado, Boulder)
Colijn, Caroline (Harvard School of Public Health)
Davis, Jim (Indiana University)
Evasius, Dean (National Science Foundation (NSF))
Frigon, Marlene (Universite de Montreal)
Gray, Larry (University of Minnesota)
Jhon, Gil-Ja (Ewha University, Korea)
Jones, Chris (University of North Carolina / University of Warwick)
Kessel, Cathy (Mathematics Education Consultant)
Kim, Wansoon (Korean Women Math Society)
Kimber, Chawne (Lafayette College)
Korten, Marianne (Kansas State Math)
Kuske, Rachel (University of British Columbia)
Marsh, Rebeccah (MITACS)
Min, Ju-Young (National Institute for Supporting Women in Science and Technology (NIS-WIST))
Nigam, Nilima (McGill University)
O'Hara, Kathleen (Mathematical Sciences Research Institute)
Park, Kyewon Koh (Ajou University)
Pedersen, Erik (University of Copenhagen)
Pereyra, Maria Cristina (University of New Mexico)
Pinho, Suani (Universidade Federal da Bahia)
Popovic, Lea (Cornell University)
Silber, Mary (Northwestern Univerity)
Taylor, Edward (Wesleyan University)
Vincelli, Matthew (NSERC)
Werner, Caryn (Allegheny College)
Wismath, Stephen (University of Lethbridge)
Wood, Kathryn (BIRS)

PHAC-MITACS Joint Symposium on Modeling Sexually Transmitted and Blood-borne Infections
August 10-12, 2007

Organizers:

David Fisman (Hospital for Sick Children and Ontario Public Health Laboratories)

Tom Wong (Public Health Agency of Canada)
Jianhong Wu (York University)

One of the objectives of this workshop was to form a national focus group on modeling sexually transmitted and blood-borne infections that was capable of making scientific recommendations to governments at provincial and national levels in the subject area.

An immediate goal of this focus group was to develop research proposals for funding support from Public Health Agency of Canada and make recommendation to funding agencies about the role of mathematical modeling for the management of sexually transmitted and blood-borne infections.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2156/

Participants:

Abbas, Zahid (Regina Qu'Appelle Health Region)
Aral, Sevgi (Centers for Disease Control and Prevention)
Arino, Julien (University of Manitoba)
Beaudoin, Carole (Public Health Agency of Canada)
Bharti, Viren (V&V Statistics Inc.)
Boily, Marie-Claude (Imperial College)
Dinner, Katherine (Public Health Agency of Canada)
Fisman, David (Hospital for Sick Children and Ontario Public Health Laboratories)
Flicker, Sarah (York University)
Gumel, Abba (University of Manitoba)
Hansen, Lisa (Public Health Agency of Canada)
Heffernan, Jane (York University)
Kropp, Rhonda (Public Health Agency of Canada)
Lerch, Robert (Public Health Agency of Canada)
Mishra, Sharmistha (Provincial Health Laboratory)
Ng, Lai King (Public Health Agency of Canada)
Osgood, Nathaniel (University of Saskatchewan)
Ota, Kaede (The Hospital for Sick Children)
Pan, Yuanyi (York University)
Richardson, Susan (The Hospital for Sick Children)
Sahai, Beni (Cadham Provincial Laboratory)
Sandhu, Jat (Vancouver Coastal Health Authority)
Severini, Alberto (Public Health Agency of Canada)
Smith, Robert (University of Ottawa)
Steben, Marc (Quebec National Institute of Public Health)
van den Driessche, Pauline (University of Victoria)
Watmough, James (University of New Brunswick)
Wong, Tom (Public Health Agency of Canada)
Wu, Jianhong (York University)
Wu, Hong-Xing (Public Health Agency of Canada)
Wu, Jun (Public Health Agency of Canada)
Yan, Ping (Public Health Agency of Canada)

Intuitive Geometry
August 31-September 2, 2007

Organizers:

Ted Bisztriczky (University of Calgary)
Gabor Fejes Toth (Alfréd Rényi Institute of Mathematics)
Ferenc Fodor (University of Szeged)
Wlodzimierz Kuperberg (Auburn University)

A typical geometric iterative process problem can be described as follows. Start with a (usually planar) point set, and in each step, add new points generated by some fixed procedure (e.g. add the incenter of any triangle determined by three points of the set). The result is a monotone increasing set of points, and we are interested in their union: depending on the initial set and the procedure, it can be a discrete or a dense set, or some more complicated structure. The talk contains a little survey of results of this type.

This workshop provided a much desired opportunity to share research findings in the interconnected areas represented in intuitive geometry. We had planned to bring together experienced researchers and graduate students to explore recent developments and freshly emerging directions, and to encourage future collaborations. We also planned to invite researchers mostly from North-America and Europe. A special effort was made to invite graduate students of various related disciplines, and to make the workshop accessible to them. We are planning to schedule about fifteen 20 minute talks during the Workshop, a problems session, and leave ample time for state of the field discussions and personal interactions.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2144/

Participants:

Ambrus, Gergely (University of Szeged and University College London)
Barany, Imre (Renyi Institute)
Bezdek, András (Auburn University)
Bezdek, Karoly (University of Calgary)
Bisztriczky, Ted (University of Calgary)
Bracho, Javier (UNAM)
Böröczky, Károly (Eötvös Loránd University)
Fejes Toth, Gabor (Alfréd Rényi Institute of Mathematics)
Fisher, J. Chris (University of Regina)
Fodor, Ferenc (University of Szeged)
Guy, Richard (University of Calgary)
Heppes, Aladar (Renyi Institute)
Holmsen, Andreas (University of Bergen)
Hubard, Alfredo (New York University)
Ismailescu, Dan (Hofstra University)
Kuperberg, Wlodzimierz (Auburn University)
Kuperberg, Krystyna (Auburn University)
Langi, Zsolt (University of Calgary)
Martini, Horst (University of Chemnitz)
Naszodi, Marton (University of Calgary)
Oliveros, Deborah (Universidad Nacional Autonoma de Mexico)
Smith, Ed (Jacksonville State University)
Soltan, Valeriu (George Mason University)
Solymosi, Jozsef (University of British Columbia)
Swanepoel, Konrad (University of South Africa)
Talata, István (Ybl College of St. István University)
Toth, Csaba (Massachusetts Institute of Technology)
Vígh, Viktor (University of Szeged)
Weiss, Asia Ivic (York University)
Zaks, Joseph (University of Haifa)

Mathematical Modelling of Water Resource Allocation Strategies
September 7-9, 2007

Organizers:

Collins Ayoo (University of Calgary)
Ted Horbulyk (University of Calgary)
Marian Weber (Alberta Research Council)

The aim of this workshop was to review and advance the mathematical programming techniques actively being used to model water resource management and policy reform. The workshop sought to consider ways of improving both specific techniques and the larger modelling programs and processes in which they are integrated. Although the South Saskatchewan River Basin will be the specific application of these methods and approaches, the topics, approaches and methods will generalize to other jurisdictions.

Some of the specific issues that will be considered at the workshop include:

1) strengths and weaknesses of various modelling approaches, including single-period versus multi-period or dynamic models, and deterministic versus stochastic approaches; 2) modelling strategies (e.g., iterative versus modular structures); 3) the formulation of nonlinear objective functions to reflect social versus private financial outcomes, or other multiple attribute objectives; 4) model calibration; 5) data requirements, definitions and sources; 6) solvers and software; 7) verification and validation processes; and 8) simulation and sensitivity analysis.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2003/

Participants:

Ayoo, Collins (University of Calgary - Economics)
Bruneau, Joel (University of Saskatchewan)
Chang, Chiadih (Alberta Environment)
Chaudhry, Hamid (Alberta Environment - Environmental Tools Analysis and Research)
Cutlac, Marius (Alberta Research Council)
Danso, George (University of Alberta)
Dridi, Chokri (University of Alberta)
Dupont, Diane (Brock University)
He, Lixia (University of Tennessee)
Hill, David (Alberta Irrigation Projects Association)
Horbulyk, Ted (University of Calgary - Economics)
Howitt, Richard (University of California at Davis)
Ilich, Nesa (Optimal Solutions Limited - Calgary)
Le Roy, Danny (University of Lethbridge)
Lund, Jay (University of California at Davis)
Mannix, Amy (University of Alberta)
Moreno-Cruz, Juan (University of Calgary - Economics)
Parkinson, Bob (Agriculture and AgriFood Canada)
Renzetti, Steven (Brock University)
Riewe, Bob (Alberta Agriculture and Food - Resource Sciences Branch)
Tang, Tom (Alberta Environment)
Weber, Marian (Alberta Research Council)

Affine Schubert Calculus Workshop: Design and Implementation of Research Tools in MuPAD-Combinat
September 14-16, 2007

Organizers:

Anne Schilling (University of California, Davis)

Nicolas M. Thiery (Universite Paris-Sud)

All the participants of the FRG “Affine Schubert Calculus” and most of the MuPAD-Combinat core developers attended the BIRS workshop 07w5048 “Applications of Macdonald Polynomials” on September 10-14 2007. This workshop was therefore be a perfect occasion for our startup meeting where we focused on deep discussions and code brainstorms about the design, development schedule, implementation, and integration of the required research tools:

Kac-Moody algebras - Representation theory (how to interact with GAP for example) - k-Schur theory - Integration of external C/C++ programs ...

We hosted some MuPAD developers as well, in order to further tighten the close collaboration between the MuPAD-Combinat project and the MuPAD team. This was essential to the project: not only was this the occasion to learn best practices and request important new features, but this was the cement for the long term compatibility of the code with new versions of MuPAD.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07w2157

Participants:

Bandlow, Jason (University of California, San Diego)
Descouens, Francois (York University)
Hivert, Florent (University of Rouen)
Lam, Thomas (Harvard University)
Lapointe, Luc (Universidad de Talca)
Morse, Jennifer (University of Miami)
Schilling, Anne (University of California, Davis)
Shimozono, Mark (Virginia Tech)
Thiery, Nicolas M. (Univ Paris-Sud)
Zabrocki, Mike (York University)

Banff International Research Station

2007

Summer Schools

Research In Teams

Focused Research Groups

Mathematics and the Environment: Energy Risk, Environmental Uncertainty and Public Decision Making April 29-May 8, 2007

Organizers:

Ulrich Horst (Humboldt University Berlin)
Peter Imkeller (Institut fur Mathematik Humboldt Universitat zu Berlin)

In a time of growing environmental concerns and the chance to enhance the development of effective mathematical methods and techniques to model climate risks and public decision making in the presence of environmental uncertainty is truly compelling. This summer school brought together graduate students, postdoctoral fellows, and young faculty members from economics, mathematics and the social sciences with leading economists and mathematicians. This workshop successfully

- Exposed young environmental and natural resource economists to mathematical methods and techniques needed in their field;

- Exposed mathematicians to new mathematical problems arising in environmental and resource economics; and

- Brought together mathematicians and environmental and resource economists to discuss recent progress in the mathematical modeling climate and energy related risk factors.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07ss081/

Participants:

Ankirchner, Stefan (Humboldt University Berlin)
Bagh, Adib (University of California (Davis))
Barth, Andrea (University of Oslo)
Burgess, Sarah (University of Victoria)
Carmona, Rene (Princeton University)
Ekeland, Ivar (University of British Columbia)
Fagan, Stephen (Simon Fraser University)
Fehr, Max (ETH Zurich)
Gollier, Christian (University of Toulouse)
Guesnerie, Roger (College de France)
Hinz, Juri (ETH Zurich)
Kirby, Natasha (University of Western Ontario)
Krol, Katja (Humboldt University Berlin)
Kupper, Michael (ETH Zurich)
L'Espérance, Bruno (University of British Columbia)
Lazrak, Ali (University of British Columbia)
Lu, Zeliang (University of British Columbia)
Ludwig, Andreas (Simon Fraser University)
Malverde, José Luis (Universidad de Chile)
Mandel, Antoine (University Paris I)
Molina-Escobar, Alberto (University of British Columbia, Vancouver)
Monahan, Adam (University of Victoria)
Moreno, Santiago (University of British Columbia)
Muehlenbachs, Lucija (University of Maryland)
Nunes dos Reis, Gonçalo Jose (Humboldt University Berlin)
Petrou, Evangelia (Humboldt University Berlin)
Pirvu, Traian (University of British Columbia)
Porchet, Arnaud (Princeton University)
Ramirez Cabrera, Hector (University of Chile)
Rus, Horatiu (University of British Columbia)
Taschini, Luca (Zurich University)
Tong, Guoshi (University of British Columbia)
Wang, Sharon (University of Western Ontario)
Wang, Tan (University of British Columbia)
Wang, Zhiqing (University of British Columbia)
Wets, Roger (University of California, Davis)
Zhao, Guangzhi (University of Western Ontario)

2007 Summer IMO Training Camp
July 10-22, 2007

Organizer:

Bill Sands (University of Calgary)

The International Mathematical Olympiad (IMO), a mathematics contest for high school students, is held each year somewhere in the world, and Canada enters a team of six students each year, organized and sponsored by the Canadian Mathematical Society (CMS). This year the IMO took place in Hanoi, Vietnam on July 19-31. At this Training Camp the students received lectures, and problem sets to work on, plus several "Mock Olympiads", practice contests to prepare them for the IMO ahead. The students also were given ample time off for excursions and other opportunities to enjoy the many facilities of BIRS and the wonders of the Banff area. Similar Training Camps were held at BIRS just before the 2003 and 2005 IMOs.

This year for the first time, the Mexican IMO Team will also be training at BIRS with the Canadian Team, from July 13 to 19. This development is part of the growing partnership between the Canadian and Mexican mathematical communities which has been spearheaded by BIRS and the Pacific Institute for Mathematical Sciences in conjunction with the Canadian Mathematical Society.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07ss005/

Participants:

Amiraslani, Amir (University of Calgary)
Antonio Avila Ponce De Leon, Marco (IMO 2007)
Buenrostro Morales, Isaac (IMO 2007)
Bui, Minh-Lac (Canadian Pacific Railway)
Campos Garcia, Fernando (IMO 2007)
Doolittle, Edward (University of Regina)
Fink, Alex (University of California, Berkeley)
Huynh, Kent (IMO 2007)
Karp, Steven (IMO 2007)
Li, Yan Cynthia (IMO 2007)
Novelo Puc, Manuel (IMO 2007)
Oliva Aviles, Cristian Manuel (IMO 2007)
Pacchiano Camacho, Aldo (IMO 2007)
Recio, Felix (University of Toronto)
Remorov, Alexander (IMO 2007)
Rhee, David (University of Waterloo)
Sands, Bill (University of Calgary)
Schneider, Jonathan (IMO 2007)
Sun, Jarno (Chengyue) (IMO 2007)
Tang, Adrian (University of Calgary)
Valdez Delgado, Rogelio (UAEM)
Zhao, Yufei (MIT)

Research in Teams

Graph Colouring Problems Arising in Telecommunications
March 18-25, 2007

Organizer:

Bruce Reed (McGill University)

We intended to work together on a number of problems in this area. McDiarmid has consulted for the Radio Communications Agency in the UK on problems of this type for many years. Havet works in the MASCOTTE group at INRIA which focuses on graph theoretic problems arising in telecommunications. Reed has written one manuscript on graph colouring and edited a manuscript on perfect graphs. Every pair of participants has written at least three joint articles, many on this topic.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit015/

Participants:

Addario-Berry, Louigi (McGill University)
Havet, Frederi (CNRS/UNSA/INRIA Sophia-Antipolis)
McDiarmid, Colin (Oxford University)
Reed, Bruce (McGill University)

Bioeconomics of Invasive Species: Integrating Ecology, Economics and Management
May 15-20, 2007

Organizers/Participants:

Reuben Keller (University of Notre Dame)
Mark Lewis (University of Alberta)
David Lodge (University of Notre Dame)
Jason Shogren (University of Wyoming)

Invasive species cause massive damage to environments, economies and human health around the world. Although many of these impacts are well known, on a global scale the investment in preventing and managing invasions has been insufficient to reduce the introduction of new species, or to substantially reduce the impacts from established invaders. Subsequently, the number of invasive species, and the total impacts from invasive species, continues to increase.

One of the primary reasons that invasive species are inefficiently managed is the common perception that they are a purely ecological problem. In reality, however, it is human travel and trade that introduce nonindigenous species, so the management of invasions thus requires an understanding of how these vectors interact with society and the species they transport. Additionally, the total ecological and economic impacts from any species are intricately linked to human uses of the environment, human values, and the feedbacks from any management efforts. Because ecologists rarely interact with economists, the literature from each discipline has remained largely isolated. Managers and policy-makers, therefore, have little guidance as to how they can best invest public funds in managing the invasive species problem, and what returns they should expect from those investments.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit141/

String Theory and Inflationary Cosmology
June 3-10, 2007

Organizer:

James Cline (McGill University)

We continued the work which we started as a team in July 2006, where we made significant progress toward understanding the challenges of finding an inflationary model which uses the motion of Dp-branes to drive inflation. Using very recent results of string theorists at Princeton, we were able to compute corrections to the superpotential which governs the motion of the branes. In previous work on this subject, these corrections were merely parametrized, rather than rigorously computed. Unfortunately, the form of the actual superpotential corrections was not what previous workers had hoped for, in their quest to find an inflation model which would satisfy current experimental data.

Our goal was to look for modifications of the theory which can satisfy these constraints. There are several strategies which we intend to investigate:

(1) modifications of the background geometry of the compact extra dimensions which would generate new corrections to the potential possibly with the desired properties;
(2) exploring the possibility of fast-roll inflation, taking advantage of the special properties of the DBI action for the D3 brane in the warped-throat geometry;
(3) computing the potential for the D3-D7 brane system, for which we laid the groundwork in our previous team research.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit135/

Participants:

Burgess, Cliff (CERN, McMaster University and Perimeter Institute)
Dasgupta, Keshav (McGill University)
Firouzjahi, Hassan (McGill University)

Mapping Quantitative Traits in Humans
Friday, June 29-July 8, 2007

Organizer:

David Siegmund (Stanford University)

I have been conducting separate research collaborations with Josee Dupuis and Benjamin Yakir on different, but related aspects of gene mapping. The objective of this proposal was to see what we can gain by three-way discussions and to make the kind of progress that only occurs in concentrated face to face meetings.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit143/

Participants:

Dupuis, Josee (Boston University School of Public Health)

Yakir, Benjamin (Hebrew University Mount Scopus)

Recent Advances in Mathematical Relativity
August 5-12, 2007

Organizers/Participants:

Piotr Chrusciel (University of Tours & Oxford University)
Greg Galloway (University of Miami)
Daniel Pollack (University of Washington)

This “Research in Teams” brought together three researchers whose expertise covers a large portion of the forefront of mathematical relativity. The aim was for us to use the time together at BIRS to write a major, high level survey of the field for publication in the “Bulletin of the American Mathematical Society”. (This article was requested by the editors of BAMS.) We aim to write a survey which presents both the most central outstanding problems in the subject, the recent mathematical advances of the field, and which points to areas of likely activity in the future.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit136/

Noncommutative Duality in Dynamical Systems
August 12-19, 2007

Organizers/Participants:

Jerry Kaminker (Univerisity of California, Davis)

Ian Putnam (University of Victoria)

The main goal was to further develop our understanding of the role of hyperbolicity in all of these examples. More specifically we intended to the following:

1. Completion of the paper proving duality for the Ruelle algebras associated to a Smale space.

About ten years ago, the KP published a paper proving duality for shifts of finite type (Comm. Math. Phys. 187 (1997), 509-522). This proved the existence of the required K-theory isomorphisms between the Cuntz-Krieger algebras O_A and O_A^T, where A is a 0-1 matrix defining the shift. Smale spaces are a broad generalization of shifts of finite type which include the basic sets for Smale's Axiom A systems. Generally, they are factors of shifts of finite type. We also had an outline for a proof in the more general case using very different methods. This was never published because the technical details were substantial. In the past few years better approaches have been developed and the proof can be simplified considerably. The first aim of the proposal is to complete this program. Much of it is already written, but there remain a few hurdles.

2. Extending the result to more general hyperbolic systems.

It is likely the result of Part 1 above could be done in other settings where some form of hyperbolicity is present. The most natural case to consider is the geodesic flow on a compact manifold of negative curvature.

3. Relations with boundary actions of discrete hyperbolic groups and self-similar groups.

As mentioned above, other cases where duality exists are closely linked with groups which are hyperbolic in some sense and their actions. More specifically, recent work of Nekrashevych and his co-workers (including Grigorchuk) have established links between self-similar groups, Smale spaces and C*-algebras. The third aim of the project is to try to understand these connections better and especially the aspects of duality.

4. Transverse groupoids

Finally, there seems to be a general context in which to study this type of duality. KP have started developing a notion of transverse groupoids, which would be basic geometric input to duality. Some known results fit into this setting--e.g. the Baum-Connes map relating the K-homology of the classifying space of a group and the K-theory of its group C*-algebra, the Fourier-Mukai transform relating derived categories associated to an abelian variety and its dual, and others. The goal of this part of the work would be to establish the definition of transverse groupoids and show how it leads to setting up a K-theoretic duality map, which will usually require additional conditions (such as hyperbolicity) in order to be an isomorphism.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit162/

Sieve Methods
August 20-28, 2007

Organizers/Participants:

John Friedlander (University of Toronto)

Henryk Iwaniec (Rutgers)

The two proposers have been writing a book on Sieve Methods, now more than eighty percent complete. Already the book contains a number of new results as well as a simpler than previously known treatment of many of the basic proofs in what is a highly complicated part of the subject. The proposers have a great deal of experience in sieve theory and have high hopes that this book will serve as the standard reference for many years to come.

The opportunity for the proposers to temporarily escape from their numerous other duties and distractions during this period of time proved to be an invaluable benefit in accelerating the completion of this volume.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit154/

Conformal and CR Geometry: Spectral and Nonlocal Aspects
August 26-September 9, 2007

Organizers/Participants:

Andreas Cap (University of Vienna)

A. Rod Gover (University of Auckland)

In recent work the applicants and collaborators have made several closely linked discoveries. These include: the existence of a new class of conformally invariant elliptic differential complexes on conformally curved structures [math.DG/0309085] (and see also [math.DG/0404004]) new torsion quantities for these ``detour complexes'' which generalise Cheeger's 1/2-torsion [articles in progress]; subcomplexes in Bernstein--Gelfand--Gelfand sequences [math.DG/050834]; operators between differential forms which generalise the Q-curvature. In ongoing joint work, the applicants have developed an efficent version of tractor calculus to exploit the relation between conformal and CR geometry introduced by Fefferman. Broadly the objective of the program is to apply these tools to construct and study new global invariants which are relevant for global analysis and spectral theory on manifolds.

From the case of four--dimensional conformal structures it is known that detour complexes are closely related to subcomplexes in Bernstein--Gelfand--Gelfand sequences, see [math.DG/0606401]. These subcomplexes generalize to CR structures, and are intimately related to the detour complexes arising there. This will provide a link to additional powerful tools from representation theory.

Relevance, importance and timeliness? We believe the work to be carried out had a lasting impact on the geometric analysis/geometric spectral theory program for conformal and CR geometry. There are likely benefits to Physics. So certainly it is important. The timing is ideal. There have been major recent advances in the algebraic aspects of conformal geometry (construction of invariant operators/invariants etc.) so it is an ideal time to apply this to establish new directions for global analysis on manifolds.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07rit132/

Focused Research Groups

Quasiconformal Homogeneity: Energy Methods and Sharp Bounds
March 4 -11, 2007

Organizers:

Petra Bonfert-Taylor (Wesleyan University)

Edward Taylor (Wesleyan University)

An (orientable) hyperbolic manifold M is K-quasiconformally homogeneous if, given any pair of points x and y in M, there exists a K-quasiconformal homeomorphism $f: M rightarrow M$ such that $y = f(x)$. If there exists a $K geq 1$ so that M is K-quasiconformally homogeneous, then M is said to be uniformly quasiconformally homogeneous. The study of uniformly quasiconformally homogeneous planar domains was initiated by Gehring and Palka in [6]. This study was extended to the study of uniformly quasiconformally homogeneous hyperbolic manifolds by Bonfert-Taylor, Canary, Martin and Taylor in [2], and continued in subsequent work by Bonfert-Taylor, Bridgeman, Canary and Taylor ([1].)

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07frg127/

Participants:

Bonfert-Taylor, Petra (Wesleyan University)
Canary, Richard (University of Michigan)
Martin, Gaven (Massey University)
Taylor, Edward (Wesleyan University)
Wolf, Michael (Rice University)

Bonfert-Taylor, Petra (Wesleyan University)
Canary, Richard (University of Michigan)
Martin, Gaven (Massey University)
Taylor, Edward (Wesleyan University)
Wolf, Michael (Rice University)

The Xi-transform
March 25-April 1, 2007

Organizers:

Maciej Dunajski (Cambridge University)

George Sparling (University of Pittsburgh)

1. One focus will be on the understanding of the implications of higher dimensions for the unification of quantum mechanics and non-commutative geometry. Non-commutative string theory along the lines of the work of Alain Connes and William Ugalde is expected to play an important role; a unifying language will be sought in the (coherent) topos theory of William Lawvere and Myles Tierney.
2. A second focus will be on the construction and further development of specific examples of the Xi-transform.
3. A third focus will try to comprehend the relation of dynamical theories to the structures, such as the fermionic fluids of Shou-Cheng Zhang and Jiangping Hu, that arise in the context where there is no preferred time, where the dynamics occurs on the boundary.
4. A fourth focus will be to try to understand the relation between the holomorphic quantum twistor theories of Witten, Mason and others and the hyperbolic non-analytic theory of Sparling. Here the theory of hypersurface twistors of Penrose, Sparling and Le Brun seems to provide the needed link.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07frg138/

Participants:

Boya, Luis (University of Zaragoza)
Doubrov, Boris (Belarussian State University)
Dunajski, Maciej (Cambridge University)
Gover, A. Rod (University of Auckland)
Grant, James (University of Vienna)
McKay, Ben (University College Cork)
Sparling, George (University of Pittsburgh)
Xing, Hao (Univeristy of Michigan)

Stochastic Models of Influenza Dynamics
May 6-13, 2007

Organizers:

Jonathan Dushoff (McMaster University)
David Earn (McMaster University)
Joshua Plotkin (University of Pennsylvania)

When the proposed Focused Research Group meeting took place, we had used the insights from our 2005 FRG to analyze a wide variety influenza epidemic data. We also had begun applying our more detailed individual-based models to influenza genomic data and patterns from influenza viral phylogenies. We were ready to gather for a brainstorming session to evaluate what we have learned from our data and simulations, and to identify key insights that we can exploit to develop simpler analytical models that shed light on our results and on the mechanisms underlying the population dynamics and evolutionary dynamics of influenza.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07frg109/

Participants:

Bolker, Ben (University of Florida)
Bruen, Trevor (McGill University)
Dushoff, Jonathan (McMaster University)
Earn, David (McMaster University)
Kryazhimskiy, Sergey (Princeton University)
Lipsitch, Marc (Harvard School of Public Health)
Ma, Junling (University of Victoria)
Plotkin, Joshua (University of Pennsylvania)

Global Attraction to Solitary Waves in Nonlinear Dispersive Hamiltonian Systems
May 20-30, 2007

Organizers:

Vladimir Buslaev (St. Petersburg University)
Andrew Comech (Texas A&M University)
Alexander Komech (University of Vienna)
Boris Vainberg (University of North Carolina, Charlotte)

Long-time asymptotics and stability of solitary waves in Hamiltonian systems with dispersion is a fundamental question of the PDE theory, and is of tremendous value for natural sciences because of the ubiquity of the dispersive equations which describe all sorts of oscillations. The ultimate goal is to prove that the global attractor for a dispersive system is formed by the solitary waves (that is, any finite energy solution asymptotically looks like a superposition of leaving solitary waves and dispersive waves). The global attractors were extensively studied for dissipative systems (such as the Ginzburg-Landau equation from Solid State Physics, the Kuramoto-Sivashinsky equation introduced in the study of phase turbulance and thermal diffusive instabilities, and the two-dimensional forced Navier-Stokes equation). Yet, the results are absent for dispersive systems, except for completely integrable models. The research in this direction stimulates the development of a variety of mathematical tools aimed at nonlinear problems. In particular, the application of the Titchmarsh Convolution Theorem for the analysis of the global attractors of models based on the Klein-Gordon equation gives yet another link of the Harmonic and Complex Analysis to the PDE Theory

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07frg137/

Participants:

Buslaev, Vladimir (St. Petersburg University)
Comech, Andrew (Texas A&M University)
Komech, Alexander (University of Vienna)
Kopylova, Elena (Russian Academy of Science)
Perelman, Galina (Ecole Polytechnique)
Stuart, David (University of Cambridge, DAMPT)
Vainberg, Boris (University of North Carolina, Charlotte)

Mathematics and Pedagogy Project
June 17-24, 2007

Organizers:

Brent Davis (University of British Columbia)

Malgorzata Dubiel (Simon Fraser University)

Our project brought together mathematicians and math educators to design a prototype course that can be used by departments of mathematics as a model for their Mathematics for Elementary Teachers' courses. The proposed course integrated what we know about the nature of mathematics, the nature of mathematics engagement and the process of the learning and teaching mathematics. It included specific mathematical content appropriate for intended elementary teachers, but would use a radically different pedagogy.

The idea of designing such a model course came from recommendations of the 2003 and 2005 Canadian Forum for Education in Mathematics. There is a need for both such a course, and appropriate materials.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07frg002/

Participants:

Davis, Brent (University of British Columbia)
Dubiel, Malgorzata (Simon Fraser University)
Kastner, Bernice (Simon Fraser University)
Mason, John (Open University)
Mighton, John (Fields Institute)
Simmt, Elaine (University of Alberta)
Watson, Anne (University of Oxford)

Integrability, Gauge Fields and Strings
July 22-29, 2007

Organizers:

Gordon Semenoff (University of British Columbia)

In concrete terms, the long-term goal of this project was to find a complete solution of the planar sector of four dimensional maximally supersymmetric Yang-Mills theory. A secondary goal was to find a similar solution to the IIB superstring theory and to understand how these are related. It is believed that these are united in the same one-parameter model, whose complete quantum integrable structure is yet to be established. A lot of evidence has been accumulated by many groups to substantiate this claim, but there is as yet no proof of this assertion. What we had specifically proposed to do in this two-week focused research group was to:
i) Further develop the approach of Beisert, Kazakov, Marshakov and Zarambo which encodes integrability data in algebraic curves.
ii) Incorporate techniques for solving long-ranged spin chains which are relevant to some problems in Yang-Mills theory and that have been developed in the context of condensed matter systems.
iii) Pursue a connection of the above strategy with the Hubbard model, which has recently been noticed by Rej, Serban and Staudacher.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2007/07frg130/

Participants:

Beisert, Niklas (Max-Planck-Institut für Gravitationsphysik)
Kazakov, Vladimir (Ecole Normale Superieure, Paris)
Kostov, Ivan (CEA - Saclay)
Kristjansen, Charlotte (Niels Bohr Institute)
Plefka, Jan (Humboldt University)
Semenoff, Gordon (University of British Columbia)
Serban, Didina (CEA Saclay)
Staudacher, Matthias (Albert Einstein Institut)
Zarembo, Konstantin (Uppsala)

5-Day Workshops 2008

Jan 13	Jan 18	Free Probability, Extensions, and Applications
Jan 20	Jan 25	Combinatorial Game Theory
Jan 27	Feb 01	C*-Algebras Associated to Discrete and Dynamical Systems
Feb 03	Feb 08	Mathematical Advancement in Geophysical Data Assimilation
Feb 10	Feb 15	Facets of Heteroepitaxy: Theory, Experiment, and Computation
Feb 17	Feb 22	Special Structures in Riemannian Geometry
Feb 24	Feb 29	Quantum Chaos: Routes to RMT Statistics and Beyond
Mar 02	Mar 07	Quantum Affine Lie algebras, Extended Affine Lie Algebras, and Applications
Mar 09	Mar 14	New Topological Contexts for Galois Theory and Algebraic Geometry
Mar 16	Mar 21	Recent Progress on the Moduli Space of Curves
Mar 23	Mar 28	Topics in Von Neumann Algebras
Mar 30	Apr 04	Recent Developments in Elliptic and Degenerate Elliptic Partial Differential Equations, Systems and Geometric Measure Theory
Apr 06	Apr 11	Hodge Theory
Apr 13	Apr 18	Geometric Flows in Mathematics and Physics
Apr 20	Apr 25	Dynamics of Structured Populations
Apr 27	May 02	Nonlocal Operators and Applications
May 4	May 9	Climate Change Impacts on Ecology and the Environment
May 11	May 16	Matrix Factorizations in Physics and Mathematics
May 18	May 23	Locally Symmetric Spaces
May 25	May 30	Low Complexity Dynamics
Jun 01	Jun 06	Emerging Statistical Challenges in Genome and Translational Research
Jun 08	Jun 13	Phase Transitions, Hard Combinatorial Problems and Message Passing Algorithms
Jun 15	Jun 20	Mathematical and Numerical Methods for Free Energy Calculations in Molecular Systems
Jun 22	Jun 27	Emerging Directions in String Theory
Jun 29	Jul 04	Recent Progress in Two-dimensional Statistical Mechanics
Jul 06	Jul 11	Rigidity, Flexibility, and Motion: Theory, Computation and Applications to Biomolecules
Jul 06	Jul 11	The Biology-Combinatorics Interface: Addressing New Challenges in Computational Biology
Jul 13	Jul 18	Multi-View Image and Geometry Processing for 3D Cinematography
Jul 13	Jul 18	Integrated Hydrogeophysical Inversion
Jul 20	Jul 25	Quantum Computation with Topological Phases of Matter
Jul 27	Aug 01	Modeling the Impact of Policy Options During Public Health Crises
Aug 03	Aug 08	Analytic Tools in Computational Complexity
Aug 17	Aug 22	The Stable Trace Formula, Automorphic Forms, and Galois Representations
Aug 24	Aug 29	Asymptotics and Singularities in Nonlinear and Geometric Dispersive Equations
Aug 31	Sep 05	Recent Developments in Numerical Methods for Nonlinear Hyperbolic Partial Differential Equations and their Applications
Sep 07	Sep 12	Spectral Methods in Representation Theory of Algebras and Applications to the Study of Rings of Singularities
Sep 14	Sep 19	Understanding the New Statistics: Expanding Core Statistical Theory
Sep 21	Sep 26	Number Theory and Physics at the Crossroads
Sep 28	Oct 03	Graph Minors
Oct 05	Oct 10	Random Matrices, Inverse Spectral Methods and Asymptotics
Oct 12	Oct 17	Self-Similarity and Branching in Group Theory
Oct 12	Oct 17	Topological Methods for Aperiodic Tilings
Oct 19	Oct 24	Mathematical Theory of Resonances
Oct 26	Oct 31	Interactions Between Noncommutative Algebra and Algebraic Geometry
Nov 2	Nov 7	WIN: Women in Numbers
Nov 9	Nov 14	Black Holes: Theoretical, Mathematical and Computational aspects
Nov 9	Nov 14	Combinatorial Design Theory
Nov 16	Nov 21	Inverse Problems: Recent Progress and New Challenges
Nov 23	Nov 28	Classical Problems on Planar Polynomial Vector Fields
Nov 23	Nov 28	Symmetries of Graphs and Networks
Nov 30	Dec 05	Arithmetic of K3 surfaces
Dec 07	Dec 12	Computability, Reverse Mathematics and Combinatorics

2-Day Workshops 2008

Apr 18	Apr 20	Ted Lewis Workshop on SNAP Math Fairs 2008
Jul 11	Jul 13	Recent Progress in Rigidity Theory
Sep 05	Sep 07	CARP User Meeting
Sep 19	Sep 21	Second Graduate Research Summit of the International Graduate Training Centre (IGTC) in Mathematical Biology
Oct 24	Oct 26	Singular Phenomena in Nonlinear Optics, Hydrodynamics and Plasmas

Summer Schools

Aug 10	Aug 17	The Stable Trace Formula, Automorphic Forms, and Galois Representations

Research In Teams

May 4	May 11	Higher Resonance Varieties
May 18	May 25	Discrete Integrable Systems in Projective Geometry
May 25	Jun 01	Investigating Graphs with Odd Cycles via Commutative Algebra
Jun 01	Jun 08	Derived Category Methods in Commutative Algebra
Jun 15	Jun 22	String Cosmology
Jul 20	Jul 27	Schur Quasisymmetric Functions and Macdonald Polynomials
Jul 27	Aug 03	Finiteness Problems in Arithmetic Deformation Theory
Aug 24	Aug 31	The Rate of Convergence of Loop-Erased Random Walk to SLE(2)
Sep 14	Sep 21	Classification of Amalgams for Non-spherical Kac-Moody Groups

Focused Research Groups

May 11	May 18	Water Movements in Biological Tissue and Diffusion-Weighted Imaging
Jun 29	Jul 06	Hausdorff Geometry of Complex Polynomials, Positive Charge Distributions and Normal Operators
Aug 03	Aug 10	Traceability of Graphs and Digraphs
Sep 28	Oct 05	Differential Equations Driven by Fractional Brownian Motion as Random Dynamical Systems: Qualitative Properties

Banff International Research Station

2008

5-Day Workshops

Free Probability, Extensions, and Applications
January 13 - 18, 2008

Organizers:

Aleandru Nica (University of Waterloo)
Roland Speicher (Queen's University)
Antonia Tulino (Università degli Studi di Napoli Federico II)
Dan Voiculescu (UC Berkeley)

Free Probability is a recent mathematical theory which tries to understand non-commutative algebras (as they appear, e.g., in quantum mechanics) by using techniques inspired by classical probability theory. This approach has been very successful, solving some longstanding problems in the field of operator algebras. Quite surprisingly, it has turned out that the methods and results of free probability can also be used to describe the spectral properties of random matrices. The latter appear in many models in applied sciences; e.g., Wishart random matrices are at the basis of modern statistics and similar kind of random matrices are used to model wireless communication by electrical engineers. The workshop put special emphasis on applications of free probability and the attempts to extend its framework.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5076/

Participants:

Anshelevich, Michael (Texas A&M University)
Belinschi, Serban (University of Saskatchewan)
Bercovici, Hari (Indiana University)
Brenken, Berndt (University of Calgary)
Bryc, Wlodzimierz (University of Cincinnati)
Caitaine, Mireille (CNRS/Universite Paul Sabatier)
Collins, Benoit (University of Ottawa)
Curran, Stephen (UC Berkeley)
Donati-Martin, Catherine (Université Paris VI/CNRS)
Dykema, Ken (Texas A&M University)
Edelman, Alan (MIT)
Farrell, Brendan (UC Davis)
Heo, Jaeseong (Hanyang University)
Hiai, Fumio (Tohoku University)
Kargin, Vladislav (Courant Institute)
Kemp, Todd (MIT)
Letac, Gerard (Universite Paul Sabatier)
McKay, Matthew (Hong Kong University of Science and Technology)
Mingo, James A. (Queen's University)
Moustakas, Aris (National & Capodistrian University of Athens)
Muller, Ralf (Norwegian University of Science and Technology)
Nica, Alexandru (University of Waterloo)
Nowak, Maciej (Jagiellonian University)
Rao, N. Raj (MIT)
Rashidi Far, Reza (Canadian Space Agency)
Ryan, Oyvind (University of Oslo)
Shiber, Dan (UCLA)
Shlyakhtenko, Dimitri (UCLA)
Silverstein, Jack (North Carolina State University)
Speicher, Roland (Queen's University)
Tulino, Antonia (Università degli Studi di Napoli Federico II)
Verdu, Sergio (Princeton University)
Voiculescu, Dan (UC Berkeley)
Wang, Jiun-Chau (Indiana University)

Combinatorial Game Theory
January 20 - 25, 2008

Organizers:

Michael Albert (University of Otago)
Elwyn Berlekamp (UC Berkeley)
Ezra Miller (University of Minnesota)
Martin Mueller (University of Alberta)
Richard Nowakowski (Dalhousie University)
David Wolfe (Gustavus Adolphus College)

Every recorded civilization has played games. Almost everyone has some interest in games, many are fascinated by them, and for some they are an obsession. Games with no chance elements such as chess, checkers and go have always had a particular intellectual attraction. Combinatorial game theory, developed largely since the 1970s, is the mathematical study of games of this type. Chess and go are far too complex to be completely understood using combinatorial game theory, but tools developed as part of the subject such as the idea of "game-theoretic value" have provided powerful methods for understanding particular problems in these and other games as well as general high-level principles for playing specific games. Most recently, computers and algorithms have become more significant in the area. In particular, the prospect of fusing the theoretical methods of combinatorial game theory to the powerful search techniques used in traditional game playing programs is an exciting one.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5075/

Participants:

Allen, Meghan (Dalhousie University)
Berlekamp, Elwyn (UC Berkeley)
Cazenave, Tristan (University Paris VIII)
Cranston, Daniel (Rutgers)
Cruttwell, Geoff (Dalhousie University)
Demaine, Martin (MIT)
Duchêne, Eric (Institut Fourier, ERT Maths à Modeler)
Elkies, Noam (Harvard University)
Fink, Alex (UC Berkeley)
Fraenkel, Aviezri (Weizmann Institute of Science)
Grossman, J.P. (D E Shaw)
Guy, Richard (University of Calgary)
Hearn, Robert (Dartmouth College)
Henderson, Philip (University of Alberta)
Knight, Erick (Gustavus Adolphus College/St. Peter High School)
Larsson, Urban (Goteborg University)
Low, Richard M. (San Jose State University)
McKay, Neil (Dalhousie University)
Miller, Ezra (University of Minnesota)
Mueller, Martin (University of Alberta)
Nakamura, Teigo (Kyushu Institute of Technology)
Nowakowski, Richard (Dalhousie University)
Ottaway, Paul (St. Francis Xavier University)
Payne, Sam (Stanford University)
Plambeck, Thane (Berkeley)
Saff, Kevin (University of Calgary)
Salama, Cherif (Rice University)
Santos, Carlos (FCUL)
Siegel, Aaron (Institute for Advanced Study)
Siegel, Angela (Dalhousie University)
Silva, Jorge Nuno (University of Lisbon)
Takizawa, Takenobu (Waseda University)
Thanatipanonda, Thotsaporn (Rutgers University)
Thompson, Howard (Spring Arbor University)
Weimerskirch, Mike (St. Olaf College)

C*-Algebras Associated to Discrete and Dynamical Systems
January 27 - February 1, 2008

Organizers:

Soren Eilers (University of Copenhagen)
George Elliott (University of Toronto)
Alex Kumjian (University of Nevada, Reno)
David Pask (Wollongong University)
Iain Raeburn (University of Wollongong)
Andrew Toms (York University)

The goal of this workshop is to connect researchers who are working on the various types of C*-algebras associated to discrete and dynamical structures. The branches of this subject have, despite their common roots in Bratteli diagrams and Cuntz-Krieger algebras, diverged both mathematically and geographically. But they have much to offer each other in terms of techniques and philosophy, if only the principals can be brought under one roof. This BIRS workshop enabled an exchange of ideas whose scale and range could not be matched by small collaborations.

Participants:

an Huef, Astrid (University of New South Wales)
Barge, Marcy (Montana State University)
Bates, Teresa (University of New South Wales)
Carlsen, Toke (University of Wollongong)
Censor, Aviv (UC Riverside)
Ciuperca, Alin (University of Toronto)
Coward, Kristofer (York University)
Cuntz, Joachim (University of Muenster)
Deaconu, Valentin (University of Nevada, Reno)
Eilers, Soren (University of Copenhagen)
Elliott, George (University of Toronto)
Giordano, Thierry (University of Ottawa)
Huang, Danrun (St. Cloud State University)
Ionescu, Marius (Cornell University)
Johansen, Rune (University of Copenhagen)
Kaliszewski, Steve (Arizona State University)
Katsura, Takeshi (University of Toronto)
Kerr, David (Texas A&M University)
Kirchberg, Eberhard (Humboldt University, Berlin)
Kribs, David (University of Guelph)
Kumjian, Alex (University of Nevada, Reno)
Mahanta, Snigdhayan (University of Toronto)
Merkli, Marco (Memorial University)
Muhly, Paul (University of Iowa)
Niu, Zhuang (Fields Institute)
Pask, David (Wollongong University)
Phillips, N. Christopher (University of Oregon)
Putnam, Ian (University of Victoria)
Quigg, John (Arizona State University)
Raeburn, Iain (University of Wollongong)
Renault, Jean (Universite d'Orleans)
Rennie, Adam (Australian National University)
Restorff, Gunnar (University of Copenhagen)
Rordam, Mikael (University of Southern Denmark)
Ruiz, Efren (University of Hawaii ,Hilo)
Santiago Moreno, Luis (University of Toronto)
Skau, Christian (NTNU Trondheim)
Spielberg, Jack (Arizona State University)
Szymanski, Wojciech (University of Newcastle)
Thomsen, Klaus (Aarhus University)
Tomforde, Mark (University of Houston)
Toms, Andrew (York University)
Watatani, Yasuo (Kyushu University)
Williams, Dana (Dartmouth University)

Mathematical Advancement in Geophysical Data Assimilation
February 3 - 8, 2008

Organizers:

Pierre Gauthier (Université du Québec à Montréal)
Kayo Ide (UCLA)
Chris Jones (University of North Carolina / University of Warwick)
Keith Thompson (Dalhousie University)

The most routinely performed implementation of geophysical data assimilation (DA) is numerical weather prediction. The daily weather forecast is state-of-the-art science performed on a supercomputer using up-to-date DA technology. The current state of the atmosphere is estimated optimally by fusing the relevant atmospheric observations over the preceding few hours of a DA cycle into an output computed by a large atmospheric model as a forecast. The resulting analysis of the current state is then used as a new initial condition to start a forecast for the next assimilation cycle. The issue of fusing data into models arises in all scientific areas that enjoy a profusion of data. We now have a tremendous opportunity to bring the relevant scientific areas together in a focused effort aimed at developing new approaches, understanding the underlying issues and testing the implementation of new schemes. This workshop aims to advance DA further beyond the current state-of-the-art by engaging the mathematical community in the fascinating challenges presented by the need for ever-improving forecasts.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5096/

Participants:

Bocquet, Marc (Université Paris-Est/INRIA)
Buehner, Mark (Environment Canada)
Desroziers, Gerald (Meteo-France)
Dowd, Mike (Dalhousie University)
Ehrendorfer, Martin (University of Reading)
Gauthier, Pierre (Université du Québec à Montréal)
Ide, Kayo (UCLA)
Jones, Chris (University of North Carolina / University of Warwick)
Kostelich, Eric (Arizona State University)
Krener, Arthur (Naval Postgraduate School)
Li, Zhijin (NASA Jet Propulsion Laboratory)
Lorenc, Andrew (Met Office)
Menard, Richard (Meteorological Service of Canada)
Miller, Robert (Oregon State University)
Nichols, Nancy (University of Reading)
Pannekoucke, Olivier (Meteo-France)
Snyder, Chris (National Center for Atmospheric Research)
Sri Namachchivaya, N. (UIUC)
Szunyogh, Istvan (University of Maryland)
Talagrand, Olivier (Laboratoire de Meteorologie Dynamique / ENS)
Tang, Youmin (University of Northern British Columbia)
Tangborn, Andrew (NASA Goddard Space Flight Center)
Thompson, Keith (Dalhousie University)
Todling, Ricardo (NASA Goddard Space Flight Center)
Toth, Zoltan (National Centers for Environmental Prediction)
van Leeuwen, Peter Jan (Utrecht University)
Vernieres, Guillaume (University of North Carolina, Chapel Hill)
Vukicevic, Tomislava (University of Colorado, Boulder)
Zhang, Fuqing (Texas A&M University)
Zupanski, Milija (Colorado State University)

Facets of Heteroepitaxy: Theory, Experiment, and Computation
February 10 - 15, 2008

Organizers:

Joanna Mirecki-Millunchick (University of Michigan) **Peter Smereka** (University of Michigan)
Christian Ratsch (UCLA)

This conference brought together mathematicians, scientists, and engineers to discuss a process, named heteroepitaxy. Quantum dot materials can be made by this process. Such materials have novel optical and electronic properties; in fact some types of solid-state lasers have been made using them. A very promising way to manufacture such quantum dots is to take advantage of the fact that due to elastic strain, these quantum dots self-assemble. Many aspects of these mechanisms remain mysterious and the purpose of this meeting is to bring together a diverse group of people to help to shed some new light on this important process.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5050/

Participants:

Baskaran, Arvind (University of Michigan)
Bickel, Jessica (University of Michigan)
Chen, Hui-Chen (University of Michigan)
Drucker, Jeff (Arizona State University)
Evans, James (Iowa State University)
Fichthorn, Kristen (Pennsylvania State University)
Gibou, Frederic (UC Santa Barbara)
Goorsky, Mark (UCLA)
Gray, Jennifer (University of Pittsburgh)
Haselwandter, Christoph (MIT)
Hull, Robert (Univerisity of Virginia)
Kohn, Robert (New York University)
Lu, Wei (University of Michigan)
Margetis, Dionisios (University of Maryland)
Medeiros-Ribeiro Gilberto (Laboratorio Nacional de Luz Sincrotron)
Mirecki-Millunchick, Joanna (University of Michigan)
Modine, Normand (Sandia National Lab)
Niu, Xiaobin (UCLA)
Placidi, Ernesto (University of Rome Tor Vergata)
Ratsch, Christian (UCLA)
Russo, Giovanni (Universita' di Catania)
Scheffler, Matthias (Fritz Haber Institute)
Schulze, Tim (University of Tennessee)
Shchukin, Vitaly (VI Systems GmbH/Technical University of Berlin)
Shenoy, Vivek (Brown University)
Smereka, Peter (University of Michigan)
Tersoff, Jerry (IBM)
Tiedje, Thomas (UBC)
Tringides, M.C. (Iowa State University, Ames Laboratory)
Versieux, Henrique (New York University)
Voigt, Axel (Techniche Universitat Dresden)
Wasilewski, Zbig (National Research Council of Canada)
Wessels, Bruce (Northwestern University)
Wu, Jia-Hung (University of Michigan)
Xie, Ya-Hong (UCLA)
Yeon, Dong-Hee (University of Michigan)

Special Structures in Riemannian Geometry
February 17 - 22, 2008

Organizers:

Gordon Craig (McMaster University/Bishop's University)
Spiro Karigiannis (Oxford University)
Conan Leung (Chinese University of Hong Kong)
Maung Min-Oo (McMaster University)
Shing-Tung Yau (Harvard University)

Mathematicians who work in the area of modern geometry study the kinds of shapes that can exist, usually of higher dimension, and the properties that these shapes possess. For higher dimensional shapes, many more surprising and complicated relationships exist between the way a shape can curve and its other geometric properties. The dimension of shape is just the number of independent quantities that are needed to describe it. Such a shape need not be visualizable, and does not have to represent physical space. A remarkable fact is that modern theories of physics, which attempt to understand the relationship between Einstein's theory of general relativity and quantum mechanics, require for their description the use of such higher dimensional shapes that possess some special properties. Mathematicians have been working together with these physicists for the last thirty years trying to understand these mysterious and yet beautiful relationships. The more they learn, the richer and more complex this marriage of physics and geometry appears to be. This workshop brought together these researchers to continue the investigations into these fundamental scientific questions.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5039/

Participants:

Anderson, Michael (SUNY Stony Brook)
Bahuaud, Eric (Université Montpellier II)
Butscher, Adrian (University of Toronto, Scarborough)
Cavalcanti, Gil (University of Oxford)
Charbonneau, Benoit (Duke University)
Clarke, Andrew (State University of New York, Stony Brook)
Craig, Gordon (McMaster University/ Bishop's University)
Dancer, Andrew (University of Oxford)
Duchemin, David (Ecole polytechnique)
Gambioli, Andrea (Université du Québec a Montréal)
Graham, Robin (University of Washington)
Grigorian, Sergey (University of Cambridge)
Gualtieri, Marco (MIT)
Gukov, Sergei (UC Santa Barbara)
Haskins, Mark (Imperial College London)
Ionel, Marianty (University of Toledo)
Isenberg, Jim (University of Oregon)
Karigiannis, Spiro (University of Oxford)
Keller, Julien (Imperial College)
Kim, Chang-Wan (Korea Institute of Advanced Study)
Lee, JaeHyouk (Washington University at St. Louis)
Leung, Naichung Conan (Chinese University of Hong Kong)
Loftin, John (Rutgers University Newark)
Lotay, Jason (MSRI)
McKay, Ben (University College Cork)
Min-Oo, Maung (McMaster University)
Moraru, Ruxandra (University of Waterloo)
Pollack, Daniel (University of Washington)
Reiris, Martin (MIT)
Swann, Andrew (University of Southern Denmark)
The, Dennis (McGill University)
Tonnesen-Friedman, Christina (Union College)
Wei, Guofang (UC Santa Barbara)

Quantum Chaos: Routes to RMT Statistics and Beyond
February 24 - 29, 2008

Organizers:

Gregory Berkolaiko (Texas Agricultural and Mechanical University)

Uzy Smilansky (Weizmann Institute of Science)
Robert Whitney (Institut Laue-Langevin, Grenoble)

Chaos is a generic property of classical dynamics. Thus, to get a deeper understanding of the physical world at the quantum level, it is crucial to explore quantum mechanics in systems whose classical counterparts are chaotic. This area of research, which attracts interest of both physicists and mathematicians, is usually termed "quantum chaos." There are several outstanding conjectures in this area, for example it has been observed numerically that many classically chaotic systems have spectra that resemble (in a statistical sense) spectra of large random matrices. There are two major approaches used to treat such problem, one using expansions over periodic orbits of the classical system and one using field-theoretical methods. This workshop was aimed at bringing together scientists that use the two approaches and, on the other hand, bring together physicists and mathematicians to heighten awareness of the recent major developments in the said approaches.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5091/

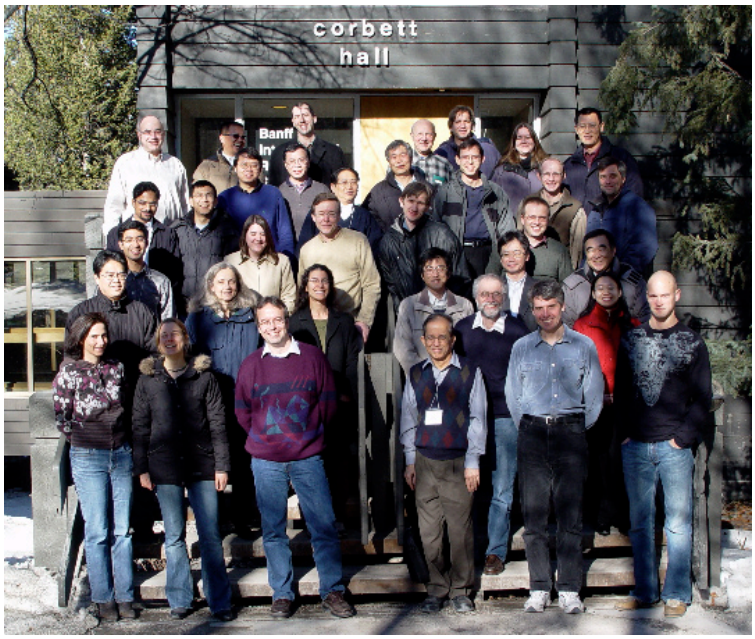
Participants:

Aizenman, Michael (Princeton University)
Band, Ram (Weizmann Institute of Science)
Baranger, Harold (Duke University)
Ben-Shach, Gilad (McGill University)
Berkolaiko, Gregory (Texas Agricultural and Mechanical University)
Bogomolny, Eugene (CNRS/Université Paris Sud)
Bohigas, Oriol (Université Paris-Sud Orsay)
Bolte, Jens (Royal Holloway, University of London)
Brouwer, Piet (Cornell)
Chalker, John (Oxford)
Cohen, Doron (Ben-Gurion University)
Gnutzman, Sven (University of Nottingham)
Haake, Fritz (Universitaet Duisburg-Essen)
Harrison, Jon (Baylor University)
Jacquod, Philippe (University of Arizona)
Kelmer, Dubi (Institute for Advanced Study)
Kuipers, Jack (Bristol University)
Macucci, Massimo (Universita di Pisa)
Mueller, Sebastian (University of Bristol)
Nagao, Taro (Nagoya University)
Nishigaki, Shinsuke M. (Shimane University)
Nonnenmacher, Stephane (Commissariat à l'énergie atomique Saclay)
Novaes, Marcel (University of Bristol)
Petitjean, Cyril (University of Regensburg)
Rahav, Saar (University of Maryland)
Rotter, Stefan (Yale University)
Schomerus, Henning (Lancaster University)
Sieber, Martin (University of Bristol)
Stark, Harold (UC San Diego)
Terras, Audrey (UC San Diego)
Tomsovic, Steven (Washington State University)
Ullmo, Denis (Université Paris Sud)
Vanicek, Jiri (Ecole Polytechnique Federale de Lausanne)
Waltner, Daniel (Universität Regensburg)
Warzel, Simone (Princeton University)
Whitney, Robert (Institut Laue-Langevin, Grenoble)
Winn, Brian (Loughborough University)
Zirnbauer, Martin (University of Cologne)

Quantum Affine Lie Algebras, Extended Affine Lie Algebras, and Applications
March 2 - 7, 2008

Organizers:

Yun Gao (York University)
Naihuan Jing (North Carolina State University)
Michael Lau (University of Windsor)
Kailash Misra (North Carolina State University)



Affine Lie algebras are mathematical objects that describe the symmetries of certain physical systems. They and their quantum analogues have applications to many beautiful areas of mathematics and physics.
This workshop brought together leading experts on two of the most important generalizations of affine Lie algebras: the theory of quantum affine Lie algebras, and extended affine Lie algebras. It is hoped that the activities of this conference will help to better understand the relationship between these theories and provide new insights and directions for research.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5015/

Participants:

Allison, Bruce (University of Alberta)
Bakalov, Bojko (North Carolina State University)
Beier, Julie (North Carolina State University)
Benkart, Georgia (University of Wisconsin, Madison)
Berman, Stephan (University of Saskatchewan)
Bhargava, Sandeep (York University)
Billg, Yuly (Carleton University)
Chari, Vyjayanthi (UC Riverside)
Chen, Xueqing (University of Wisconsin, Whitewater)
Christodoloupoulou, Konstantina (University of Windsor)
Cox, Ben (College of Charleston)
Dong, Chongying (University of California)
Futorny, Vyacheslav (University of Sao Paulo)
Gao, Yun (York University)
Jing, Naihuan (North Carolina State University)
Lau, Michael (University of Windsor)
Lin, Yanan (Xiamen University)
Misra, Kailash (North Carolina State University)
Morita, Jun (University of Tsukuba)
Mukhin, Evgeny (Purdue University)
Nakashima, Toshiki (Sophia University)
Neeb, Karl-Hermann (Darmstadt Technical University)
Neher, Erhard (University of Ottawa)
Okado, Masato (Osaka University)
Pianzola, Arturo (University of Alberta)
Ray, Rob (Gonzaga University Washington)
Savage, Alistair (University of Ottawa)
Schilling, Anne (UC Davis)
Senesi, Prasad (University of Ottawa)
Sun, Jie (University of Alberta)
Tan, Shaobin (Xiamen University)
Varagnolo, Michela (Universite de Cergy-Pontoise)
Vasserot, Eric (University Paris VII)
Vazirani, Monica (UC Davis)
Walia, Rajeev (UC Riverside)
Welte, Angelika (University of Ottawa)
Yoshii, Yoji (Akita National College of Technology)
Zhao, Kaiming (Wilfrid Laurier)

New Topological Contexts for Galois Theory and Algebraic Geometry
March 9 - 14, 2008

Organizers:

Andrew Baker (University of Glasgow /University of Oslo) **Birgit Richter** (University of Hamburg)

Algebraic topology is primarily concerned with the introduction of computable or otherwise usable algebraic invariants of spaces and continuous mappings with a view to solving geometric problems. The oldest examples are derived from homotopy and homology of spaces, but the late twentieth century saw the subject expand rapidly and become increasingly sophisticated in its ability to define homotopically invariant algebraic machinery, often associated with multiplicative cohomology theories and their internal operations. The inputs to these have included established mathematical ideas from subjects such as algebraic geometry, number theory and many others. Our program is intended to bring together topologists actively developing or using these new techniques and to open further the interactions with other subject areas by including non-topologist participants who would contribute to this. The main focus is on new contexts for Galois theory and Algebraic Geometry.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5014/

Participants:

Ando, Matthew (University of Illinois)
Angeltveit, Vigleik (University of Chicago)
Ausoni, Christian (University of Bonn)
Baker, Andrew (University of Glasgow/University of Oslo)
Barwick, Clark (Institute for Advanced Study)
Basterra, Maria (University of New Hampshire, Durham)
Bauer, Kristine (University of Calgary)
Blumberg, Andrew (Stanford University)
Brun, Morten (University of Bergen)
Bruner, Robert (Wayne State University)
Chebolu, Sunil (University of Western Ontario)
Devinatz, Ethan (University of Washington)
Dundas, Bjoern (University of Bergen)
Dwyer, William (Notre Dame University)
Elmendorf, Tony (Purdue University, Calumet)
Gepner, David (University of Sheffield)
Goerss, Paul (Northwestern University)
Greenlees, John (University of Sheffield)
Hess, Kathryn (Ecole Polytechnique Fédérale de Lausanne)
Hill, Mike (University of Virginia)
Hovey, Mark (Wesleyan University)
Hu, Po (Wayne State University)
Jardine, Rick (University of Western Ontario)
Laures, Gerd (Universitaet Bochum)
Lawson, Tyler (University of Minnesota)
Lunoe-Nielsen, Sverre (University of Oslo)
Mandell, Michael A. (Indiana University)
May, Peter (University of Chicago)
McCarthy, Randy (UIUC)
Montgomery, Susan (University of Southern California)
Morava, Jack (Johns Hopkins University)
Reinhard, Philipp (University of Glasgow)
Richter, Birgit (University of Hamburg)
Rognes, John (University of Oslo)
Roitzheim, Constanze (University of Sheffield)
Roth, Fridolin (University of Hamburg)
Sagave, Steffen (University of Oslo)
Schlichtkrull, Christian (University of Bergen)
Shipley, Brooke (University of Illinois, Chicago)
Strickland, Neil (University of Sheffield)
Whitehouse, Sarah (University of Sheffield)

Recent Progress on the Moduli Space of Curves
March 16 - 21, 2008

Organizers:

Aaron Bertram (University of Utah)
Jim Bryan (UBC)
Renzo Cavalieri (University of Michigan)
David Ellwood (Clay Mathematics Institute)

Enumerative geometry has roots going back to the ancient Greeks. A thorough understanding of the intersection properties of special geometric spaces is crucial to the "modern" approach to enumerative (counting) problems in geometry. Some of the most important, and still most mysterious, of these are the spaces of algebraic curves. New insights inspired by string theory have led to recent breakthroughs in the study of the intersections properties of the spaces of algebraic curves. In this workshop, experts and students gathered to discuss the recent developments and explore their consequences.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5086/

Participants:

Anderson, David (University of Michigan)
Arcara, Daniele (Saint Vincent College)
Bayer, Arend (University of Utah)
Bertram, Aaron (University of Utah)
Bryan, Jim (UBC)
Cadman, Charles (UBC)
Cavalieri, Renzo (University of Michigan)
Ciocan-Fontanine, Ionut (University of Minnesota)
DeLand, Matt (Columbia University)
Edidin, Dan (University of Missouri)
Faber, Carel (Kungliga Tekniska Högskolan)
Fantechi, Barbara (Scuola Internazionale Superiore di Studi Avanzati)
Farkas, Gavril (Humboldt Universitat zu Berlin)
Gibney, Angela (University of Pennsylvania)
Gillam, Danny (Columbia University)
Goulden, Ian (University of Waterloo)
Hering, Milena (University of Minnesota)
Ionel, Eleny (Stanford University)
Jackson, David (University of Waterloo)
Jarvis, Tyler (Brigham Young University)
Jiang, Yunfeng (University of Utah)
Johnson, Paul (University of Michigan)
Kimura, Takashi (Boston University)
Krawitz, Marc (University of Michigan)
Lee, Yuan-Pin (University of Utah)
Liu, Chiu-Chu Melissa (Northwestern University)
Lozano, Cesar (CINVESTAV-IPN)
Ludkvist, Christian (University of Michigan)
Morrison, Andrew (UBC)
Pagani, Nicola (Scuola Internazionale Superiore di Studi Avanzati)
Payne, Sam (Clay Institute/Stanford University)
Penev, Nikola (Stanford University)
Safnuk, Brad (McMaster University)
Shapiro, Michael (Michigan State University)
Smith, Gregory G. (Queens University)
Steinberg, David (UBC)
Szendroi, Balazs (Oxford University)
Todorov, Gueorgui (University of Utah)
Tseng, Hsian-hua (University of Wisconsin)
Vakil, Ravi (Stanford University)
Wise, Jonathan (Brown University)
Yang, Stephanie (Kungliga Tekniska Högskolan)

Topics in Von Neumann Algebras
March 23 - 28, 2008

Organizers:

Juliana Erlijman (University of Regina) **Hans Wenzl** (UC San Diego)

There have been exciting developments in the theory of von Neumann algebras with close connections to recent works in quantum mechanics, topology and representation theory of infinite groups. Major emphasis will be given to Popa's recent breakthroughs in von Neumann algebras, which are connected to rigidity theorems in group theory as well as to Jones' subfactor theory. The latter already had deep applications in topology and intriguing connections to quantum field theory. It also inspired, at least in part, Freedman's work on quantum computing. The workshop will be a great opportunity for the participants to make further progress on these exciting topics, as well as for younger people to get exposed to the latest developments.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/ 08w5093/

Participants:

Argerami, Martin (University of Regina)
Asaeda, Marta (UC Riverside)
Asher, Jason (UCLA)
Belinschi, Serban (University of Saskatchewan)
Bisch, Dietmar (Vanderbilt University)
Brenken, Berndt (University of Calgary)
Burstein, Richard (UC Berkeley)
Censor, Aviv (UC Riverside)
Dean, Andrew (Lakehead University)
Dykema, Ken (Texas A&M University)
Dynov, Ivan (Max Planck Institute for Mathematics)
Elliott, George (University of Toronto)
Erlijman, Juliana (University of Regina)
Grossman, Pinhas (Vanderbilt University)
Haagerup, Uffe (University of Southern Denmark)
Houdayer, Cyril (UCLA)
Ioana, Adrian (Caltech)
Ivanescu, Cristian (University of Toronto)
Jensen, Troels Steenstrup (University of Southern Denmark)
Kawahigashi, Yasuyuki (University of Tokyo)
Longo, Roberto (University of Rome Tor Vergata)
Mingo, James A. (Queen's University)
Musat, Magdalena (University of Memphis)
Niu, Zhuang (University of Oregon)
Ozawa, Narutaka (University of Tokyo)
Peters, Emily (UC Berkeley)
Peterson, Jesse (UC Berkeley)
Pichot, Mikael (IHES)
Rowell, Eric (Texas A&M University)
Sako, Hiroki (University of Tokyo)
Sasyk, Roman (University of Ottawa)
Sauer, Roman (University of Chicago)
Sunder, V.S. (IMSc, India)
Tornquist, Asger (University of Toronto)
Vaes, Stefaan (Katholieke Universiteit Leuven)
Viola, Maria Grazia (Fields Institute)
Wang, Zhenghan (Microsoft Corporation/UCSB)
Wenzl, Hans (UC San Diego)
Xu, Feng (UC Riverside)

Recent Developments in Elliptic and Degenerate Elliptic Partial Differential Equations, Systems and Geometric Measure Theory
March 30 - April 4, 2008

Organizers:

David Cruz-Uribe (Trinity College)
Steven Hofmann (University of Missouri, Columbia)
Marius Mitrea (University of Missouri, Columbia)
Salvador Perez Esteva (UNAM)
Cristian Rios (University of Calgary)
Eric Sawyer (McMaster University)

Elliptic and parabolic PDEs are the subject of considerable pure and numerical scientific research. They are of paramount importance in pure and applied sciences and have vastly contributed to our present-day understanding of such basic phenomena as heat transfer, market pricing, optimal transport problems, electrodynamics, and celestial movements, among many others.
The workshop focused on the exciting recent advances in the theory of Elliptic, and Parabolic Partial Differential Equations with rough coefficients as well as equations and systems which fail to be elliptic in a traditional sense, due to various sources of degeneracy.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5061/

Participants:

Capogna, Luca (University of Arkansas)
Cruz-Uribe, David (Trinity College)
David, Guy (University of Paris-Sud)
de Teresa, Luz (UNAM)
Garofalo, Nicola (Purdue University)
Hofmann, Steven (University of Missouri-Columbia)
Karabash, Illia (University of Calgary)
Lacey, Michael (Georgia Tech)
Lanzani, Loredana (University of Arkansas)
Marmolejo-olea, Emilio (UNAM)
Martell, Jose Maria (Consejo Superior de Investigaciones Cientificas)
Mayboroda, Svitlana (Ohio State University)
McIntosh, Alan (Australian National University)
Milakis, Emmanouil (University of Washington)
Mitrea, Marius (University of Missouri, Columbia)
Mitrea, Dorina (University of Missouri, Columbia)
Mitrea, Irina (University of Virginia)
Perez, Carlos (Universidad de Sevilla)
Perez Esteva, Salvador (UNAM)
Phan, Tuoc (UBC)
Rios, Cristian (University of Calgary)
Rodney, Scott (McMaster University)
Rule, David (University of Edinburgh)
Safonov, Mikhail (University of Minnesota)
Sawyer, Eric (McMaster University)
Shen, Zhongwei (University of Kentucky)
Torres, Rodolfo (University of Kansas)
Uriarte-Tuero, Ignacio (University of Missouri, Columbia/Fields Institute)
Verchota, Greg (Syracuse University)
Wright, James (Edinburgh University)
Xu, Chao-Jiang (Universite de Rouen)

Hodge Theory
April 6 - 11, 2008

Organizers:

Patrick Brosnan (UBC)
Mark Green (UCLA)
Ludmil Katzarkov (University of Miami)
Gregory Pearlstein (Michigan State University)

Hodge theory is the field of mathematics concerned with integrals of algebraic functions, their values and their properties. For example, the number *pi* is such an integral because it measures the area of the unit circle. One of the most important and difficult questions in mathematics, the Hodge conjecture, asks essentially whether the value of these integrals determines the algebraic structure of the functions being integrated. Hodge theory grew out of questions in physics about the equations of waves and it has many applications to physics. One notable example is in string theory.
A number of prominent specialists in Hodge theory converged at The Banff Centre for the workshop.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5106/

Participants:

Arap, Maxim (University of Georgia)
Belcher, Stephanie (University of Durham)
Brosnan, Patrick (UBC)
Cattani, Eduardo (University of Massachusetts)
Cautis, Sabin (Rice University)
Clemens, Herb (Ohio State University)
de Cataldo, Marc (Stony Brook University)
ElZein, Fouad (Institut de Mathematiques, Jussieu)
Fakhruddin, Najmuddin (Tata Institute)
Gangl, Herbert (University of Durham, UK)
Green, Mark (UCLA)
Griffiths, Phillip (Institute for Advanced Study)
Hayama, Tatsuki (Osaka University)
Hernandez, Jose (University of Alberta)
Hertling, Claus (Universitaet Manheim)
Izadi, Elham (University of Georgia)
Kang, Su-Jeong (University of Alberta)
Katzarkov, Ludmil (University of Miami)
Kerr, Matt (University of Durham)
Kooistra, Remkes (University of Alberta)
Kumar, Manish (Michigan State University)
Lalin, Matilde (University of Alberta)
Lewis, James (University of Alberta)
Pearlstein, Gregory (Michigan State University)
Sabbah, Claude (Ecole Polytechnique)
Saito, Morihiko (Kyoto University)
Schnell, Christian (Ohio State University)
Sreekantan, Ramesh (Tata Institute)
Steenbrink, Joseph (Radboud University)
Tuncer, Serhan (University of Alberta)
Turkmen, Inan (University of Alberta)
Usui, Sampei (Osaka University)
Voisin, Claire (IHES)
Young, Andrew (Princeton University)
Zucker, Steven (Johns Hopkins University)

Geometric Flows in Mathematics and Physics
April 13 - 18, 2008

Organizers:

Gerhard Huisken (Max Planck Institute for Gravitational Physics)

Todd Oliynyk (Monash University)
Eric Woolgar (University of Alberta)

This workshop sought to explore the connections between geometric flows and other areas of mathematics and physics. Geometric flows refer to various controlled ways in which geometry can be made to change smoothly with time, rather analogous to the way in which the geometry of the surface of a balloon becomes smooth and round as it is inflated with air. Over the last few years, this field has seen amazing mathematical progress, and the number of applications outside mathematics has increased dramatically as well. In this workshop, we will invite a wide spectrum of mathematical workers in the field, but we will also invite a roughly equal number of physicists working on applications of geometric flows in physics. Our hope is that by bringing these communities together, we will be able to facilitate the transfer of the most recent mathematical knowledge to those working on physical problems, while exposing mathematicians to physics problems to encourage and motivate further mathematical advances.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5110/

Participants:

Akbar, Mohammad (University of Alberta)
Anco, Stephen (Brock University)
Athanassenas, Maria (Monash University)
Bakas, Ioannis (University of Patras)
Bartnik, Robert (Monash University)
Cao, Huai-Dong (Lehigh University)
Carfora, Mauro (University of Pavia)
Cox, Graham (Duke University)
Dai, Xianzhe (UC Santa Barbara)
Friedan, Daniel (Rutgers University)
Gegenberg, Jack (University of New Brunswick)
Gulcev, Liljana (Lily) (University of Alberta)
Hobill, David (University of Calgary)
Holder, Cody (University of Alberta)
Holzegel, Gustav (University of Cambridge)
Huisken, Gerhard (Max Planck Institute for Gravitational Physics)
Husain, Viqar (University of New Brunswick)
Lamm, Tobias (Max Planck Institute for Gravitational Physics)
Li, Jun-Fang (McGill University)
Metzger, Jan (Albert Einstein Institut)
Miao, Pengzi (Monash University)
Morrison, David (UC Santa Barbara)
Ni, Lei (UC San Diego)
Oliynyk, Todd (Monash University)
Schulze, Felix (Freie Universitat Berlin)
Sesum, Natasa (Columbia University)
Simon, Miles (Albert Ludwigs Universitaet, Freiburg)
Streets, Jeffrey (Princeton University)
Taylor, Stephen (SUNY Stony Brook)
Vardarajan, Suneeta (University of Alberta)
Warnick, Claude (Cambridge)
Woolgar, Eric (University of Alberta)

Dynamics of Structured Populations
April 20 - 25, 2008

Organizers:

Thomas Hillen (University of Alberta)
Frithjof Lutscher (University of Ottawa)
H. Thieme (Arizona State University)
Pauline van den Driessche (University of Victoria)

In this workshop, we studied mathematical models that are relevant to biological or medical applications. In recent years, it has been shown that mathematical modeling forms a powerful tool to understand, analyze and control biological or medical processes. A common theme of all these problems is the form of mathematical model that is used. The models are structured population dynamic models. A mathematical theory for structured population models is beginning to emerge. We aimed to advance the theory of structured population models, but also, we exchanged new developments between the various applications. The class of structured population models becomes more and more important in biomedical modeling and we expect that for some of the applications significant progress can be made.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5031/

Participants:

Arino, Julien (University of Manitoba)
Billings, Lora (Montclair State University)
Boldin, Barbara (University of Helsinki)
Caswell, Hal (Woods Hole Oceanographic Institution)
Cushing, Jim (University of Arizona)
Desjardins, Sylvie (UBC, Okanagan)
Diekmann, Odo (Universiteit Utrecht)
Flores, Kevin (Arizona State University)
Gong, Jiafen (University of Alberta)
Greenwood, Priscilla (Arizona State University)
Guo, Hongbin (York University)
Gyllenberg, Mats (University of Helsinki)
Hadeler, Karl (Arizona State University)
Hamelin, Frederic (University of Alberta)
Hastings, Alan (UC Davis)
Hilker, Frank (University of Alberta)
Hillen, Thomas (University of Alberta)
Klepac, Petra (Penn State University)
Kot, Mark (University of Washington)
Lewis, Mark (University of Alberta)
Lutscher, Frithjof (University of Ottawa)
Ma, Junling (University of Victoria)
Magal, Pierre (University of LeHavre)
Martin, Jonathan (University of Alberta)
Neubert, Michael (Woods Hole Oceanographic Institution)
Nevai, Andrew (The Ohio State University)
Ruan, Shigui (University of Miami)
Schreiber, Sebastian (UC Davis)
Seo, Gunog (University of Washington)
Smith, Hal (Arizona State University)
Thanate, Dhirasakdanon (Arizona State University)
Thieme, H. (Arizona State University)
Tyson, Rebecca (UBC, Okanagan)
van den Driessche, Pauline (University of Victoria)
Watmough, James (University of New Brunswick)
Weinberger, Hans (University of Minnesota)
Zhao, Xiaoqiang (Memorial University)
Zhu, Huaiping (York University)

Nonlocal Operators and Applications
April 27 - May 2, 2008

Organizers:

Imbert, Cyril (Université Paris, Dauphine/CEREMADE) **Regis Monneau** (École nationale des ponts et chaussées)
Antoine Mellet (UBC)

Numerous mathematicians met to discuss the most recent advances in nonlocal operators and applications. Nonlocal operators form a particular class of mathematical tools that are extremely useful in a wide range of applications (mathematical finance, formation of crystals etc.). This workshop brought together mathematicians from around the world to discuss the recent progress of mathematics concerning those operators and their applications. Six main topics were treated: non-local moving fronts, fractal Burgers equations, non-linear stochastic differential equations, mean-field and kinetic equations, non-linear elliptic equations, and reaction-diffsion equations. Several talks also discussed problems coming from applications such as oil extraction and genetic evolution.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5102/

Participants:

Alibaud, Nathael (Université Montpellier II)
Capella, Antonio (Universitat Bonn)
Cardaliaguet, Pierre (Université de Bretagne Occidentale)
Cowan, Craig (UBC)
Dolbeault, Jean (Université Paris Dauphine)
Droniou, Jerome (Université Montpellier II)
Gentil, Ivan (Université of Paris-Dauphine)
Ghoussoub, Nassif (BIRS)
Imbert, Cyril (Université Paris, Dauphine/CEREMADE)
Jourdain, Benjamin (Ecole nationale des ponts et chaussées)
Karch, Grzegorz (Uniwersytet Wroclawski)
Margetis, Dionisios (University of Maryland)
Meleard, Sylvie (Ecole Polytechnique)
Mellet, Antoine (UBC)
Monteillet, Aurelien (University of Brest)
Moradifam, Amir (UBC)
Mouhot, Clément (CNRS/Université Paris, Dauphine)
Patrizi, Stefania (Sapienza Università di Roma)
Peirce, Anthony (UBC)
Perthame, Benoit (University Pierre et Marie Curie)
Roquejoffre, Jean-Michel (Université Paul Sabatier Toulouse III)
Schwab, Russell (University of Texas at Austin)
Silvestre, Luis (New York University)
Sire, Yannick (Universite Paul Cezanne)
Souganidis, Panagiotis (University of Texas, Austin)
Vasseur, Alexis (University of Texas, Austin)
Vovelle, Julien (PIMS, Unité Mixte Internationale)
Woczynski, Wojbor (Case Western Reserve University)

Climate Change Impacts on Ecology and the Environment
May 4 - 9, 2008

Organizers:

Charmaine Dean (SFU)
Sylvia Esterby (UBC Okanagan)
Peter Guttorp (University of Washington)
Jim Zidek (UBC)

This workshop brought together a variety of environmental scientists, statisticians, and epidemiologists, in order to bring to bear modern methods of space-time modeling to assess and model the impact of climate change on agriculture, forestry and human health conditions.
The development of methods to assess and quantify climate change and its impacts is a critical area of research. For rapid advancement in this field, there is a need to work in a collaborative environment with a merging of tools in information science and ecosystem expertise because of the strong reliance on quantifying the changes using data analytic methods.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5054/

Participants:

Braun, John (Willard) (University of Western Ontario)
Cannon, Alex (Meteorological Service of Canada)
Cao, Jiguo (SFU)
Chen, Louis (National University of Singapore)
Chiu, Grace (University of Waterloo)
Conquest, Loveday (University of Washington)
Dou, Yiping (UBC)
Esterby, Sylvia (UBC Okanagan)
Feng, Cindy (SFU)
Fleming, Richard (Canadian Forest Service)
Flower, Aquila (Pacific Climate Impacts Consortium)
Fu, Frances (University of Western Ontario)
Gneiting, Tilmann (University of Washington)
Higdon, Dave (Los Alamos National Laboratory)
Horst, Ulrich (Humboldt University Berlin)
Hosseini, Reza (UBC)
Hrdlicková, Zuzana (UBC Okanagan)
Liu, Zhong (UBC)
Loeppky, Jason (UBC Okanagan)
Martell, David (University of Toronto)
Newlands, Nathaniel (Agriculture and Agri-Food Canada)
Petkau, A. John (UBC)
Picka, Jeffrey (University of New Brunswick)
Podur, Justin (York University)
Ramsay, Jim (McGill University)
Reese, Shane (Brigham Young University)
Routledge, Rick (SFU)
Scott, Marian (University of Glasgow)
Sheppard, Lianne (University of Washington)
Smith, Ron (Centre for Ecology and Hydrology)
Stocks, Brian (BJ Stocks Wildfire Investigations Ltd)
Welch, Will (UBC)
Woolford, Douglas (SFU)
Wotton, Mike (University of Toronto)
Zidek, Jim (UBC)
Zwiers, Francis (Environment Canada)

Matrix Factorizations in Physics and Mathematics
May 11 - 16, 2008

Organizers:

Ragnar-Olaf Buchweitz (University of Toronto, Scarborough)
Kentaro Hori (University of Toronto)
Anton Kapustin (California Institute of Technology)
Wolfgang Lerche (CERN)
Duco van Straten (University of Mainz)

Matrix factorizations are relevant nowadays in several different fields in physics and mathematics, including String theory, algebraic geometry, singularity theory, representation theory, and knot theory. The workshop brought together physicists and mathematicians from different backgrounds: algebra, topology, geometry, and String theory, who have common interests centered around matrix factorizations. It provided a forum to present new results, exchange ideas, and discuss new directions of research.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5080/

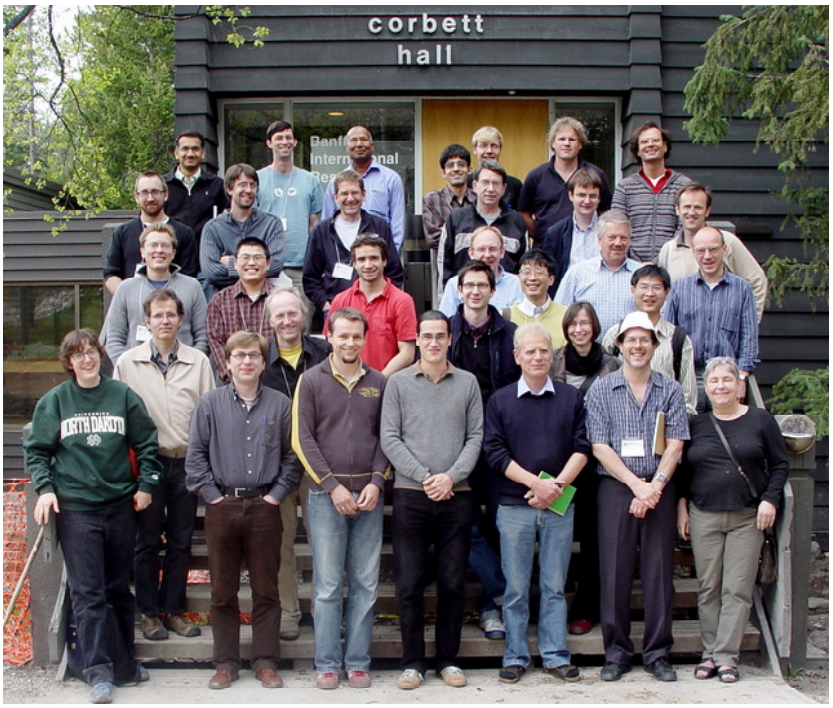
Participants:

Aspinwall, Paul (Duke University)
Baciu, Corina (Johannes Gutenberg University, Mainz)
Buchweitz, Ragnar-Olaf (University of Toronto, Scarborough)
Burban, Igor (University of Bonn)
Caldararu, Andrei (University of Wisconsin, Madison)
Carqueville, Nils (King's Collge London)
Craw, Alastair (University of Glasgow)
Dell'Aquila, Eleonora (Perimeter Institute)
Diaconescu, Duiliu-Emanuel (Rutgers University)
Fredenhagen, Stefan (Max Planck Potsdam)
Gao, Dongfeng (University of Toronto)
Gao, Peng (University of Toronto)
Hochenegger, Andreas (Freie Universitaet Berlin)
Hori, Kentaro (University of Toronto)
Hovinen, Bradford (University of Toronto)
Jockers, Hans (Stanford University)
Kajiura, Hiroshige (Research Institute for Mathematical Sciences)
Kapustin, Anton (California Institute of Technology)
Knapp, Johanna (Max Planck Institut fuer Physik, Munich)
Krasner, Daniel (Columbia University)
Nemeschansky, Dennis (University of Southern California)
Page, David (String Theory Researcher)
Quintero Velez, Alexander (Universiteit Utrecht)
Recknagel, Andreas (King's College London)
Roggenkamp, Daniel (Rutgers University)
Rozansky, Lev (University of North Carolina)
Saito, Kyoji (The Institute for the Physics and Mathematics of the Universe (IPMU))
Scheidegger, Emanuel (Universitaet Augsburg)
Smith, Gregory G. (Queens University)
Takahashi, Atsushi (Osaka University)

Locally Symmetric Spaces
May 18 - 23, 2008

Organizers:

Stephen Kudla (University of Toronto)
Juergen Rohlfs (Katholische Universitaet Eichstaett)
Leslie Saper (Duke University)
Birgit Speh (Cornell University



Locally symmetric spaces are important in geometry, analysis, and number theory, and their study uses techniques from all these areas. There has been substantial progress within each of these fields and some interactions between mathematicians from these different areas. In September 2003, J. Rohlfs and B. Speh organized a very successful workshop on locally symmetric spaces at Oberwolfach. This workshop was intended to be a sequel to it, with a greater range of topics, and with an expanded list of organizers in order to attract a more diverse group of mathematicians and in particular to encourage the attendance at the workshop of younger North American mathematicians.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5056/

Participants:

Benoist, Yves (ENS)
Bergeron, Nicolas (Institut de Mathematiques, Jussieu)
Boland, Patrick (University of Massachusetts)
Cossutta, Mathieu (DMA ENS/Paris 7)
Deitmar, Anton (Universitat Tabingen)
Fuchs, Mathias (Göttingen University)
Funke, Jens (New Mexico State University)
Getz, Jayce (Princeton University)
Gotsbacher, Gerald (University of Toronto)
Grobner, Harald (Universität Wien)
Hanke, Jonathan (University of Georgia)
Hilgert, Joachim (Paderborn University)
Ji, Lizhen (University of Michigan)
Kaiser, Christian (Max Planck Institut, Bonn)
Kobayashi, Toshiyuki (University of Tokyo)
Krötz, Bernhard (Max Planck Institut)
Leuzinger, Enrico (Universität Karlsruhe)
Mahnkopf, Joachim (Universität Wien)
Miller, Andrea (Harvard University)
Morel, Sophie (Institute for Advanced Study)
Müller, Werner (Universitat Bonn)
Nair, Arvind (Tata Institute)
Olbrich, Martin (Université du Luxembourg)
Prasad, Gopal (University of Michigan)
Rohlfs, Juergen (Katholische Universitaet Eichstaett)
Sagerschnig, Katja (Universität Wien)
Salmasian, Hadi (University of Alberta)
Saper, Leslie (Duke University)
Speh, Birgit (Cornell University)
Vasy, András (Stanford University)
Waldner, Christoph (Universität Wien)
Yasaki, Dan (University of Massachusetts)
Zucker, Steven (Johns Hopkins University)

Low Complexity Dynamics
May 25 - 30, 2008

Organizers:

Peter Ashwin (University of Exeter)
Arek Goetz (San Francisco State University)
Anthony Quas (University of Victoria)

This area of research deals with chaos in the presence of large-scale changes occurring instantaneously (such as in a collision of a billiard ball with an obstacle). Phenomena of this kind lead to a coexistence of very stable behaviour with very unstable behaviour.
The workshop brought together 40 specialists in low complexity dynamics. The main aim was to promote cutting edge research in these areas by fostering interaction between these groups. Over the last couple of years, there have been very significant advances in interval exchanges, leading to the solution of conjectures that have been open and actively studied by many authors for several decades. For this reason, it will be valuable to take stock of the new developments in the field with a view to exporting techniques and paradigms to neighbouring disciplines.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5046/

Participants:

Allahbakhshi, Mahsa (University of Victoria)
Ashwin, Peter (University of Exeter)
Baake, Michael (University of Bielefeld)
Bailey Frick, Sarah (Ohio State University)
Bedaride, Nicolas (Aix-Marseille III)
Boshernitzan, Michael (Rice University)
Bruin, Henk (University of Surrey)
Buzzi, Jerome (CNRS / Ecole Polytechnique)
Cheung, Yitwah (San Francisco State University)
Damanik, David (Rice University)
Devaney, Robert (Boston University)
Edwards, Roderick (University of Victoria)
Ferenczi, Sebastien (Institut de Mathematiques de Luminy)
Gaydashev, Denis (CRM)
Goetz, Arek (San Francisco State University)
Gunturk, Sinan (Courant Institute)
Hooper, Pat (Northwestern University)
Krueger, Helge (Rice University)
Lin, Congping (Zhejiang Normal University)
Lloyd, Simon (University of New South Wales)
Lowenstein, John (New York University)
Neumaerker, Natascha (University of Bielefeld)
Nicol, Matthew (University of Houston)
Nowicki, Tomasz (IBM TJ Watson Research Center)
Pavlov, Ronald (UBC)
Petersen, Karl (University of North Carolina)
Pires, Benito (University of Sao Paulo)
Quas, Anthony (University of Victoria)
Ralston, David (Rice University)
Roberts, John (University of New South Wales)
Schlaegel, Ulrike (University of Bielefeld)
Schwartz, Richard (Brown University)
Sturman, Rob (University of Leeds)
Tabachnikov, Sergei (Penn State University)
Ugarcovici, Ilie (DePaul University)
Vivaldi, Franco (Queen Mary University of London)
Wieler, Susana (University of Victoria)
Wu, Chai Wah (IBM TJ Watson Research Center)

Emerging Statistical Challenges in Genome and Translational Research
June 01 - 06, 2008

Organizers:

Jennifer Bryan (UBC)
Sandrine Dudoit (UC Berkeley)
Jane Fridlyand (Genentech Inc)
Darlene Goldstein (Ecole Polytechnique Fédérale de Lausanne)
Sunduz Keles (University of Wisconsin, Madison)
Katherine S. Pollard (UC Davis)

It is now well accepted that the capacity to generate genome-wide data has far outpaced the ability to analyze and interpret it. The rapid development of new high-throughput technologies allows biological investigations on an ever-growing scale. Addressing the new statistical demands has clear relevance for continued progress in biological and biomedical research predicated on genome-scale assays. Numerous researchers and specialists gathered to discuss these topics. The primary objectives of this workshop were (1) to address emerging statistical problems in the analysis and combination of diverse datasets arising from genome-scale assays applied in clinical and molecular genetic research, and (2) to facilitate meaningful interactions between the experimental biologists and physicians who produce genome-scale data and the statisticians who develop and implement appropriate analytical methodology. Substantive collaborations between these groups are vital for transforming the massive amount of data produced by new technologies into important biological discoveries and translational research.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5062/

Participants:

Ansari, Aseem (University of Wisconsin, Madison)
Baggerly, Keith (MD Anderson Cancer Center)
Bengtsson, Henrik (UC Berkeley)
Broman, Karl (Johns Hopkins University)
Bryan, Jennifer (UBC)
Bullard, James (UC Berkeley)
Collin, Francois (Genomic Health)
Conibear, Elizabeth (UBC)
Culhane, Aedin (Dana Farber Cancer Institute)
Delorenzi, Mauro (Swiss Institute of Bioinformatics)
Dopazo, Joaquin (Centro de Investigacion Principe Felipe)
Dudoit, Sandrine (UC Berkeley)
Durinck, Steffen (Lawrence Berkeley National Laboratory/UC Berkeley)
Fan, Jian-Bing (Illumina)
Fodor, Imola (Genentech, Inc)
Fridlyand, Jane (Genentech Inc.)
Goldstein, Darlene (Ecole Polytechnique Fédérale de Lausanne)
Gottardo, Raphael (UBC)
Hansen, Kasper (UC Berkeley)
Hayes, D Neil (University of North Carolina)
Hughes, Tim (University of Toronto)
Irizarry, Rafael (Johns Hopkins University)
Keles, Sunduz (University of Wisconsin, Madison)
Kostka, Dennis (UC Davis)
Lieb, Jason (University of North Carolina, Chapel Hill)
Mills, Gordon (M D Anderson Cancer Center)
Molinaro, Annette (Yale University)
Ngai, John (UC Berkeley)
Olshen, Adam (Memorial Sloan-Kettering Cancer Center)
Picard, Franck (CNRS)
Pollard, Katherine S (UC Davis)
Ruczinski, Ingo (Johns Hopkins University)
Segal, Mark (UC San Francisco)
Speed, Terry (Walter & Eliza Hall Institute of Medical Research)
Taub, Margaret (UC Berkeley)
Tavaré, Simon (University of Southern California/ Cambridge University)
Thorne, Natalie (Cambridge University)
van der Laan, Mark (UC Berkeley)
Wirapati, Pratyaksha (Swiss Institute of Bioinformatics)
Yang, Yee Hwa Jean (University of Sydney)
Yeh, Ru -Fang (UC San Francisco)
Zhao, Hongyu (Yale University)

Phase Transitions, Hard Combinatorial Problems and Message Passing Algorithms
June 08 - 13, 2008

Organizers:

Jennifer Chayes (Microsoft Research)
Fabio Martinelli (University of Roma Tre)
Michael Molloy (University of Toronto, Scarborough)
Prasad Tetali (Georgia Tech)

Many of the fundamental questions in natural and engineering sciences have been reduced to hard combinatorial optimization problems. During the last few years, there has been a growing awareness that insights and techniques from the study of phase transitions in physics are relevant to the "average-case" performance of algorithms for random instances of these combinatorial problems. In particular, work on phase transitions in spin glasses inspired the invention of a new class of so-called "message-passing" algorithms for these problems. These algorithms perform astonishingly well in practice, and suggest a host of fascinating mathematical conjectures. This workshop examined mathematical, theoretical and applied aspects of these new algorithms.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5109/

Participants:

Achlioptas, Dimitris (UC Santa Cruz)
Bayati, Mohsen (Microsoft Research)
Bhatnagar, Nayantara (UC Berkeley)
Borgs, Christian (Microsoft Research)
Chayes, Jennifer (Microsoft Research)
Frieze, Alan (Carnegie Mellon University)
Gamarnik, David (MIT)
Kang, Mihyun (Humboldt University Berlin)
Kanoria, Yashodhan (Stanford University)
Lozano, Jose (University of the Basque Country)
Lubetzky, Eyal (Microsoft Research)
Maneva, Elitza (IBM Almaden Research Center)
Mao, Yongyi (University of Ottawa)
Martinelli, Fabio (University of Roma Tre)
Menchaca, Ricardo (UC Santa Cruz)
Montanari, Andrea (Stanford University)
Mora, Thierry (Universite Paris Sud)
Mossel, Elchanan (UC Berkeley)
Nair, Chandra (Chinese University of Hong Kong)
Peres, Yuval (Microsoft Research)
Restrepo Lopez, Ricardo (Georgia Tech)
Ricci-Tersenghi, Federico (University of Rome, La Sapienza)
Roch, Sebastien (Microsoft Research)
Scudo, Petra (University of Trento)
Shah, Devavrat (MIT)
Sly, Allan (UC Berkeley)
Sorkin, Greg (IBM Research)
Tetali, Prasad (Georgia Tech)
Venkatesan, Ramarathnam (Microsoft)
Vera, Juan (University of Waterloo)
Vigoda, Eric (Georgia Tech)
Vilenchik, Dan (Tel Aviv University)
Vontobel, Pascal (Hewlett Packard Laboratories)
Wainwright, Martin (UC Berkeley)
Zecchina, Riccardo (Politecnico di Torino)

Mathematical and Numerical Methods for Free Energy Calculations in Molecular Systems
June 15 - 20, 2008

Organizers:

Christophe Chipot (Universite Henri Poincaré/CNRS) **Eric Darve** (Stanford University)

The out-of-pocket cost of developing a new drug can be enormous. Computer simulation is an attractive alternative to expensive experiments to reduce this cost. This would lead to shorter drug development time, lower costs and more broadly could reduce health care costs. Combined advances in computer hardware and mathematical algorithms will bring about these advances. This interdisciplinary workshop brought together experts from around the world in the fields of mathematics, computer science, chemistry and biology to discuss recent research progress and future breakthroughs.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5074/

Participants:

Beck, Thomas (University of Cincinnati)
Bolhuis, Peter (Universiteit van Amsterdam)
Bond, Stephen (UIUC)
Cai, Wei (Stanford University)
Calvo, Florent (LASIM/Universite Claude Bernard Lyon I)
Chipot, Christophe (Universite Henri Poincaré/CNRS)
Chodera, John (Stanford University)
Cyr, Eric (UIUC)
Darve, Eric (Stanford University)
Fong, William (Stanford University)
Garcia, Angel (Rensselaer Polytechnic Institute)
Geissler, Phill (UC Berkeley)
Huang, He (Purdue University)
Izaguirre, Jesus (University of Notre Dame)
Jarzynski, Christopher (University of Maryland, College Park)
Kim, Jaegil (Boston University)
Kofke, David (University at Buffalo)
Legoll, Frederic (Ecole Nationale des Ponts et Chaussees/LAMI)
Leimkuhler, Ben (University of Edinburgh)
Lelievre, Tony (Ecole Nationale des Ponts et Chaussées)
Lew, Adrian (Stanford University)
Mark, Alan (University of Queensland)
Noorizadeh, Emad (University of Edinburgh)
Panagiotopoulos, Athanassios (Princeton)
Pande, Vijay (Stanford University)
Park, Sanghyun (Argonne National Laboratory)
Pohorille, Andrew (NASA Ames Research Center)
Post, Carol (Purdue University)
Roux, Benoit (University of Chicago)
Sagui, Celeste (North Carolina State University)
Shen, Juanfang (Purdue University)
Skeel, Robert (Purdue University)
Stoltz, Gabriel (Ecole Nationale des Ponts et Chaussées)
Tuckerman, Mark (New York University)
Vaikuntanathan, Suriyanarayanan (University of Maryland)
Vanden-Eijnden, Eric (Courant Institute)
Woolf, Thomas (Johns Hopkins University)
Ytreberg, F. Marty (University of Idaho)

Emerging Directions in String Theory
June 22 - 27, 2008

Organizers:

Robert Myers (Perimeter Institute)
Hirosi Ooguri (California Institute of Technology)
Washington Taylor (MIT)
Mark Van Raamsdonk (UBC)

Of all scientific endeavors, string theory has perhaps the grandest ambitions: to explain all known matter and forces in the universe in a single, unified framework. In the most optimistic scenario, string theory would explain all properties of the elementary particles and the forces between them, the physics of the big bang which led to the universe we observe, the nature of the mysterious dark matter and dark energy required to explain the observed large-scale properties of our universe, and the detailed physics of black holes, perhaps the most mysterious objects in our present universe. Remarkably, it is already clear that string theory provides a rich enough framework to accomplish all of these objectives. The workshop brought together experts from all areas in the field of string theory in order to stimulate new directions for research.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/085059/

Participants:

Adams, Allan (MIT)
Basu, Pallab (UBC)
Becker, Katrin (Texas A&M University)
Becker, Melanie (Texas A&M University)
Brandenberger, Robert (McGill University)
Buchel, Alex (University of Western Ontario)
Dasgupta, Keshav (McGill University)
de Boer, Jan. (Institute for Theoretical Physics)
DeWolfe, Oliver (University of Colorado)
Distler, Jacques (University of Texas)
Freivogel, Ben (UC Berkeley)
Ganor, Ori (UC Berkeley)
Gomis, Jaume (Perimeter Institute)
Hartnoll, Sean (UC Santa Barbara)
Hellerman, Simeon (Institute for Advanced Study)
Herzog, Christopher (Princeton University)
Horava, Petr (Berkeley Center for Theoretical Physics)
Kabat, Dan (Columbia University)
Karczmarek, Joanna (UBC)
Kleban, Matthew (New York University)
Maloney, Alexander (McGill University)
Martinec, Emil (Enrico Fermi Institute)
Mukherjee, Anindya (UBC)
Myers, Robert (Perimeter Institute)
Peet, Amanda (University of Toronto)
Polchinski, Joseph (Kavli Institute for Theoretical Physics/UC Santa Barbara)
Saremi, Omid (McGill University)
Semenoff, Gordon (UBC)
Shieh, Hsien-Hang (UBC)
Shih, David (Institute for Advanced Study)
Sinha, Aninda (Perimeter Institute)
Spradlin, Marcus (Brown University)
Sreenivasa Gopalan, Vijay Kumar (MIT)
Taylor, Washington (MIT)
Tomasiello, Alessandro (Harvard University)
Van Raamsdonk, Mark (UBC)
Vazquez, Samuel (Perimeter Institute)
Verlinde, Herman (Princeton University)
Walcher, Johannes (CERN)
Wecht, Brian (Institute for Advanced Study)
Weigand, Timo (University of Pennsylvania)

Recent Progress in Two-Dimensional Statistical Mechanics
June 29 - July 04, 2008

Organizer:

Richard Kenyon (Brown University)

How does ice form from water when its temperature cools? This and other natural phase transitions pose extremely difficult problems for mathematics. Recent work by Fields medalist Okounkov and Werner and their colleagues have shown the way to resolve, at least partially, some of the fundamental questions in two-dimensional phase transitions (related to such diverse questions as the spread of forest fires according to density of tree growth, spread of disease in a population distributed in two dimensions, or the shape of crystal surfaces at low temperature). One of the goals of statistical mechanics is to understand the large-scale behavior of a system whose individual components are only interacting locally. While the real world of three dimensions is still far from understood, mathematical models for natural systems have in many cases been solved in two dimensions, and the solutions are often extremely deep, using tools from and yielding connections with many other parts of mathematics. In fact, this is one of the qualities that mathematicians are very fond of: finding connections between hitherto disconnected areas of mathematics.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5084/

Participants:

Angel, Omer (University of Toronto)
Blair-Stahn, Nathaniel (University of Washington)
Burchard, Almut (University of Toronto)
Ciucu, Mihai (Indiana University)
deTiliere, Beatrice (University of Neuchatel)
Dubedat, Julien (University of Chicago)
Hoffman, Chris (University of Washington)
Imbrie, John (University of Virginia)
Kenyon, Richard (Brown University)
Kotecky, Roman (Charles University)
Kozdron, Michael (University of Regina)
Lawler, Greg (University of Chicago)
Levin, David Asher (University of Oregon)
Li, Zhongyang (Brown University)
Masson, Robert (University of Chicago)
Millar, Jessica (Brown University)
Nienhuis, Bernard (Amsterdam)
Peres, Yuval (Microsoft Research)
Sheffield, Scott (Courant Institute)
Valko, Benedek (University of Toronto)
Vuletic, Mirjana (California Institute of Technology)
Wilson, David (Microsoft)

Rigidity, Flexibility, and Motion: Theory, Computation and Applications to Biomolecules
July 06 - 11, 2008 Half Workshop

Organizers:

Maria Kurnikova (Carnegie Mellon University)
David Richardson (Duke University Medical Center)
Jack Snoeyink (University of North Carolina, Chapel Hill)
Michael Thorpe (Arizona State University)
Walter Whiteley (York University)

How a protein functions, and how to change this with drug treatment, has an essential connection with how the protein holds its and changes its shape. This workshop focused on mathematical and computational methods to predict and describe the flexibility, rigidity, and dynamics of proteins, or protein complexes, based on single snap shots as currently deposited in public data banks such as the protein data bank. The goal is rapid predictions to focus choices for further in depth analysis either with more intensive (and slower) computational methods or in the laboratory. The methods can also eliminate options which are likely to fail so that experimental time is used efficiently. This is an interdisciplinary effort, involving mathematicians, computer scientists, biophysicists and biochemists bringing together critical questions and innovative techniques to develop new methods and new applications.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5104/

Participants:

Chubynsky, Mykyta (University of Ottawa)
Connelly, Robert (Cornell University)
Degraff, Adam (Arizona State University)
Gao, Jie (SUNY Stony Brook)
Guest, Simon (University of Cambridge)
Jackson, Bill (Queen Mary College, London)
Jordan, Tibor (Eotvos University, Budapest)
Kurnikova, Maria (Carnegie Mellon University)
Macdonald, Alex (University of Cambridge)
Myers, Natasha (York University)
Palfi, Villo (Eotvos University)
Richardson, David (Duke University Medical Center)
Ross, Elissa (York University)
Schulze, Bernd (York University)
Servatius, Brigitte (Worcester Polytechnic Institute)
Servatius, Herman (Clark University)
Shai, Offer (Tel-Aviv University)
Sitharan, Meera (University of Florida)
Sljoka, Adnan (York University)
Snoeyink, Jack (University of North Carolina, Chapel Hill)
Szabadka, Zoltan (Eotvos University)
Tama, Florence (University of Arizona)
Thorpe, Michael (Arizona State University)
Watson, Adam (Queen Mary College, London)
Whiteley, Walter (York University)
Wilson, Derek (York University)

The Biology-Combinatorics Interface: Addressing New Challenges in Computational Biology
July 06 - 11, 2008 Half Workshop

Organizers:

David Bremner (University of New Brunswick)
Anne Condon (UBC)
Ken Dill (UC San Francisco)
Ron Elber (University of Texas, Austin)
Arvind Gupta (MITACS)
Ladislav Stacho (SFU)

Systems biologists are interested in models at various levels, from the microscopic (genes, protein structures, and signaling pathways) to the macroscopic (metabolic and genetic circuits, cells, organs, organisms, and populations). Mathematics is poised to help to understand emergent large-scale properties from properties of smaller subsystems. This workshop brought together biologists with discrete mathematicians to understand the emerging challenges in systems biology. Participants worked on specific problems drawn from such areas as how proteins and RNA fold and interact, capacity of biomolecular compounds to mutate, models of entire cells, and the possibility of developing nano-structures using biomolecular molecules.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5069/

Participants:

Bremner, David (University of New Brunswick)
Bruinsma, Robijn (UCLA)
Condon, Anne (UBC)
Dill, Ken (UC San Francisco)
Elber, Ron (University of Texas at Austin)
Evans, Patricia (University of New Brunswick)
Gupta, Arvind (MITACS)
Heitsch, Christine (Georgia Tech)
Higgs, Paul (McMaster University)
Liang, Jie (University of Illinois, Chicago)
Manuch, Jan (SFU)
Meyer, Irmtraud (UBC)
Rafiey, Arash (SFU)
Sneppen, Kim (University of Copenhagen)
Stacho, Ladislav (SFU)
Stoll, Christine (SFU)
Thachuk, Chris (UBC)
Winfree, Erik (California Institute of Technology)

Multi-View Image and Geometry Processing for 3D Cinematography
July 13 - 18, 2008 Half Workshop

Organizers:

Remi Ronfard (Xtranormal)

Gabriel Taubin (Brown University)

In 3D cinematography, multiple synchronized video streams are synchronously captured from multiple viewpoints, and combined into representations, which allow the user to look at the action from an arbitrary virtual viewpoint. Several different mathematical approaches are used to combine the multiple video streams. Some of these produce a complete reconstruction of the 3D scene geometry. 3D cinematography has applications in video games, virtual reality, medicine, television, and education. This workshop focused on the mathematical foundations of 3D cinematography, in order to determine a path to advance the state-of-the-art.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5070/

Participants:

Aizawa, Kiyo (University of Tokyo)
Beardsley, Paul (Disney Research Zurich)
Birkbeck, Neil (University of Alberta)
Cobzas, Dana (University of Alberta)
Devernay, Frédéric (INRIA - Institut national de recherche en informatique et en automatique)
Furukawa, Yasutaka (University of Illinois)
Goesele, Michael (TU Darmstadt)
Hilton, Adrian (University of Surrey)
Jagersand, Martin (University of Alberta)
Lanman, Douglas (Brown University)
Magnor, Marcus (Technische Universität Braunschweig)
Matsuyama, Takashi (Kyoto University)
Rachmielowski, Adam (University of Alberta)
Raskar, Ramesh (MIT Media Lab)
Ronfard, Remi (Xtranormal)
Tanimoto, Masayuki (Nagoya University)
Taubin, Gabriel (Brown University)
Theobalt, Christian (Stanford University)
Wilburn, Bennett (Microsoft Research Asia)
Zitnick, Larry (Microsoft)

Integrated Hydrogeophysical Inversion
July 13 - 18, 2008 Half Workshop

Organizers:

Laurence Bentley (University of Calgary)
Andrew Binley (Lancaster University)
Ty Ferre (University of Arizona)

Water resources have been identified as the major limiting factor to growth and sustainability in both developed countries, such as Canada, and underdeveloped countries around the world. While great advances have been made in the use of remote, satellite-based measurement methods to quantify water storage and movement at the Earth's surface, relatively few improvements have been made to our ability to characterize subsurface hydrologic processes. Managing groundwater resources and remediating contaminated groundwater require mathematical models to predict groundwater flow, quantify groundwater volumes and chemical transport. The models require definition of the physical system geometry, boundary conditions and specification of the values of parameters such as hydraulic conductivity. All of these parameters always are known with significant uncertainty because data are limited in space and time and often also have uncertainty associated with them. This fact has lead to the use of geophysical data to constrain groundwater model parameters. However, geophysical images also suffer from data deficiencies. On the other hand, the state of the groundwater system predicted from groundwater models has the potential of helping focus the geophysical images.
This workshop brought together hydrogeologic modelers, geophysicists and members of the medical imaging and mathematics communities to address the generalized hydrogeophysical inverse problem in order to improve our ability to characterize and manage groundwater resources.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5051/

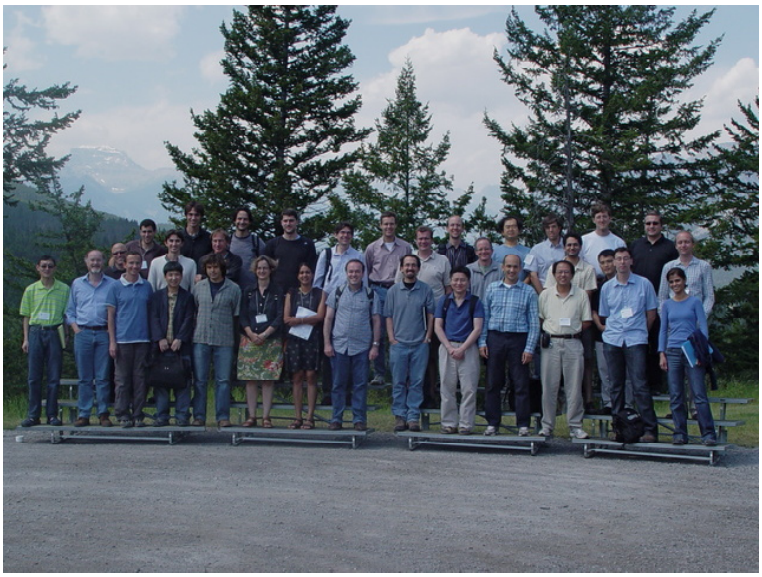
Participants:

Ajo-Franklin, Jonathan (Lawrence Berkeley National Laboratory)
Bentley, Laurence (University of Calgary)
Binley, Andrew (Lancaster University)
Cardiff, Michael (Standford University)
Ferre, Ty (University of Arizona)
Forte, Sarah (University of Calgary)
Holliger, Klaus (University of Lausanne)
Huisman, Sander (Institute of Chemistry and Dynamics of the Geosphere)
Johnson, Tim (Idaho National Laboratory)
Kemna, Andreas (University of Bonn)
Knowles, Ian (University of Alabama, Birmingham)
Linde, Niklas (Institute of Geophysics, ETH Zurich)
Minsley, Burke (MIT)
Pidlisecky, Adam (Stanford University/University of Calgary)
Routh, Partha (Conoco Phillips)
Singha, Kamini (Pennsylvania State University)
Vrugt, Jasper (Los Alamos National Laboratory)
Yeh, Jim (University of Arizona)

Quantum Computation with Topological Phases of Matter
July 20 - 25, 2008

Organizers:

Marcel Franz (UBC)
Michael H. Freedman (Microsoft Corporation)
Yong-Baek Kim (University of Toronto)
Chetan Nayak (UCLA)
Kirill Shtengel (UC Riverside)



Properties of microscopic objects, such as atoms and molecules, are governed by the peculiar laws of quantum physics. In the quantum world, particles often behave as waves, and wave phenomena, such as light, acquire particle-like attributes. In some cases, this quantum behavior manifests itself in macroscopic objects and affects (and improves!) our everyday lives; lasers and solid-state electronic devices stand as standard examples. This workshop was concerned with exploring quantum phenomena in systems that include solids, liquids, and gases, which arise when very large numbers of quantum particles interact very strongly. Unusual things then happen: in some situations, interacting systems can behave as if their elementary constituents (electrons, for example) splinter into new particles. This phenomenon is called ''fractionalization.'' Fractions of the electron have fascinating properties and are of great interest to fundamental science. Besides contributing to resolving the underlying intellectual challenges, the aim of this research is to help develop practical applications of these remarkable phenomena in the area of quantum computation and information.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/085103/

Participants:

Ardonne, Eddy (Nordic Institute for Theoretical Physics)
Bonderson, Parsa (Microsoft Station Q)
Bonesteel, Nicholas (Florida State University)
Castelnovo, Claudio (University of Oxford)
Eisenstein, Jim (Caltech)
Essin, Andrew (UC Berkeley)
Feder, David (University of Calgary)
Fendley, Paul (University of Oxford)
Fidkowski, Lukasz (Caltech)
Fisher, Matthew (Microsoft Station Q/UCSB)
Franz, Marcel (UBC)
Gunnar, Moller (Cambridge University)
Gurarie, Victor (University of Colorado)
Hormozi, Layla (Joint Quantum Institute)
Kallin, Catherine (McMaster University)
Kang, Woowon (University of Chicago)
Kim, Yong-Baek (University of Toronto)
Klich, Israel (Kavli Institute for Theoretical Physics/UC Santa Barbara)
Lee, Sung-Sik (McMaster)
Moore, Joel (UC Berkeley)
Ortiz, Gerardo (Indiana University)
Oshikawa, Masaki (University of Tokyo)
Pachos, Jiannis (University of Leeds)
Read, Nicholas (Yale University)
Refael, Gil (Caltech)
Seradjeh, Babak (UBC)
Shtengel, Kirill (University of Calilfornia Riverside)
Simon, Steven (Alcatel-Lucent Bell Labs)
Slingerland, Joost (Dublin Institute for Advanced Studies)
Stern, Ady (Weizmann Institute)
Trebst, Simon (Microsoft Station Q)
Vala, Jiri (National University of Maynooth)
Vishveshwara, Smitha (University of Illinois)
Wang, Zhenghan (Microsoft Corporation/UCSB)
Wen, X-G (MIT)

Modeling the Impact of Policy Options During Public Health Crises
July 27 - August 01, 2008

Organizers:

Fred Brauer (UBC)
Zhilan Feng (Purdue University)
John Glasser (US Centers for Disease Control and Prevention)

This workshop was designed to facilitate discussion and collaboration between health-policy decision makers and mathematical modelers having advised or desiring to advise health policymakers. The activity may create opportunities to develop sound public policy in preparation for or response to merging/re-emerging infectious diseases. We believe a workshop in a setting conducive to discussion of the benefits of collaboration would repay dividends during future public health crises. We hope that interactions between experienced and willing collaborators in this setting will lead to significant partnerships between modelers and policymakers.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5043/

Participants:

Alexander, Jim (US Centers for Disease Control and Prevention)
Arino, Julien (University of Manitoba)
Ball, Frank (University of Nottingham)
Brauer, Fred (UBC)
Chowell, Gerardo (Arizona State University)
Chuang, Jen-Hsiang (Centers for Disease Control Taiwan)
Day, Troy (Queen's University)
Dushoff, Jonathan (McMaster University)
Earn, David (McMaster University)
Feng, Zhilan (Purdue University)
Fraser, Christophe (Imperial College of Science, Technology & Medicine)
Galvani, Alison (Yale University)
Gao, Linda (North Central College)
Glasser, John (US Centers for Disease Control and Prevention)
Gomes, Gabriela (Instituto Gulbenkian de Ciencia)
Hatchett, Richard (National Institute of Allergy and Infectious Diseases/National Institutes of Health)
Hyman, Mac (Los Alamos National Laboratory)
Johansson, Michael (Centers for Disease Control and Prevention)
Kretzschmar, Mirjam (National Institute of Public Health and the Environment)
Levin, Simon (Princeton University)
Liu, Rongsong (Purdue University)
Lloyd, Alun (North Carolina State University)
Lloyd-Smith, James (Pennsylvania State University)
McCauley, Mary (Centers for Disease Control and Prevention)
McKenzie, Ellis (National Institutes of Health)
Parsons, Todd (University of Pennsylvania)
Pater, Laurent (ENS Cachan)
Pellis, Lorenzo (Imperial College London)
Pinchaud, Lorène (ENS Cachan)
Primot, Armel (ENS Cachan)
Riley, Steven (The University of Hong Kong)
Roberts, Fred (Rutgers University)
Rodewald, Lance (Centers for Disease Control and Prevention)
Schwehm, Markus (University of Tübingen)
Shim, Eunha (Yale University)
Simpson, Diane (Centers for Disease Control and Prevention)
van den Driessche, Pauline (University of Victoria)
Wang, Da-Wei (Academia Sinica)
Watmough, James (University of New Brunswick)
Wolfson, Lara (World Health Organization)
Xu, Dashun (Southern Illinois University Carbondale)
Yan, Ping (Public Health Agency of Canada)
Zhang, Fan (Public Health Agency of Canada)
Zhou, Fangjun (Centers for Disease Control and Prevention)

Analytic Tools in Computational Complexity
August 03 - 08, 2008

Organizers:

Paul Beame (University of Washington)
Stephen Cook (University of Toronto)
Russell Impagliazzo (UC San Diego)
Valentine Kabanets (SFU)
Avi Wigderson (Institute for Advanced Study)

The objective of the workshop was to bring together some of the most active researchers in computational complexity as well as a few senior graduate students and postdocs to examine the analytic tools used in a number of recent results in computational complexity, and to understand the power and limitations of such methods. The current research in computational complexity is characterized by a high degree of interpenetration of ideas from different fields of computer science and mathematics (e.g., coding theory, information theory, bounded arithmetic, and number theory). The use of analytic tools has already been quite fruitful for computational complexity, and one of the goals of the proposed workshop is to strengthen the existing connections between analysis and computational complexity.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5094/

Participants:

Aaronson, Scott (MIT)
Arora, Sanjeev (Princeton University)
Barak, Boaz (Princeton University)
Beame, Paul (University of Washington)
Bogdanov, Andrej (Tsinghua University)
Braverman, Mark (University of Toronto)
Bulatov, Andrei (SFU)
Dinur, Irit (Weizmann Institute)
Dvir, Zeev (Weizmann Institute)
Huynh-Ngoc, Dang-Trinh (University of Washington)
Impagliazzo, Russell (UC San Diego)
Jaiswal, Ragesh (UC San Diego)
Kabanets, Valentine (SFU)
Kapron, Bruce (University of Victoria)
Kaufman, Tali (Institute for Advanced Study)
Khot, Subhash (New York University)
Kindler, Guy (Weizmann Institute)
King, Valerie (University of Victoria)
Klivans, Adam (University of Texas, Austin)
Kolokolova, Antonina (Memorial University)
Lovett, Shachar (Weizmann Institute of Science)
McKenzie, Pierre (University of Montreal)
Moshkovitz, Dana (Weizmann)
O'Donnell, Ryan (Carnegie Mellon University)
Pitassi, Toni (University of Toronto)
Rao, Anup (Institute for Advanced Study)
Raz, Ran (Weizmann Institute of Science)
Regev, Oded (Tel-Aviv University)
Reingold, Omer (Weizmann Institute)
Saks, Michael (Rutgers University)
Servedio, Rocco (Columbia University)
Shaltiel, Ronen (University of Haifa)
Sherstov, Alexander (University of Texas, Austin)
Sudan, Madhu (MIT)
Szegedy, Mario (Rutgers University)
Trevisan, Luca (UC Berkeley)
Umans, Chris (California Institute of Technology)
Vadhan, Salil (Harvard University)
Valiant, Paul (MIT)
Viola, Emanuele (Columbia University)
Wigderson, Avi (Institute for Advanced Study)
Zuckerman, David (University of Texas, Austin)

The Stable Trace Formula, Automorphic Forms, and Galois Representations
August 17 - 22, 2008

Organizers:

James Arthur (University of Toronto)
Michael Harris (Université de Paris VII)
Eric Urban (Columbia University)
Vinayak Vatsal (UBC)

The Langlands program, initiated by Robert Langlands in the 1960s, is a grand unification of two of the oldest branches of mathematics. Langlands' duality, as it is sometimes called, provides a way to interpret results in number theory in terms of function theory, and vice versa, providing a new perspective in each case that was otherwise unattainable. As a vision guiding research, it has been one of the great success stories of mathematics in the past half century, and versions of Langlands' duality principle have been influential in numerous other branches of mathematics, as well as in mathematical physics.
This workshop aims to present recent progress, largely due to James Arthur, in Canada, and to Gerard Laumon, Ngo Bao-Chau, Jean-Loup Waldspurger, and Jean-Pierre Labesse, in France, toward the development of a stable trace formula, a crucial tool for confirming the predictions of the Langlands program.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5040/

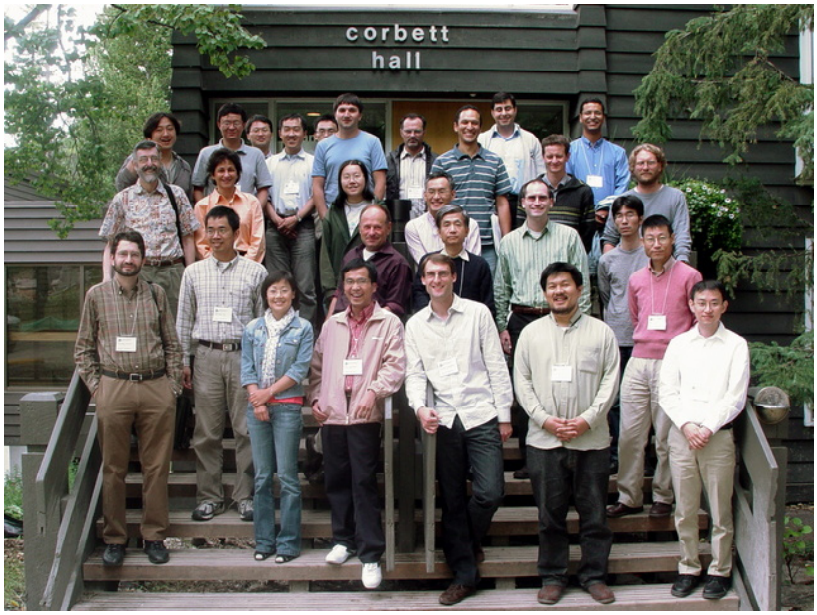
Participants:

Arthur, James (University of Toronto)
Ash, Avner (Boston College)
Bellaïche, Joël (Brandeis University)
Blasius, Don (UCLA)
Bueltel, Oliver (University of Heidelberg)
Casselman, Bill (UBC)
Chaudouard, Pierre-Henri (Université Paris-Sud)
Chenevier, Gaetan (Université Paris XIII)
Clozel, Laurent (Universite Paris-Sud)
Cogdell, James (Ohio State University)
Cunningham, Clifton (University of Calgary)
Dac Tuan, Ngo (Université Paris-Nord)
Emerton, Matthew (Northwestern University)
Fargues, Laurent (Université Paris-Sud)
Furusawa, Masaaki (Osaka City University)
Getz, Jayce (Princeton University)
Haines, Thomas (University of Maryland)
Hales, Thomas C. (University of Pittsburgh)
Harris, Michael (Université de Paris VII)
Hida, Haruzo (UCLA)
Ichino, Atsushi (Osaka City University)
Jiang, Dihua (University of Minnesota)
Kaletha, Tasho (University of Chicago)
Labesse, Jean-Pierre (Universite Aix-Marseille II)
Lapid, Erez (Hebrew University)
Mantovan, Elena (California Institute of Technology)
Mezo, Paul (Carleton University)
Moeglin, Colette (Institut de Mathematiques de Jussieu)
Morel, Sophie (Institute for Advanced Study)
Paniagua, Octavio (Université Paris Sud)
Ramakrishnan, Dinakar (Caltech)
Shelstad, Diana (Rutgers University)
Shin, Sug Woo (Institute for Advanced Study)
Skinner, Christopher (Princeton University)
Smithling, Brian (University of Toronto)
Sorenson, Claus (Princeton University)
Varshavsky, Yakov (Hebrew University)
Waldspurger, Jean-Loup (Institut de Mathematiques de Jussieu)
Whitehouse, David (MIT)
Yoshida, Teruyoshi (Harvard University)

Asymptotics and Singularities in Nonlinear and Geometric Dispersive Equations
August 24 - 29, 2008

Organizers:

Stephen Gustafson (UBC)
Kenji Nakanishi (Kyoto University)
Tai-Peng Tsai (UBC)
Chongchun Zeng (Georgia Tech)



What do ocean waves, black holes, superfluids, lasers, and magnets have in common? These physical systems all exhibit wave-like behaviour, on one hand, and on the other hand, highly non-linear behaviour, and they can all be described by remarkably similar mathematical equations! It is a huge mathematical challenge to understand this interplay of waves with nonlinearity, needing a wide variety of deep mathematical tools. Our workshop brought together leading experts on such equations from all over the world, with the goal of learning and improving upon state-of-the-art knowledge in this field, and ultimately of furthering understanding of the diverse physical phenomena mentioned above.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5058/

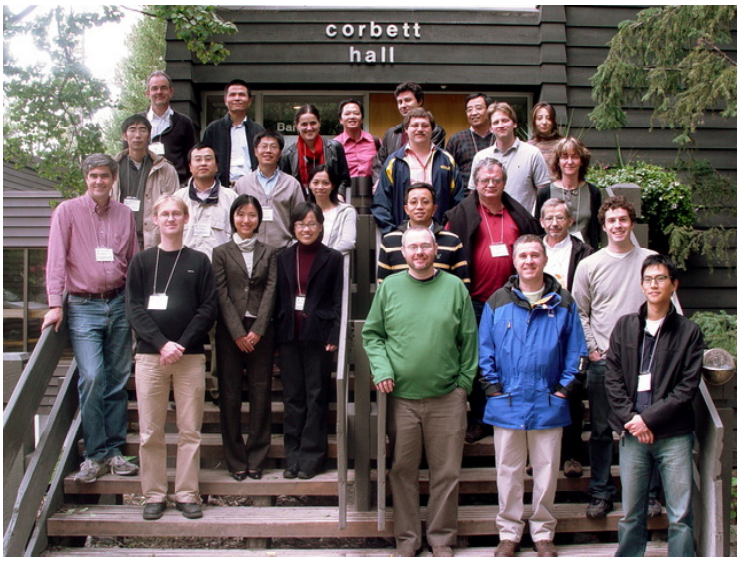
Participants:

Abou Salem, Walid (University of Toronto)
Bejenaru, Ioan (Texas A&M University)
Boussaid, Nabile (University of Franche-Comte)
Burq, Nicolas (Université Paris-Sud)
Ghoussoub, Nassif (BIRS)
Guan, Meijiao (UBC)
Gustafson, Stephen (UBC)
Holmer, Justin (UC Berkeley)
Ibrahim, Slim (Arizona State University)
Kang, Kyungkeun (Sungkyunkwan University)
Kato, Jun (Nagoya University)
Koo, Eva (UBC)
Masaki, Satoshi (Kyoto University)
Miura, Hideyuki (Kyoto University)
Mizumachi, Tetsu (Kyushu University)
Nahmod, Andrea (University of Massachusetts)
Nakanishi, Kenji (Kyoto University)
Oh, Tadahiro (Choonghong) (University of Toronto)
Ohta, Masahito (Saitama University)
Perelman, Galina (Ecole Polytechnique)
Phan, Tuoc (UBC)
Planchon, Fabrice (Université Paris 13)
Shimomura, Akihiro (Tokyo Metropolitan University)
Sigal, Israel Michael (University of Toronto)
Sterbenz, Jacob (UC San Diego)
Strauss, Walter (Brown University)
Tahvildar-Zadeh, A. Shadi (Rutgers University)
Tsai, Tai-Peng (UBC)
Tsutsumi, Yoshio (Kyoto University)
Tzirakis, Nikolaos (University of Illinois)
Zeng, Chongchun (Georgia Tech)

Recent Developments in Numerical Methods for Nonlinear Hyperbolic Partial Differential Equations and their Applications
August 31 - September 05, 2008

Organizers:

Ian Mitchell (UBC)
Stanley Osher (UCLA)
Chi-Wang Shu (Brown University)
Hongkai Zhao (UC Irvine)



Nonlinear partial differential equations (PDEs) of hyperbolic type have wide and important uses in science and engineering. These PDEs pose great mathematical challenges. Closed form analytic solution is unlikely in all but the simplest cases; consequently, numerical approximations are crucial in practice. Recently, there have been many new developments in numerical methods as well as emerging new applications for nonlinear hyperbolic PDEs. The goal of the workshop was to bring together experts as well as junior researchers who are approaching nonlinear hyperbolic PDEs from different perspectives, including numerical analysis, algorithms and applications. An intense, five-day workshop provided wonderful opportunities for communication and further collaboration among participants, as well as transitions of new algorithms between subfields and into

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5024/

Participants:

Abgrall, Remi (Bordeaux)
Alton, Kenneth (UBC)
Cheng, Yingda (University of Texas at Austin)
Claudel, Christian (UC Berkeley)
Degond, Pierre (Université Paul Sabatier)
Ferretti, Roberto (Universita degli Studi di Roma Tre)
Gamba, Irene M (University of Texas, Austin)
Jin, Shi (University of Wisconsin, Madison)
Kao, Chiuyen (Ohio State University)
Kurganov, Alexander (Tulane University)
LeVeque, Randy (University of Washington)
Li, Fengyan (Rensselaer Polytechnic Institute)
Liu, Yingjie (Georgia Tech)
Liu, Jian-Guo (University of Maryland)
Marquina , Antonio (UCLA)
Martin, Pino (Princeton University)
Mitchell, Ian (UBC)
Prodanovic, Masa (University of Texas (Austin))
Qian, Jianliang (Michigan State University)
Qiu, Jing-Mei (Colorado School of Mines)
Runborg, Olof (Royal Institute of Technology, Sweden)
Ruuth, Steve (SFU)
Serna, Susana (University of California)
Shu, Chi-Wang (Brown University)
Smadar, Karni (University of Michigan)
Spiteri, Ray (University of Saskatchewan)
Takei, Ryo (UCLA)
Tang, Tao (The Hong Kong Baptist University)
Tsai, Richard (University of Texas at Austin)
Vladimirsky, Alexander (Cornell University)
Zhang, Yongtao (University of Notre Dame)
Zhao, Hongkai (UC Irvine)

Spectral Methods in Representation Theory of Algebras and Applications to the Study of Rings of Singularities
September 07 - 12, 2008

Organizers:

Jose Antonio de la Pena (UNAM)
Vlastimil Dlab (Carleton University)
Helmut Lenzing (University of Paderborn)

Spectral methods, in particular the study of Coxeter transformations and related Hilbert-Poincaré series, have recently been shown to have a large, unexploited potential for investigations in the representation theory of finite dimensional algebras, for singularity and other topics such as algebraic number theory. Applications to Lie theory and graph theory, moreover, have a longstanding tradition. The workshop aimed to summarize the present status of the subject with a particular emphasis on new developments linking representation and singularity theory.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5080/

Participants:

Barot, Michael (UNAM)
Batyrev, Victor (University of Tubingen)
Bobinski, Grzegorz (University of Bielefeld)
Buan, Aslak (The Norwegian University of Science and Technology, Trondheim)
Chapoton, Frédéric (Université Claude Bernard Lyon I)
Chen, Xueqing (University of Wisconsin, Whitewater)
de la Pena, Jose Antonio (UNAM)
Dlab, Vlastimil (Carleton University)
Ebeling, Wolfgang (Leibniz Universität Hannover)
Geiss, Christof (UNAM)
Happel, Dieter (Technische Universität Chemnitz)
Hille, Lutz (University of Bielefeld)
Iyama, Osamu (Nagoya University)
Keller, Bernhard (University Denis Diderot/Paris VII)
Krause, Henning (University of Paderborn)
Kussin, Dirk (University of Paderborn)
Ladkani, Sefi (Hebrew University of Jerusalem)
Lakatos, Piroska (University of Debrecen)
Lenzing, Helmut (University of Paderborn)
Marko, Frantisek (Penn State University Hazleton)
Meltzer, Hagen (University of Szczecin)
Murfet, Daniel (Australian National University)
Pospichal, Tomas (University of Windsor)
Reiten, Idun (Norwegian University of Science and Technology)
Ringel, Claus Michael (Universitaet Bielefeld)
Saito, Kyoji (The Institute for the Physics and Mathematics of the Universe)
Stekolshchik, Rafael (Electronics Corporation of Israel)
Takahashi, Atsushi (Osaka University)
Ueda, Kazushi (Osaka University)

Understanding the New Statistics: Expanding Core Statistical Theory September 14 - 19, 2008

Organizers:

Rudolf Beran (UC Davis)
Iain Johnstone (Stanford University)
Ivan Mizera (University of Alberta)
Sara van de Geer (Eidgenössische Technische Hochschule Zürich)

The focus of the workshop is core statistical theory. In the past, we might have called the topic "mathematical statistics," were not this name so closely associated with the 1960s vision of statistics before the computer revolution changed our discipline. We put emphasis on "the new statistics" to indicate that we not interested in variations on old themes, but rather in relevant theory for the data-analytic circumstances of the present. The call for this type of theory - rethinking the old and seeking new approaches - was recently expressed in several places. We concentrate on several topics that we believe are particularly important in this context and see the workshop as an opportunity to make first steps on a likely long way.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5071/

Participants:

Belkin, Mikhail (Ohio State University)
Beran, Rudolf (UC Davis)
Bilodeau, Martin (Universite de Montreal)
Brown, Lawrence (University of Pennsylvania)
Bunea, Florentina (Florida State University)
Chen, Gemai (University of Calgary)
Chenouri, Shojaeddin (University of Waterloo)
Clarke, Bertrand (UBC)
Davies, Laurie (University of Duisburg-Essen)
Delaigle, Aurore (University of Bristol)
Doksum, Kjell (University of Wisconsin)
El Karoui, Noureddine (UC Berkeley)
Farahmand, Amir Massoud (University of Alberta)
Feuerverger, Andrey (University of Toronto)
Fukumizu, Kenji (Institute of Statistical Mathematics)
Genovese, Christopher (Carnegie Mellon University)
Hallin, Marc (Universite Libre de Bruxelles)
Hlubinka, Daniel (Charles University)
Hooker, Giles (Cornell University)
Johnstone, Iain (Stanford University)
Jordan, Michael (UC Berkeley)
Kim, Peter (University of Guelph)
Koenker, Roger (UIUC)
Kovac, Arne (University of Bristol)
Leeb, Hannes (Yale University)
Maathuis, Marloes (Eidgenössische Technische Hochschule Zürich)
Marron, J. S. (Steve) (University of North Carolina, Chapel Hill)
Mason, David M. (University of Delaware)
McCullagh, Peter (University of Chicago)
Mizera, Ivan (University of Alberta)
Owen, Art B. (Stanford University)
Paul, Debashis (UC Davis)
Poetscher, Benedikt M. (University of Vienna)
Polonik, Wolfgang (UC Davis)
Rajaratnam, Bala (Stanford University)
Ramsay, Jim (McGill University)
Rosset, Saharon (Tel Aviv University)
van de Geer, Sara (Eidgenössische Technische Hochschule Zürich)
Vovk, Vladimir (Royal Holloway, London)
Wegkamp, Marten (Florida State University)
Zlatev, Boyko (University of Alberta)

Number Theory and Physics at the Crossroads
September 21 - 26, 2008

Organizers:

Charles Doran (University of Washington)
Sergei Gukov (UC Santa Barbara)
Helena Verrill (Louisiana State University)
Noriko Yui (Queen's University)
Don Zagier (Max Planck Institut fuer Mathematik)

Modular forms have long played a key role in the theory of numbers, including most famously, the proof of Fermat's Last Theorem. Through its quest to unify the spectacularly successful theories of quantum mechanics and general relativity, string theory has long suggested deep connections between branches of mathematics such as topology, geometry, representation theory, and combinatorics. Less well-known are the emerging connections between physics, in particular, string theory and number theory. Mathematicians and physicists converged on BIRS for a week of both introductory lectures, designed to educate one another in relevant aspects of their subjects, and research talks at the cutting edge of this rapidly growing field.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5077/

Participants:

Batyrev, Victor (University of Tubingen)
Bouchard, Vincent (Harvard University)
Candelas, Philip (University of Oxford)
Clingher, Adrian (University of Missouri, St.Louis)
Dabholkar, Atish (CNRS)
Dimofte, Tudor (Caltech)
Doran, Charles (University of Washington)
Eager, Richard (UC Santa Barbara)
Gaiotto, Davide (Institute for Advanced Study, Princeton)
Gannon, Terry (University of Alberta)
Gukov, Sergei (UC Santa Barbara)
Gunnells, Paul (University of Massachusetts, Amherst)
Hosono, Shinobu (The University of Tokyo)
Kazhdan, David (Hebrew University)
Keller, Christoph (Eidgenössische Technische Hochschule, Zürich)
Kerr, Matt (University of Durham)
Klemm, Albrecht (University of Bonn)
Konishi, Yukiko (Kyoto University)
Lewis, Jacob (University of Washington)
Livne, Ron (Hebrew University)
Manschot, Jan (University of Amsterdam)
Marion, Samantha (University of Alberta)
McKay, John (Concordia University)
Miller, Robert (University of Washington)
Minabe, Satoshi (IHES)
Neitzke, Andy (Institute for Advanced Study, Princeton)
Novoseltsev, Andrey (University of Alberta)
Ramakrishnan, Dinakar (Caltech)
Rodriguez Villegas, Fernando (University of Texas, Austin)
Samol, Kira (University of Mainz)
Scheidegger, Emanuel (University of Augsburg)
Schimmrigk, Rolf (Indiana University South Bend)
Walcher, Johannes (CERN)
Yamazaki, Takao (Tohoku University)
Yang, Yifan (National Chiao Tung University)
Yeats, Karen (Boston University)
Yui, Noriko (Queens University)
Zagier, Don (Max Planck Institut fuer Mathematik)

Graph Minors
September 28 - October 03, 2008

Organizers:

Ken-ichi Kawarabayashi (National Institute of Informatics)
Bojan Mohar (SFU)
Bruce Reed (McGill University)
Paul Seymour (Princeton University)

A monumental project in graph theory was recently completed by Robertson and Seymour which is now called "Graph Minor Theory." The Graph Minors project has resulted in many theoretical advances, but it also has algorithmic applications, and some of the methods have been successfully used in practical computation. Currently, Graph Minor Theory is reasonably well understood by many, and several researchers have been working on extensions of the Graph Minor project. Also, techniques and tools from Graph Minor Theory are reasonably well understood, and some research groups have been working on exact structural descriptions using them. It is now time to gather various research groups who are working on Graph Minors and present a "state of the art" of their current projects. It seems important to report where these projects stand and where they would go. The workshop focused on the following two areas: extensions of Graph Minor Theory and applications of Graph Minor Theory techniques and tools.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5079/

Participants:

Adler, Isolde (Humbolt University)
Beaudou, Laurent (University of Grenoble)
Chudnovsky, Maria (Columbia University)
Courcelle, Bruno (University of Bordeaux)
Cranston, Dan (Rutgers University)
Demasi, Lino (SFU)
Ding, Guoli (Louisiana State University)
Dujmovic, Vida (Mcgill University)
Dvorak, Zdenek (SFU)
Fijavz, Gasper (University of Ljubljana)
Fomin, Fedor (University of Bergen)
Geelen, Jim (University of Waterloo)
Goddyn, Luis (SFU)
Harutyunyan, Ararat (SFU)
Huynh, Tony (Waterloo University)
Kawarabayashi, Ken-ichi (National Institute of Informatics)
King, Andrew (McGill University)
Kobayashi, Yusuke (University of Tokyo)
Kral, Daniel (Charles University)
Kreutzer, Stephan (Oxford University)
Li, Zhentao (McGill University)
Mohar, Bojan (SFU)
Norin, Sergey (Princeton University)
Oporowski, Bogdan (Louisiana State University)
Oum, Sang-il (Korea Advanced Institute of Science and Technology)
Postle, Luke (Georgia Tech)
Rautenbach, Dieter (Illmenau University)
Reed, Bruce (McGill University)
Richter, Bruce (University of Waterloo)
Robertson, G. Neil (Ohio State University)
Seymour, Paul (Princeton University)
Thilikos, Dimitrios (National and Kapodistrian University of Athens)
Thomas, Robin (Georgia Tech)
Wollan, Paul (Hamburg University)
Wood, David (The University of Melbourne)
Yerger, Carl (Georgia Tech)
Yu, Xingxing (Georgia Institute of Technology)
Zwols, Yori (Columbia University)

Random Matrices, Inverse Spectral Methods and Asymptotics
October 05 - 10, 2008

Organizers:

Estelle Basor (American Institute of Mathematics)
Marco Bertola (Concordia University)
Betrand Eynard (SPhT CEA Saclay)
John Harnad (Concordia University / CRM)
Alexander Its (Indiana University/Purdue University, Indianapolis)
Ken McLaughlin (University of Arizona)

The study of random matrix theory in physics dates back at least to the middle of the last century, and originates in studies of the statistical properties of high-lying energy levels of large atomic nuclei. Matrices are finite dimensional analogs of the linear operators that appear in the quantum theory of such complex systems, and this approach was based on the idea that "universal" behaviour appears at a statistical level, independently of the detailed quantum dynamics involved, which were too complex in any case to allow for computation of individual energy levels. The mathematical theory has been considerably developed since that time, and newer applications were found in a stunning variety of seemingly unrelated areas of mathematics and physics.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5017/

Participants:

Balogh, Ferenc (Concordia University)
Bertola, Marco (Concordia University)
Buckingham, Robert (University of Michigan)
Dell'Aquila, Joseph (Indiana University/Purdue University Indianapolis)
DiFranco, Jeffery (Seattle University)
Gekhtman, Michael (University of Notre Dame)
Harnad, John (Concordia University / CRM)
Ismail, Mourad (University of Central Florida)
Jenkins, Bob (University of Arizona)
Klochko, Yuliya (Concordia)
Lee, Seung Yeop (CRM, Universite de Montreal)
Liechty, Karl (Indiana University/Purdue University Indianapolis)
Marchal, Olivier (University of Montreal)
McLaughlin, Ken (University of Arizona)
Miller, Peter (University of Michigan)
Niles, David (Indiana University/Purdue University Indianapolis)
Pierce, Virgil (University of Texas/Pan American)
Prats, Aleix (CRM)
Putinar, Mihai (UC Santa Barbara)
Sinclair, Christopher (University of Colorado, Boulder)
Soshnikov, Alexander (UC Davis)
Szmigielski, Jacek (University of Saskatchewan)
Wang, Dong (Université de Montréal)
Xu, Zhengjie (University of Michigan)

Self-Similarity and Branching in Group Theory
October 12 - 17, 2008 Half Workshop

Organizers:

Rostislav Grigorchuk (Texas A&M University)
Benjamin Steinberg (Carleton University)
Zoran Sunic (Texas A & M University).

The importance of self-similarity and branching phenomena in group theory has recently come to the forefront. Self-similar groups are the algebraic counterparts to fractals. Fractals quite often arise as Julia sets of certain rational functions, say polynomials. For instance, the Basilica of Saint Mark fractal is the Julia set of the polynomial z^2+1. The famous Sierpinski gasket is also the Julia set of a rational function. To each such rational function, there is associated a self-similar group, which encodes algebraically the Julia set and the dynamics of the rational function on the Julia set.

The study of self-similar groups has led to new insights and a better understanding of fractals and their related dynamics. A long-standing problem concerning the rabbit fractal and the airplane fractal was solved via the method of self-similar groups. Self-similar groups also have interactions with Computer Science, since much of their structure can be encoded by finite-state machines. These machines can be used in turn to produce the fractals.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5066/

Participants:

Abert, Miklos (University of Chicago)
Amir, Gideon (University of Toronto)
Benli, Mustafa G. (Texas A&M University)
Bumagin, Inna (Carleton University)
Glasner, Yair (Ben Gurion University of the Negev)
Grigorchuk, Rostislav (Texas A&M University)
Kharlampovich, Olga (McGill University)
Mccune, David (University of Lincoln at Nebraska)
Miasnikov, Alexei (McGill University)
Morris, Dave (University of Lethbridge)
Nekrashevych, Volodymyr (Texas A&M University)
Sapir, Mark (Vanderbilt University)
Savchuk, Dmytro (Texas A&M University)
Steinberg, Benjamin (Carleton University)
Sunic, Zoran (Texas A & M University)
Vorobets, Yaroslav (Texas A&M University)
Vorobets, Mariya (Texas A&M University)

Topological Methods for Aperiodic Tilings
October 12 - 17, 2008 Half Workshop

Organizers:

Ian Putnam (University of Victoria) **Lorenzo Sadun** (University of Texas, Austin)

Ordinary crystals, such as those found in materials ranging from grains of salt to precious gems, have been thoroughly studied by physicists. Mathematicians long ago developed theories classifying such periodic structures, those that consist of infinitely repeating patterns. In the 1980s, however, physicists discovered new substances called quasicrystals. The atomic structures of quasicrystals do NOT consist of periodic (or repeating) patterns, but they are nonetheless highly ordered. Even before the discovery of quasicrystals, mathematicians had discovered mathematical patterns, such as Penrose tilings, that likewise are non-periodic but highly ordered. The discovery that these mathematical patterns were useful in describing quasicrystals led to rapid advances in both physics and mathematics. This workshop will bring together researchers studying various aspects of this subject. They will be adapting techniques from the field of topology (the study of shape) to solve outstanding problems in this field.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5044/

Participants:

Arnoux, Pierre (Université de la Méditerranée)
Barge, Marcy (Montana State University)
Bellissard, Jean (Georgia Tech)
Frank, Natalie Priebe (Vassar College)
Giordano, Thierry (University of Ottawa)
Gähler, Franz (Universität Stuttgart)
Hunton, John (University of Leicester)
Julien, Antoine (Université de Lyon)
Kellendonk, Johannes (Institut Camille Jordan, University of Lyon)
Kwapisz, Jaroslaw (Montana State University)
Ormes, Nicholas (University of Denver)
Oyono-Oyono, Herve (Université Blaise Pascal)
Pearson, John (Georgia Tech)
Petite, Samuel (University of Picardie)
Putnam, Ian (University of Victoria)
Sadun, Lorenzo (University of Texas at Austin)
Savinien, Jean (Georgia Tech)
Siegel, Anne (CNRS)
Whittaker, Michael (University of Victoria)
Williams, Robert (University of Texas)

Mathematical Theory of Resonances
October 19 - 24, 2008

Organizers:

Tanya Christiansen (University of Missouri)
Richard Froese (UBC)
Maciej Zworski (UC Berkeley)

One of the fundamental predictions of quantum theory is that the allowed energy levels of confined quantum systems can take on only a discrete set of values. These numbers are called eigenvalues and lie on the real number line. The theory of quantum systems where particles are not confined, but can escape to infinity, is more subtle. Here, a continuum of energy levels is possible and there may be no eigenvalues. Nevertheless there is a discrete set of numbers called resonances, which describe quantum states that, although not confined forever, persist for a long time. Resonances are complex numbers, and contain information both about the energy and the lifetime of the resonant state. Resonances show up in other physics problems (for example, in acoustic scattering) and in pure mathematics. Researchers have discovered many connections between the position of resonances and the underlying geometry and dynamics. However many questions still remain.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5092/

Participants:

Alexandrova,Ivana (East Carolina University)
Bindel, David (Courant Institute)
Borthwick, David (Emory University)
Bruneau, Vincent (Universite de Bordeaux)
Burq, Nicolas (Université Paris-Sud)
Christiansen, Tanya (University of Missouri)
Christianson, Hans (MIT)
Datchev, Kiril (UC Berkeley)
Froese, Richard (UBC)
Guillarmou, Colin (Université de Nice)
Hislop, Peter (University of Kentucky)
Hitrik, Michael (UCLA)
Jakobson, Dmitry (McGill University)
Martinez, André (Università di Bologna)
Merkli, Marco (Memorial University)
Michel, Laurent (Université de Nice, Sophia Antipolis)
Müller, Werner (Universitat Bonn)
Nakamura, Shu (University of Tokyo)
Naud, Frederic (Université d'Avignon)
Nedelec, Laurence (Stanford University)
Nonnenmacher, Stephane (Commissariat à l'énergie atomique Saclay)
Perry, Peter (University of Kentucky)
Petkov, Vesselin (Université de Bordeaux I)
Ramond, Thierry (Université de Paris XI (Paris-Sud)
Schenck, Emmanuel (Commissariat à l'Énergie Atomique (CEA))
Stefanov, Plamen (Purdue University)
Vasy, András (Stanford University)
Villegas-Blas, Carlos (UNAM)
Vodev, Georgi (Université de Nantes)
Weir, John (Kings College London)
White, Denis (University of Toledo)
Zworski, Maciej (UC Berkeley)

Interactions Between Noncommutative Algebra and Algebraic Geometry
October 26 - 31, 2008

Organizers:

Michael Artin (MIT)
Colin Ingalls (University of New Brunswick)
Lance Small (UC San Diego)
James Zhang (University of Washington)

Noncommutative Algebraic Geometry is a relatively new field that studies interactions between the subjects of noncommutative algebra and algebraic geometry. Noncommutative geometry is described by having functions on a space that do not commute, so $xy \neq yx$. It is felt that some type of noncommutative geometry may be help explain the physical structure of the space we live in. Noncommutative algebra is fundamental in quantum mechanics and other areas of physics. Our meeting will bring together experts from the field of Algebraic Geometry: the geometry of spaces of solutions to polynomials, and Noncommutative Algebra: the study of algebras with variables that do not commute. We will study the structure and examples of noncommutative spaces to further our understanding and we will benefit from the interaction of these two groups.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5072/

Participants:

Bell, Jason (SFU)
Chan, Daniel (Univesity of New South Wales)
Chan, Kenneth (University of New South Wales)
D'Adderio, Michele (UC San Diego)
Goodearl, Kenneth (UC Santa Barbara)
Green, Ed (Virginia Tech)
Huisgen-Zimmermann, Birge (UC Santa Barbara)
Ingalls, Colin (University of New Brunswick)
Ishii, Akira (Hiroshima University)
Iyama, Osamu (Nagoya University)
Kawamata, Yujiro (The University of Tokyo)
Kirkman, Ellen (Wake Forest University)
Krähmer, Ulrich (University of Glasgow)
Kulkarni, Rajesh (Michigan State University)
Letzter, Edward (Temple University)
Lieblich, Max (Princeton University)
Lorenz, Martin (Temple University)
Lu, Di-Ming (Zhejiang University)
Lunts, Valery (Indiana University)
Montgomery, Susan (University of Southern California)
Mori, Izuru (Shizuoka University)
Nyman, Adam (University of Montana)
Reichstein, Zinovy (UBC)
Rogalski, Daniel (UC San Diego)
Saltman, David J (Princeton)
Shelton, Brad (University of Oregon)
Sierra, Susan (University of Washington)
Small, Lance (UC San Diego)
Smoktunowicz, Agata (University of Edinburgh)
Stafford, Toby (University of Michigan)
Todorov, Gordana (Northeastern University)
Uehara, Hokuto (Tokyo Metropolitan University)
Vancliff, Michaela (University of Texas, Arlington)
Vonessen, Nikolaus (University of Montana)
Wu, Quanshui (Fudan University)
Yekutieli, Amnon (Ben Gurion University)
Zhang, James (University of Washington)
Zhang, Jun (University of Washington)

WIN: Women in Numbers
November 02 - 07, 2008

Organizers:

Kristin Lauter (Microsoft Research)
Rachel Pries (Colorado State University)
Renate Scheidler (University of Calgary)

This workshop was a unique effort to combine strong broad impact with a top-level technical research program. In order to help raise the profile of active female researchers in number theory and increase their participation in research activities in the field, this event brought together female senior and junior researchers in the field for collaboration. Emphasis was placed on on-site collaboration on open research problems as well as student training. Collaborative group projects introducing students to areas of active research were a key component of this workshop.
We would like to thank the following organizations for their support of this workshop: BIRS, NSA, Fields Institute, PIMS, Microsoft Research, and University of Calgary.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5112/

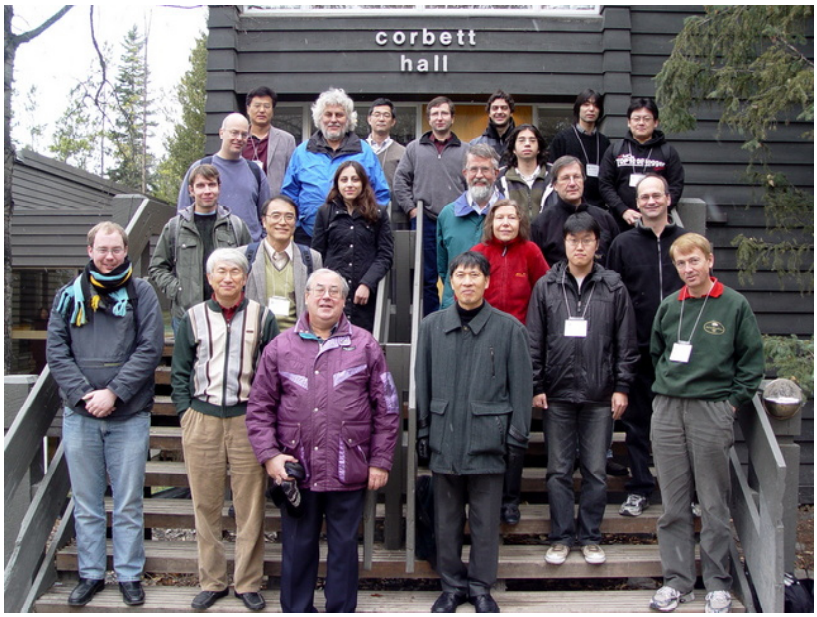
Participants:

Akhtari, Shabnam (UBC)
Balakrishnan, Jennifer (MIT)
Belding, Juliana (University of Maryland)
Berger, Lisa (Stony Brook University)
Bucur, Alina (MIT)
Chisholm, Sarah (University of Calgary)
Ciperiani, Mirela (Columbia University)
Cojocaru, Alina (University of Illionois at Chicago)
David, Chantal (Concordia University)
Eisentraeger, Kirsten (Penn State University)
Feigon, Brooke (University of Toronto)
Garthwaite, Sharon (Bucknell University)
Gruendken, Linda (University of Pennsylvania)
Grundman, Helen (Bryn Mawr College)
Hall-Seelig, Laura (University of Massachusetts, Amherst)
Im, Bo-Hae (Chung-Ang University)
Johnson-Leung, Jennifer (University of Idaho)
Kadiri, Habiba (University of Lethbridge)
Lalin, Matilde (University of Alberta)
Lauter, Kristin (Microsoft Research)
Lee, Yoonjin (SFU)
Li, Winnie (Pennsylvania State University)
Long, Ling (Iowa State University)
Long Hoelscher, Jing (University of Arizona)
Malmskog, Beth (Colorado State University)
Manes, Michelle (University of Hawaii)
Ozman, Ekin (University of Wisconsin, Madison)
Paulhus, Jennifer (Kansas State University)
Pries, Rachel (Colorado State University)
Salerno, Adriana (University of Texas)
Scheidler, Renate (University of Calgary)
Stange, Katherine (Harvard University)
Stevenson, Katherine (California State University, Northridge)
Swisher, Holly (Oregon State University)
Terras, Audrey (UC San Diego)
Teske, Edlyn (University of Waterloo)
Treneer, Stephanie (Western Washington University)
Upton, Margaret (Texas A&M University)
Vila, Nuria (University of Barcelona)
Viray, Bianca (UC Berkeley)
Wittenborn, Erika (University of Colorado)

Black Holes: Theoretical, Mathematical and Computational Aspects
November 09 - 14, 2008 Half Workshop

Organizers:

Valeri Frolov (University of Alberta)
Sang Pyo Kim (Asia Pacific Center for Theoretical Physics)
Don Page (University of Alberta)
Misao Sasaki (Kyoto University)
Gordon Semenoff (UBC)



Does our space have more than 3 dimensions? Some modern models proposed by theoreticians are based on this assumption. Mini black holes can play a role of natural probes of large extra dimensions if they exist. Are the properties of higher dimensional black holes similar to those we know in 4 dimensions? What are the differences? In the presence of extra dimensions a 'zoo' of the black objects becomes large: besides the black holes, it contains a variety of new objects with the different topology of the horizon, such as black rings, black strings etc. What we know about these objects, their stability, uniqueness, and possible transitions between different 'black phases?' These are the main subjects of the Workshop. Theoretical models, mathematical and computational tools for their study will be discussed. The study of the properties of higher-dimensional black objects might be important for understanding of such exciting consequences of the modern physical models, as possible mini black hole production in the future collider and cosmic ray experiments.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5033/

Participants:

Abdolrahimi, Shohreh (University of Alberta)
Connell, Patrick (University of Alberta)
Cuzinatto, Rodrigo (University of Alberta)
Frolov, Valeri (University of Alberta)
Gorbonos, Dan (University of Alberta)
Kang, Gungwon (Korea Institute of Science and Technology Information)
Kim, Sang Pyo (Asia Pacific Center for Theoretical Physics)
Kimura, Masashi (Osaka City University)
Kunz, Jutta (University of Oldenburg)
Lee, Hyun Kyu (Hanyang University)
Mann, Robert (University of Waterloo)
Murata, Keiju (Kyoto University)
Myers, Robert (Perimeter Institute)
Page, Don (University of Alberta)
Park, Seong Chan (University of Tokyo)
Poisson, Eric (University of Guelph)
Sasaki, Misao (Kyoto University)
Semenoff, Gordon (UBC)
Shibata, Masaru (University of Tokyo)
Shoom, Andrei (University of Alberta)
Unruh, Bill (UBC)
Yoshino, Hirotaka (University of Alberta)
Zelnikov, Andrei (University of Alberta)

Combinatorial Design Theory
November 09 - 14, 2008

Organizers:

Peter Dukes (University of Victoria)
Esther Lamken (University of California)
Richard Wilson (California Institute of Technology)

Combinatorial design theory is the study of arranging elements of a finite set into patterns (subsets, arrays) according to specified rules. It is a field of combinatorics with close ties to several other areas of mathematics including group theory, the theory of finite fields, the theory of finite geometries, number theory, combinatorial matrix theory, and graph theory, and with a wide range of applications in areas such as information theory, statistics, computer science, biology, and engineering. Like most areas of combinatorics, design theory has grown up with computer science and it has experienced a tremendous amount of growth in the last 20 - 25 years. The field has developed subfields and groups depending on the main techniques used: combinatorial, algebraic, and algorithmic/computational. There are also groups primarily involved with applications such as in coding theory, cryptography, and computer science. As design theory has grown, researchers have become increasingly specialized and focused in subfields. In recent years, design theory has also become quite interdisciplinary with researchers found in both mathematics and computer science departments as well as occasionally in engineering or applied mathematics groups and in industrial groups.
The primary objective of this workshop is to gather together researchers of all levels from different groups and from several different areas of design theory in one place. The goal of the workshop is the exchange of new ideas and techniques in the different areas of design theory. We hope that the workshop will lead to new connections between areas and new techniques that can be used to solve both purely theoretical problems and problems arising in applications. We expect that the workshop will also lead to better communication between areas and groups in design theory and will give people a broader view of the field (and maybe new collaborators), particularly the younger researchers.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5098/

Participants:

Balachandran, Niranjan (California Institute of Technology)
Bruen, Aiden (University of Calgary)
Colbourn, Charles (Arizona State University)
Dewar, Megan (Government of Canada)
Dinitz, Jeff (University of Vermont)
Dukes, Peter (University of Victoria)
Jimbo, Masakazu (Nagoya University)
Kharaghani, Hadi (University of Lethbridge)
Kreher, Donald (Michigan Technological University)
Lamken, Esther (University of California)
Lindner, Curt (Auburn University)
Ling, Alan (University of Vermont)
Malloch, Amanda (University of Victoria)
Mendelsohn, Eric (University of Toronto)
Rosa, Alexander (McMaster University)
Wilson, Richard (California Institute of Technology)
Xiang, Qing (University of Delaware)
Yazici, Emine (Koç University)

Inverse Problems: Recent Progress and New Challenges
November 16 - 21, 2008

Organizers:

Adrian Nachman (University of Toronto)

Fadil Santosa (University of Minnesota)

Inverse problems lie at the heart of scientific inquiry and technological development. Progress in science and applied mathematics has brought about increasingly accurate models of observed phenomena. In order to use these models for prediction, one needs first to determine the parameters of the models. A similar situation arises in engineering, where one needs to set parameter values of a system to meet certain performance objectives. Inverse problems can be viewed as the process of determining parameters of a model which match observed data or meet a design objective. The workshop brings together scientists working in the forefront of the subject of inverse problems to address new challenges arising in this field. One goal in this workshop is to create interdisciplinary teams to work on inverse problems which potentially have great impact in development

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5065/

Participants:

Arridge, Simon (University College London)
Astala, Kari (University of Helsinki)
Axel, Leon (NYU Langone Medical Center)
Bal, Guillaume (Columbia University)
Barbone, Paul (Boston University)
Blum, Jacques (University of Nice Sophia Antipolis)
Bonnetier, Eric (Université Joseph Fourier)
Cakoni, Fioralba (University of Delaware)
Colton, David (University of Delaware)
Dobson, David (University of Utah)
Dos Santos Ferreira, David (Université Paris XIII)
Engl, Heinz (Austrian Academy of Sciences)
Greenleaf, Allan (University of Rochester)
Guzina, Bojan (Universiy of Minnesota)
Joy, Michael (University of Toronto)
Kirsch, Andreas (University of Karlsruhe)
Lamoureux, Michael (University of Calgary)
Lassas, Matti (Helsinki University of Technology)
Malcolm, Alison (MIT)
Mazzucato, Anna L (Penn State University)
McDowall, Stephen (Western Washington University)
Nachman, Adrian (University of Toronto)
Ola, Petri (University of Helsinki)
Otazo, Ricardo (New York University Langone Medical Center)
Pan, Xiaochuan (University of Chicago)
Päivärinta, Lassi (University of Helsinki)
Rondi, Luca (Università degli Studi di Trieste)
Rundell, William (Texas A&M University)
Santosa, Fadil (University of Minnesota)
Schotland, John (University of Pennsylvania)
Siltanen, Samuli (Tampere University of Technology)
Stefanov, Plamen (Purdue University)
Stephens, Ben (University of Toronto)
Street, Brian (University of Toronto)
Tamasan, Alexandru (University of Central Florida)
Wang, Lihong (Washington University, St. Louis)
Zarate Saiz, Ramon (UBC/PIMS)

Classical Problems on Planar Polynomial Vector Fields
November 23 - 28, 2008 Half Workshop

Organizers:

Jaume Llibre (Universitat Autònoma de Barcelona)
Dana Schlomiuk (Universite de Montreal)
Douglas Shafer (University of Northern Carolina, Charlotte)

Planar polynomial differential systems intervene often in applications: in mechanical and electrical systems, chemical reactions, fluid dynamics, population dynamics, cosmology, etc. The theory of these systems was founded in the late 19th century by Poincaré and forms the basis of the qualitative theory of ordinary differential equations.
There are several classical problems on planar differential systems which have defied researchers for more than a century. These problems were formulated by the great mathematicians Poincaré, Hilbert and Darboux. In recent years we have been witnessing steady progress on these classical problems, revealing exciting connections between them and also with other areas of research. Research in this area is interdisciplinary, involving methods of analysis, algebra, geometry as well as computer and numerical calculations.
The workshop brought together experts who have made significant contributions to this subject with specialists in connecting areas, important in these developments.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5055/

Participants:

Arriagada, Waldo (Université de Montréal)
Artes, Joan C. (Universitat Autonòma de Barcelona)
Boularas, Driss (Universite de Limoges)
Brudnyi, Alex (University of Calgary)
De Maesschalck, Peter (Hasselt University)
Dimitrov, Nikolay (Cornell University)
Dumortier, Freddy (Hasselt University)
Garcia, Isaac (Universitat de Lleida)
Gasull, Armengol (Universitat Autonòma de Barcelona)
Giné, Jaume (Universitat de Lleida)
Graf v. Bothmer, Hans-Christian (Universität Göttingen)
Grau Montana, Maite (Universitat de Lleida)
Han, Maoan (Shanghai Normal University)
Li, Chengzhi (Peking University)
Li, Jibin (Kunming University of Science and Technology/Zhejiang Normal University)
Llibre, Jaume (Universitat Autònoma de Barcelona)
McLean, Doug (University of Calgary)
Roussarie, Robert (Université de Bourgogne)
Rousseau, Christiane (Universite de Montreal)
Schlomiuk, Dana (Universite de Montreal)
Vulpe, Nicolae (Institute of Mathematics and Computer Science)
Yu, Pei (University of Western Ontario)
Zhang, Xiang (Shanghai Jiao Tong University)

Symmetries of Graphs and Networks
November 23 - 28, 2008 Half Workshop

Organizers:

Brian Alspach (University of Newcastle)

Edward Dobson (Mississippi State University)
Joy Morris (University of Lethbridge)

When designing networks, whether they be for use in telecommunications, computers, or some other format, symmetry is an important tool. Networks with symmetry tend to have desirable properties: not breaking down too easily; requiring few intermediaries in order to connect even the most distant nodes; and not being excessively expensive to design or to build.

In this workshop, we aimed to study some of the properties of symmetric networks. Our main goals were to analyse the symmetries involved, and to use our understanding of symmetry to study problems associated with networks in this restricted context. One example we considered is the problem of finding delivery routes (for the delivery of either physical objects or information) through these networks.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5047/

Participants:

Alspach, Brian (University of Newcastle)
Conder, Marston (University of Auckland)
Devillers, Alice (University of Western Australia)
Dobson, Edward (Mississippi State University)
Du, Shaofei (Capital Normal University)
Giudici, Michael (University of Western Australia)
Godsil, Chris (University of Waterloo)
Kovacs, Istvan (University of Primorska)
Kutnar, Klavdija (University of Primorska)
Li, Cai Heng (University of Western Australia)
Malnic, Aleksander (University of Ljubljana)
Marusic, Dragan (University of Ljubljana/University of Primorska, Koper)
Morris, Joy (University of Lethbridge)
Morris, Dave (University of Lethbridge)
Potocnik, Primoz (University of Ljubljana)
Praeger, Cheryl (University of Western Australia)
Sparl, Primoz (University of Ljubljana)
Spiga, Pablo (University of Padova)
Thomson, Alison (University of Melbourne)
Zhou, Sanming (University of Melbourne)

Arithmetic of K3 surfaces
November 30 - December 05, 2008

Organizers:

Jean-Louis Colliot-Thélène (CNRS/Université Paris-Sud)
Adam Logan (University of Waterloo)
David McKinnon (University of Waterloo)
Alexei Skorobogatov (Imperial College London)
Yuri Tschinkel (Courant Institute / University of Goettingen)
Ronald van Luijk (Universiteit Leiden)

Understanding Diophantine equations is one of the fundamental goals of mathematics. Algebraic geometry has proved to be indispensable in the study of Diophantine problems. It is therefore no wonder that throughout history, the geometric complexity of the Diophantine problems in focus has been increasing steadily. While the arithmetic of curves has been studied for a long time now, only fairly recently has there been substantial progress on that of higher-dimensional varieties. Naturally, this started with the easier varieties, such as rational and abelian varieties. K3 surfaces, where many basic problems are still wide open, are the next step in complexity. In the last five years, the rate of progress on the arithmetic of K3 surfaces has increased dramatically. However, not a single international meeting has been held to join the forces of the people involved. The big open problems can only be tackled by combining different strengths, both computational and theoretical

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5083/

Participants:

Amerik, Ekaterina (Université Paris-XI)
Baragar, Arthur (University of Nevada, Las Vegas)
Beauville, Arnaud (University of Nice)
Bender, Andreas (Korea Institute for Advanced Study)
Bright, Martin (University of Bristol)
Bruin, Nils (SFU)
Cantat, Serge (Université de Rennes)
Colliot-Thélène, Jean-Louis (CNRS/Université Paris-Sud)
Corn, Patrick (St. Mary's College of Maryland)
Dedieu, Thomas (Universität Bayreuth)
Demarche, Cyril (Université Paris-Sud)
Doran, Charles (University of Washington)
Hutz, Benjamin (Amherst College)
Ieronymou, Evis (Ecole Polytechnique Fédérale de Lausanne)
Ingram, Patrick (Waterloo)
Jain, Sonal (New York University)
Keum, Jong Hae (Korea Institute for Advanced Study)
Kisilevsky, Hershy (Concordia University)
Kloosterman, Remke (Leibniz Universitaet, Hannover)
Kumar, Abhinav (MIT)
Kuwata, Masato (Chuo University)
Levin, Aaron (Scuola Normale Superiore di Pisa)
McKinnon, David (University of Waterloo)
Poonen, Bjorn (MIT)
Salgado, Cecilia (Jussieu)
Sarti, Alessandra (University of Poitiers)
Schoen, Chad (Duke University)
Schuett, Matthias (University of Copenhagen)
Shioda, Tetsuji (Rikkyo University)
Silverman, Joseph (Brown University)
Skorobogatov, Alexei (Imperial College London)
Stoll, Michael (Bayreuth)
Testa, Damiano (Oxford University)
Top, Jaap (Universiteit Groningen)
van Luijk, Ronald (Universiteit Leiden)
Varilly-Alvarado, Anthony (UC Berkeley)
Viray, Bianca (UC Berkeley)
Wittenberg, Olivier (CNRS/ENS)
Woo, Jeechul (Harvard University)
Yui, Noriko (Queens University)
Zarhin, Yuri (Penn State University)

Computability, Reverse Mathematics and Combinatorics
December 07 - 12, 2008

Organizers:

Peter Cholak (University of Notre Dame)
Barbara Csima (University of Waterloo)
Steffen Lempp (University of Wisconsin, Madison)
Manuel Lerman (University of Connecticut, Storrs)
Richard Shore (Cornell University)
Theodore A. Slaman (UC Berkeley)

Reverse Mathematics or How Much Coffee? What does it take to prove a mathematical theorem? The itinerant and eccentric mathematician Paul Erdos, famous as both a solver and poser of problems, used to say that a mathematician is a machine for turning coffee into theorems. The task of this workshop is to figure out how much coffee do we really need. How hard is it to prove specific mathematical theorems? Hard, not actually in the sense of the numbers of hours of effort or the amount of caffeine consumed, but in the mathematical sense of what assumptions (axioms) are needed.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w5019/

Participants:

Anderson, Bernard (Appalachian State University)
Buss, Sam (UC San Diego)
Carlson, Tim (Ohio State University)
Cenzer, Douglas (University of Florida)
Cholak, Peter (University of Notre Dame)
Chong, Chitat (National University if Singapore)
Csima, Barbara (University of Waterloo)
Dorais, François (University of Michigan)
Greenberg, Noam (Victoria University of Wellington)
Harizanov, Valentina (George Washington University)
Hirschfeldt, Denis (University of Chicago)
Hirst, Jeffry (Appalachian State University)
Jockusch, Carl Jr. (UIUC)
Kach, Asher (University of Connecticut)
Keisler, H. Jerome (University of Wisconsin, Madison)
Kierstead, Hal (Arizona State University)
Kjos-Hanssen, Bjoern (University of Hawaii, Manoa)
Knight, Julia (University of Notre Dame)
Kohlenbach, Ulrich (Technische Universitaet Darmstadt)
Lempp, Steffen (University of Wisconsin, Madison)
Lerman, Manuel (University of Connecticut-Storrs)
Marcone, Alberto (University of Udine)
Mileti, Joseph (Dartmouth College)
Miller, Joseph (University of Connecticut-Storrs)
Montalban, Antonio (University of Chicago)
Mummert, Carl (University of Michigan)
Remmel, Jeff (UC San Diego)
Sauer, Norbert (University of Calgary)
Schmerl, James (University of Connecticut)
Shore, Richard (Cornell University)
Simpson, Stephen (Pennsylvania State University)
Solomon, Reed (University of Connecticut, Storrs)
Stephan, Frank (Singapore National University)
Towsner, Henry (Carnegie Mellon University)
Weber, Rebecca (Dartmouth College)
Weiermann, Andreas (Ghent University)
Yamazaki, Takeshi (Tohoku University)
Yang, Yue (Singapore National University)
Yokoyama, Keita (Tokyo Institute of Technology)

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2008

2-Day Workshops

Ted Lewis Workshop on SNAP Math Fairs 2008
April 18 - 20, 2008

Organizers:

Tiina Hohn (Grant MacEwan College)
Ted Lewis (University of Alberta)
Andy Liu (University of Alberta)

This is the sixth annual math fair workshop in BIRS. The workshop is extremely popular with teachers, provides them with resources for their courses, and it is helping to reshape the way mathematics is being approached in the schools. This is not limited to Alberta schools and the math fair idea is now spreading around the world. Nevertheless people in the rest of Canada and other countries are looking for us for leadership. To have teachers share their valuable experiences with math fair in their own schools is the best and most useful information to the other teachers.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w2021/

Participants:

Arbuckle, Charlotte (Wood's Home's Schools)
Comish, Troy (Simcoe County District School Board)
Creary, John (George Wood Learning Centre)
Cunningham, Valerie (Queen Elizabeth High School)
Dumanski, Micheal (SNAP Foundation)
Francis-Poscente, Krista (University of Calgary)
Hamilton, Gordon (Masters Academy and College)
Hamnett, Jacqueline (BC Schools (Dr A.R.Lord))
Hassenstein, Ray (Clearview Schools)
Hodgson, Jon (West Point Grey Academy)
Hohn, Tiina (Grant MacEwan College)
Hubbard, Barb (Keenooshayo School)
Hummel, Allen (DS MacKenzie School EPSB)
Jones, Kate (Kadon Enterprises, Inc.)
Keanie, Marlene (Keenooshayo Elementary School)
Lannigan, Darragh (George Wood Centre)
Lewis, Ted (University of Alberta)
Liu, Andy (University of Alberta)
Lynn, Wendy (Capilano College)
Lytviak, Val (Queen Elizabeth High School)
Marion, Samantha (University of Alberta)
Martin, Judy (University of Calgary)
McCaffrey, Allison (Father Doucet School)
McKinley, Janet (Sherwood Park Schools)
Morgan, Chris (Capillano College)
Nichols, Ryan (Edmonton Schools)
Pasanen, Trevor (University of Alberta)
Ritchie, Bill (Thinkfun)
Shaw, Dolph (Edmonton Public Schools)
Smart, Brenda (Keenooshayo School)
Stroud, Chris (West Point Grey Academy)
Sun, Wen-Hsien (Chiu Chang Mathematics Education Foundation)
Thompson, Tanya (ThinkFun, Inc)
Timourian, James (University of Alberta)
Yen, Lily (Capilano College, BC)

Recent Progress in Rigidity Theory
July 11 - 13, 2008

Organizers:

Robert Connelly (Cornell University)
Bill Jackson (Queen Mary College, University of London)
Tibor Jordan (Eotvos University, Budapest)
Walter Whiteley (York University)

The objective of the two-day workshop was to pull together surveys of key recent progress on results, and techniques, and to share conjectures and unsolved problems. The goal is make connections between the techniques, the conjectures, and the problems, to map out likely directions for progress in the near future, as well as encourage new collaborations to advance the theory and its applications. The interplay between the theory of rigidity and its applications has been particularly fruitful and we believe that this will continue. The potential for further contributions often lies in further progress on these problems. We asked key people to share conjectures/problems, along with key relevant references, in advance of the workshop.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w2137/

Participants:

Bremner, David (University of New Brunswick)
Chubynsky, Mykyta (University of Ottawa)
Connelly, Robert (Cornell University)
Jackson, Bill (Queen Mary College, University of London)
Jordan, Tibor (Eotvos University, Budapest)
Ross, Elissa (York University)
Schulze, Bernd (York University)
Servatius, Brigitte (Worcester Polytechnic Institute)
Servatius, Herman (Clark University)
Shai, Offer (Tel-Aviv University)
Sitharan, Meera (University of Florida)
Sljoka, Adnan (York University)
Snoeyink, Jack (University of North Carolina, Chapel Hill)
Szabadka, Zoltan (Eotvos Universite)
Thorpe, Michael (Arizona State University)
Watson, Adam (Queen Mary, University of London)
Whiteley, Walter (York University)

CARP User Meeting
September 05 - 07, 2008

Organizers:

Gernot Plank (Medical University of Graz / Oxford University)

Edward Vigmond (University of Calgary)

CARP is being increasingly used by academic groups, notably prestigious universities including Johns Hopkins, Oxford, UCSF, and Liverpool. Its continuous development is necessary to incorporate new techniques, other types of simulations and make use of new parallel programming paradigms. The objective of the workshop was to bring together the developers, users, and industry to chart the future of CARP. Mathematicians, engineers, physiologists, and computer scientists were in attendance. Users defined features to be incorporated, developers presented new computational techniques to reduce run time, and a long-term roadmap of code development for the addition of major new features. Modeling is increasingly becoming used in drug, surgical, and medical device development. At this point in time, there are no commercial software packages available. Industry has repeatedly expressed interest in performing these types of calculations. Medical researchers with experimental expertise are also drawn to the insights offered by modeling, but lack the programming capability. Writing the complex code from scratch is a major endeavor and requires a great deal of expertise, making it a daunting undertaking. Thus, companies are eager to avoid this initial investment and use an available package.
Cardiac modeling has reached the level where it can directly address industrially and medically relevant problems. This has come about because of improved medical imaging offering realistic geometry, sufficiently developed mathematical models, and the computational power to perform the simulations with the necessary detail.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w2131/

Participants:

Armstrong, Thomas (SGI)
Bayer, Jason (Johns Hopkins University)
Blake, Robert (Johns Hopkins University)
Boyle, Patrick (University of Calgary)
Comtois, Phillippe (Montreal Heart Institute)
Deo, Makarand (University of Calgary)
Di Martino, Elena (University of Calgary)
Gurev, Viatcheslav (Johns Hopkins University)
Haase, Gundolf (University of Graz)
Kickinger, Ferdinand (CAE Software solutions)
Kim, Albert (UC San Francisco)
Kohl, Peter (Oxford University)
Leon, L. Joshua (Dalhousie University)
Liebmann, Manfred (University of Graz)
Liu, Wenhui (University of Calgary)
McIlroy, Brian (General Electric Global Research)
Munoz, Mauricio (University of Calgary)
Plank, Gernot (Medical University of Graz/Oxford University)
Potse, Mark (University of Montreal)
Prassl, Anton J. (Medical University of Graz)
Sebastian, Rafael (Universitat Pompeu Fabra)
Tice, Brock (Johns Hopkins University)
Trayanova, Natalia (Johns Hopkins University)
Vigmond, Edward (University of Calgary)
Vinet, Alain (Université de Montréal)
Voth, Eric (St. Jude Medical, Inc)
Weber dos Santos, Rodrigo (Federal University of Juiz de Fora)
Zhang, Peter (Medtronic)

Second Graduate Research Summit of the International Graduate Training Centre (IGTC) in Mathematical Biology September 19 - 21, 2008

Organizers:

Alejandro Adem (UBC)
Gustavo Carrero (Athabasca University/University of Alberta)
Leah Keshet (UBC)
Mark Lewis (University of Alberta)
Pauline van den Driessche (University of Victoria)

The International Graduate Training Centre (IGTC) in Mathematical Biology is an initiative sponsored and funded by the Pacific Institute for the Mathematical Sciences (PIMS). Its focus is the training of graduate students of PIMS-associated universities in the field of Mathematical Biology.
The 2-day workshop served as one of the fundamental training elements of the IGTC program, namely the Annual Graduate Research Summit. The main theme of the Summit was Communicating Mathematical Biology. Given the fact that Mathematical Biology is an interdisciplinary field, scientists in it face real challenges at the time of communicating research ideas and scientific findings to audiences whose specific research areas are solely in Mathematics or in Biology. A mathematical biologist should be able to bridge these two scientific areas and make his/her research accessible to both mathematicians and biologists. The theme of the Summit aimed at training IGTC students to face successfully these particular communications challenge.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w2141/

Participants:

Ashander, Jaime (University of Alberta)
Brydges, David (UBC)
Campbell, David (SFU)
Carrero, Gustavo (Athabasca University/University of Alberta)
Cooper, Jane (University of Alberta)
Cytrynbaum, Eric (UBC)
Dawes, Adriana (University of Alberta)
Dawson, Andria (University of Alberta)
de Vries, Gerda (University of Alberta)
Dushek, Omer (UBC)
Fox, Jeremy (University of Calgary)
Gong, Jiafen (University of Alberta)
Jacobsen, Jon (University of Alberta)
Lewis, Mark (University of Alberta)
Lindquist, Jennifer (University of Victoria)
Lukeman, Ryan (UBC)
Ma, Junling (University of Victoria)
Marleau, Justin (University of Alberta)
Martin, Jonathan (University of Alberta)
Mckenzie, Hannah (University of Alberta)
Merchant, Sandra (UBC)
Morrison, Jennifer (UBC)
Prosk, Erin (UBC)
Rajakaruna, Harshana (University of Alberta)
Rajani, Vishaal (University of Alberta)
Strohm, Shaun (UBC-Okanagan)
Tyson, Rebecca (UBC, Okanagan)
van den Driessche, Pauline (University of Victoria)
Wheeler, Jeanette (University of Alberta)
White, Diana (University of Alberta)
Wilson, Ben (UBC, Okanagan)
Wittmann, Meike (University of Alberta)
Wong, Rita (University of Alberta)

Singular Phenomena in Nonlinear Optics, Hydrodynamics and Plasmas
October 24 - 26, 2008

Organizers:

Alejandro Aceves (Southern Methodist University)
Pavel Lushnikov (University of New Mexico)
Vladimir Zakharov (Lebedev Physics Institute of the Russian Academy of Sciences/University of Arizona)

The objectives of the workshop were to:
- Study dissipative vs. non-dissipative mechanisms for regularization of singularities
- Identification of universality as well as differences in singularity regularization mechanisms in nonlinear optics, hydrodynamics and plasmas
-Explore the connection between formation of singularities and strong turbulence in nonlinear optics (ultraviolet light multiple filamentation), hydrodynamics (freak waves distribution in ocean) and plasmas (self-focusing of laser beam for laser fusion) - Utilizing universal mechanisms of singularity formation to applications in nonlinear optics, hydrodynamics and plasmas
- Understand filamentation and vortex dynamics in nonlinear optics
- Expose junior faculty to the state-of-the-art research and to important future challenges- Establish connections between researchers working in different areas of applied mathematics on singularity formation
- Dissemination of workshop results including publications and video to help interdisciplinary training of graduate students. Provide a rich interdisciplinary learning experience for students and postdoctoral fellows.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08w2133/

Participants:

Balk, Alexander (University of Utah)
Craig, Walter (McMaster University)
Goldman, Martin (University of Colorado, Boulder)
Guyenne, Philippe (University of Delaware)
Hoefer, Mark (Columbia University)
Ilan, Boaz (University of California, Merced)
Krasny, Robert (University of Michigan)
LeMesurier, Brenton (College of Charleston)
Lushnikov, Pavel (University of New Mexico)
Mezentsev, Vladimir (Aston University)
Raphael, Pierre (Toulouse)
Rumpf, Benno (Chemnitz University of Technology)
Sulem, Catherine (University of Toronto)
Thomases, Becca (UC Davis)
Vladimirova, Natalia (University of New Mexico)
Warchall, Henry A. (National Science Foundation)
Weinstein, Michael (Columbia University)
Yu, Xinwei (University of Alberta
Zakharov, Vladimir (Lebedev Physics Institute of the Russian Academy of Sciences/University of Arizona)

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2008

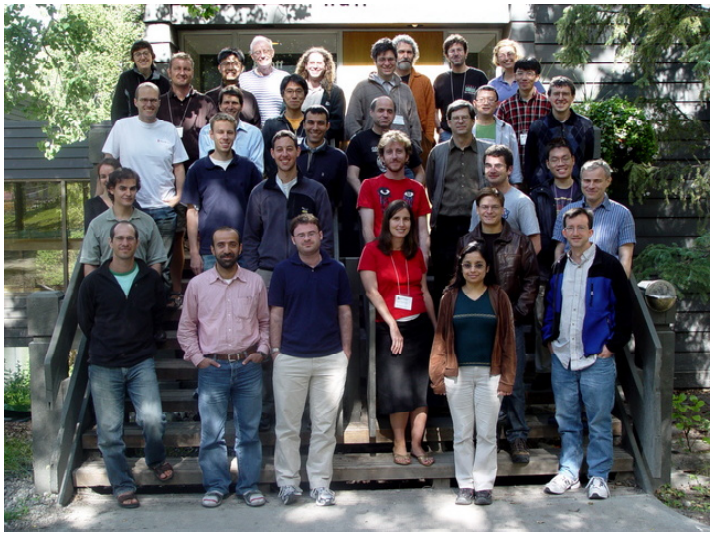
Summer Schools
Research in Teams
Focused Research Groups

Summer Schools

The Stable Trace Formula, Automorphic Forms, and Galois Representations
August 10 - 17, 2008

Organizers:

James Arthur (University of Toronto)
Michael Harris (Universite de Paris 7)
Eric Urban (Columbia University)
Vinayak Vatsal (UBC)



The primary goal of the summer school was to contribute to creating a situation where number theorists would be able to make use of the most recent developments in the theory of automorphic forms on higher-dimensional groups with no less ease than they have hitherto done with the GL(2)-theory. This necessarily involves coming to terms with the stable trace formula.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08ss045/

Participants:

Arthur, James (University of Toronto)
Bellaïche, Joël (Brandeis University)
Boeckle, Gebhard (University of Duisburg-Essen)
Cogdell, James (Ohio State University)
Darmon, Henri (McGill University)
Fargues, Laurent (Université Paris-Sud)
Feigon, Brooke (University of Toronto)
Franc, Cameron (McGill University)
Gee, Toby (Northwestern University)
Guerberoff, Lucio (Université Paris VII/University of Buenos Aires)
Haines, Thomas (University of Maryland)
Hales, Thomas C. (University of Pittsburgh)
Harris, Michael (Universite de Paris VII)
Ichino, Atsushi (Osaka City University)
Iovita, Adrian (Concordia University)
Kaletha, Tasho (University of Chicago)
Kisin, Mark (University of Chicago)
Kreidl, Martin (University of Bonn)
Labesse, Jean-Pierre (Universite Aix-Marseille II)
Lapid, Erez (Hebrew University)
Li, Chao (University of Toronto)
Mantovan, Elena (California Institute of Technology)
Mezo, Paul (Carleton University)
Miller, Andrea (Harvard University)
Minguez, Alberto (University of East Anglia)
Moeglin, Colette (Institut de Mathematiques de Jussieu)
Mok, Chung Pang (UC Berkeley)
Morel, Sophie (Institute for Advanced Study)
Nekovar, Jan (Université Paris VI)
Park, Jeehoon (McGill University)
Prasanna, Kartik (University of Maryland)
Savitt, David (University of Arizona)
Shahabi, Shahab (McGill University)
Shelstad, Diana (Rutgers University)
Shin, Sug Woo (Institute for Advanced Study)
Sinha, Kaneenika (PIMS / University of Alberta)
Skinner, Christopher (Princeton University)
Sorenson, Claus (Princeton University)
Terstiege, Ulrich (University of Bonn)
Tignor, Kenneth (Columbia University)
Whitehouse, David (MIT)

Research In Teams

Higher Resonance Varieties
May 04 - 11, 2008

Organizers/Participants:

Graham Denham (University of Western Ontario)
Henry Schenck (University of Illinois)

The purpose of this meeting was to describe some qualitative properties of the higher resonance varieties of hyperplane arrangements and related topological spaces. Our starting point was the Bernstein-Gelfand-Gelfand (BGG) correspondence, an equivalence of bounded derived categories of graded modules over a polynomial algebra and an exterior algebra, respectively. By using Eisenbud, Fløystad and Schreyer's explicit formulation of the BGG correspondence, we were able to generalize some previous work of Schenck and Suciu from the first to the higher resonance varieties.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit129/

Discrete Integrable Systems in Projective Geometry
May 18 - 25, 2008

Organizers/Participants:

Valentin Ovsienko (CNRS/Institut Camille Jordan/Universite Claude Bernard Lyon I)
Sergei Tabachnikov (Penn State University)

The notion of integrability is one of the central notions in mathematics. Starting from Euler and Jacobi, the theory of integrable systems is among the most remarkable applications of geometric ideas to mathematics and physics in general. Discrete integrable systems is a new and actively developing subject, hundreds of new articles in this field are written every year by mathematicians and physicists. However, geometric interpretation of most of the discrete integrable systems considered in the mathematical and physical literature is unclear. The main purpose of this Workshop was to study one particular dynamical system called the pentagram map. The interest in this map is motivated by its natural geometric meaning and aesthetical attractiveness.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit125/

Investigating Graphs with Odd Cycles via Commutative Algebra
May 25 - June 01, 2008

Organizers/Participants:

Chris Francisco (Oklahoma State University)
Tai Ha (Tulane University)
Adam Van Tuyl (Lakehead University)

Our work over the last few years has focused on building bridges between commutative algebra and graph theory. We associate monomial ideals to graphs to try to understand the structure of graphs and algebraic implications of different features of graphs, and this correspondence helps us use knowledge of graphs to study purely algebraic questions. As a result of this work and computational experiments using computer algebra systems, we became interested in questions related to perfect graphs. The Research In Teams week enabled the three of us, who live far enough apart that we are rarely all together, to spend an intensive week working in a collaborative environment. We found that we made progress much more quickly with all three of us in the same room rather than trying to attack the problems on our own and sending incremental accomplishments to

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit124/

Derived Category Methods in Commutative Algebra
June 01 - 08, 2008

Organizers:

Lars Christensen (Texas Tech University)
Hans-Bjorn Foxby (University of Copenhagen)

Derived category methods have proved to be very successful in ring theory,
in particular in commutative algebra. Surprisingly, there is no accessible introduction or reference to the applications of derived category methods in commutative algebra, or in general ring theory for that matter. To be an effective practitioner of these methods, one must be well-versed in a series of research articles and lecture notes,including unpublished ones. To get an overview of their applications in commutative algebra, the list grows further. The purpose of the BIRS workshop was to make progress on a book manuscript, authored by L.W. Christensen, H.-B. Foxby, and H. Holm, that will remedy this deficiency.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit132/

Participants:

Christensen, Lars (Texas Tech University)
Holm, Henrik (University of Copenhagen)

String Cosmology
June 15 - 22, 2008

Organizer:

Cliff Burgess (Conseil Européen pour la Recherche Nucléaire/McMaster University/Perimeter Institute)

We propose to further explore the work which we began as a team in June 2007, where we made significant progress toward understanding the challenges of finding an inflationary model which uses the motion of Dp-branes to drive inflation. Using very recent results of string theorists at Princeton (one of whom now joins our team), we were able to compute corrections to the superpotential which governs brane motion within the cosmologically interesting string solutions. We intend to further our programme wherein we rigorously compute the properties of the relevant effective 4D supergravity that describes the cosmologically interesting motion about the Calabi Yau vacua of interest, rather than merely parametrizing an estimate of what the result might be (as is more commonly done in the literature). Since the form of the superpotential corrections we have been finding to date are not what previously been assumed, there is a possibility of obtaining interesting cosmological solutions in regimes which have been hitherto overlooked.

We believe that this is an extremely opportune time to do this work, because of the confluence right now of good cosmological observations with the development of the right mathematical tools for extracting the relevant string theoretic predictions. Because the time is now ripe the field is also very competitive, since this confluence is not lost on other workers. This can be seen from the fact that many of the world's most prominent string theorists (such as those at Cambridge, Princeton and Stanford) are presently studying problems closely related to the ones we have targeted. From past experience we have found that the Banff centre can provide a crucial leg up on the opposition by allowing a fruitful period of undivided time during which we can pursue these ideas in depth. Our team works together very effectively in the Banff environment, and we look forward to making significant further progress in this proposed sequel.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit128/

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Cline, James (McGill University)
Dasgupta, Keshav (McGill University)
McAllister, Liam (Cornell University)

Schur Quasisymmetric Functions and Macdonald Polynomials
July 20 - 27, 2008

Organizers:

Jim Haglund (University of Pennsylvania) **Stephanie van Willigenburg** (UBC)

The study of Macdonald polynomials is one of the most active current areas of research in the area of algebraic combinatorics. It exhibits natural ties with many areas of mathematics such as algebraic geometry, representation theory, and quantum computation. Quasisymmetric functions, like Macdonald polynomials, is another area of strong activity in algebraic combinatorics that appears in a number of mathematical areas. More precisely, the Hopf algebra Qsym of quasisymmetric functions was introduced by Gessel in the early 1980's as a source of generating functions for Stanley's P-partitions. Since then, quasisymmetric functions have appeared in many contexts. In particular, in the 1990's it transpired that the Hopf algebra of quasisymmetric functions is a terminal object in the category of graded Hopf algebras equipped with a zeta-function. Connecting these two areas in a natural way are the symmetric functions known as Schur functions, which are both refined by quasisymmetric functions and generalized by Macdonald polynomials that are, in fact, symmetric functions with additional parameters that naturally generalize Schur functions. Schur functions are often considered to be the source of the area of algebraic combinatorics since the work of Schur and Frobenius on the representation theory of the symmetric group over 100 years ago. Their impact has been felt in the fields of algebraic geometry via classical Schubert calculus, representation theory through the symmetric group, and enumerative combinatorics as the generating function of tableaux. Their impact continues to be felt today through the work of Field's medalists such as Tao. Our aim for our Research in Teams was to prove the Littlewood-Richardson rule, and extend it to the analogous product of a Schur function and a Demazure atom; and to the analogous product of a Schur function and a Demazure character. Further to completing our project from which a journal article will result, we also learned a range of techniques and relationships between our areas of expertise, through informal lectures we gave to each other. Additionally, the concurrent 5-day workshop "Quantum Computation with Topological Phases of Matter," gave our group a rare chance to interact with mathematical physicists whose research also involves specific instances of Macdonald polynomials, known as Jack polynomials. This interaction included both conversing during the lecture breaks and attending relevant seminars.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit138/

Participants:

Haglund, Jim (University of Pennsylvania)
Luoto, Kurt (University of Washington)
Mason, Sarah (Davidson College)
van Willigenburg, Stephanie (UBC)

Finiteness Problems in Arithmetic Deformation Theory
July 27 - August 03, 2008

Organizers/Participants:

Frauke Bleher (University of Iowa) **Ted Chinburg** (University of Pennsylvania)

We plan to study a basic finiteness problem concerning deformations of complexes of modules for a finitely generated profinite group. In a 2005 paper in the Annales de l'Institut Fourier we showed how to generalize the deformation theory of Mazur and Schlessinger to the derived category of complexes of modules for the group. Such complexes arise naturally in arithmetic geometry, e.g. from the hypercohomology of complexes of étale sheaves.

Many important results in number theory amount to the computation of the universal deformation ring of a Galois module. A new problem arises in studying complexes of modules, however. This is to show that the universal deformation in question can be specified by a finite amount of linear algebra information with coefficients in the universal deformation ring.

This problem has an affirmative answer for modules, but for complexes we do not expect this to be so in general. We do conjecture, however, that it holds for complexes arising from arithmetic in a suitable sense.

Thus far we think we can show the finiteness property when the profinite group is the tame fundamental group of a regular local ring with finite residue field with respect to a divisor with strict normal crossings, but some of the details remain to be written. During the workshop we plan to work on finishing writing up this result and to investigate other arithmetic examples as well as potential counterexamples. If the conjecture survives close scrutiny, we believe it has the potential to become a central question in this area in the same way that other finiteness problems have motivated new developments in arithmetic geometry.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit135/

The Rate of Convergence of Loop-Erased Random Walk to SLE(2)
August 24 - 31, 2008

Organizers:

Christian Benes (Brooklyn College of the City University of New York)

Michael Kozdron (University of Regina)

One of the broad goals of statistical mechanics is to understand the behaviour of a physical system at criticality; that is, at (or near) the temperature at which a phase transition occurs. In elaborate continuous physical systems, it is often useful to approximate this continuous system by a discrete, or lattice, model. These lattice models lend themselves better to simulation. Furthermore, they are often more tractable mathematically and physical or chemical predictions about the original system can be proved rigorously using results established for the lattice model. The importance of proving predictions about such models made by conformal field theory in a rigorous mathematical sense was acknowledged when W. Werner was awarded a Fields medal in 2006 for "his contributions to the development of stochastic Loewner evolution, the geometry of two-dimensional Brownian motion, and conformal field theory." However, although there is knowledge of the scaling limit in some select few examples, there is essentially nothing known about the rates of convergence of any of these discrete models to SLE. In fact, this important open problem was communicated by Schramm in his plenary lecture at the International Congress of Mathematicians in Madrid in 2006: "Obtain reasonable estimates for the speed of convergence of the discrete processes which are known to converge to SLE." (Proceedings of the ICM 2006, Vol I, page 532) Therefore, the objective of our research in teams meeting is to study the rate of convergence of loop-erased random walk to SLE(2). In our opinion, this is the most promising case and the first one that should be considered. Loop-erased random walk has been extensively studied, and there are a number of tools available for analyzing them including a detailed proof of convergence to radial SLE(2) by G. Lawler, O. Schramm, and W. Werner; a proof of convergence to chordal SLE(2) via Wilson's algorithm by F. Johansson; the scaling limit of Fomin\'s identity in terms of SLE(2) by M. Kozdron; and the work by C. Benes on discrete half-plane capacity, a natural discrete analogue to the half-plane capacity, which parametrizes the SLE curves. Our specific goal during a week of intensive study in Banff is to determine a nontrivial estimate (including an outline of the proof) for the speed of convergence of loop-erased random walk to SLE(2).

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08rit136/

Participants:

Benes, Christian (Brooklyn College of the City University of New York)

Kozdron, Michael (University of Regina)

Johansson, Fredrik (Royal Institute of Technology (KTH) Stockholm)

Classification of Amalgams for Non-spherical Kac-Moody Groups
September 14 - 21, 2008

Organizers/Participants:

Rieuwert Blok (Bowling Green State University)

Corneliu Hoffman (University of Birmingham)

We classify all amalgams of Curtis-Tits type for all simply-laced diagrams, generalizing the spherical and affine diagrams for groups of Lie type. For any Curtis-Tits amalgam and its completion as in (A) one can define Phan-type flips and consider the associated Phan-type amalgams. This brings us to our second and third goal. (B) We develop a Phan-Curtis-Tits theory for these very general Kac-Moody type groups, analyzing the possible flips of the corresponding geometric structures. (C) We then apply our Phan-Curtis-Tits theory to the universal completions of such amalgams to construct amalgam presentations for twisted versions of those groups. We show that the diagram involved does not change although the groups corresponding to the nodes and edges of the diagram do.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08writ130/

Focused Research Groups

Water Movements in Biological Tissue and Diffusion-Weighted Imaging
May 11 - 18, 2008

Organizers:

Jin Cheng (Fudan University)
Huaxiong Huang (York University)
Robert Miura (New Jersey Institute of Technology)

This Focused Research Group (FRG) was organized with two goals. The first goal was to facilitate the interpretation of results from the state-of-the-art diffusion-weighted magnetic resonance imaging (DWI) technique by using a multi-scale mathematical modeling approach to study the transport of ions and water in biological tissue. The second goal was to utilize more realistic models of water transport in tissues, such as the brain-cell micro-environment, to develop methodologies to refine imaging techniques such as DWI. At the FRG, we took initial steps to achieve these goals by focussing on simple models of apparent diffusion coefficient (ADC) and on cell swelling associated with the clinically important problem called cortical spreading depression (CSD). Cell swelling serves as a case study to explore the issues related to co-transport of ions and water as well as those associated with DWI.
The FRG included applied mathematicians involved in modelling, mathematical analysis, and scientific computing of fundamental problems in fluid dynamics and neuroscience (Huang, Lewis, Miura, Wylie) and biomedical and mechanical engineers and a biomechanician involved in applications to mammalian biological tissue (Sotak, Takagi, Yao).

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08frg113/

Participants:

Huang, Huaxiong (York University)
Lewis, Gregory (University of Ontario Institute of Technology)
Miura, Robert (New Jersey Institute of Technology)
Sotak, Christopher (Worcester Polytechnic Institute)
Takagi, Shu (Riken / The University of Tokyo)
Wylie, Jonathan (City University of Hong Kong)
Yao, Wei (Fudan University)

Hausdorff Geometry of Complex Polynomials, Positive-Charge Distributions and Normal Operators
June 29 - July 06, 2008

Organizers:

Julius Borcea (University of Stockholm)
Rajesh Pereira (University of Guelph)
Mihai Putinar (UC Santa Barbara)

The intensive week spent at the Banff Research Center was focused on discussions of a series of precise quantitative conjectures and pointed questions referring to the Euclidean distance geometry of the critical points of complex polynomials versus the locations of their zeros. The subject goes back to some early studies in electrostatics by Gauss and Maxwell and has penetrated into modern mathematics via approximation theory, specifically the Ilieff-Sendov conjecture.
Because of the diverse research backgrounds of the group, we were able to find connections among and acquaint one another with many different areas of mathematics. In one case this extended beyond our focused research group. Julius Borcea gave a talk entitled "Negative correlations, phase transitions and zeros of multivariate polynomials" to the BIRS workshop in Recent progress in two-dimensional statistical mechanics which was taking place at the same time.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08frg121/

Participants:

Borcea, Julius (University of Stockholm)
Khavinson, Dmitry (University of South Florida)
Pereira, Rajesh (University of Guelph)
Putinar, Mihai (UC Santa Barbara)
Shimorin, Serguei (Royal Institute of Technology, Stockholm)

Traceability of Graphs and Digraphs
August 03 - 10, 2008

Organizers:

Maietjie Frick (University of South Africa)
Ortrud Oellermann (University of Winnipeg)

Each of the participants has worked on one or more of the traceability problems described below. We wish to combine our results at a BIRS workshop, in order to make further progress on these problems. During the workshop we addressed the following two questions:
Question 1 - Does there exist a nontraceable 6-traceable oriented graph of order 9 or 10?
Question 2 - Do there exist nontraceable k-traceable oriented graphs of arbitrarily large order for some $k \geq 7$?
The underlying graph of a k-traceable oriented graph is, obviously, also k-traceable, so we also considered the following two questions during the workshop.
Question 4 - What is the structure of k-traceable oriented graphs?
Question 5 - Which k-traceable graphs have k-traceable orientations?

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08frg134/

Participants:

Dunbar, Jean (Converse College, South Carolina)
Frick, Marietjie (University of South Africa)
Nielsen, Morten (University of Winnipeg)
Oellermann, Ortrud (University of Winnipeg)
van Aardt, Susan (University of South Africa)

Differential Equations Driven by Fractional Brownian Motion as Random Dynamical Systems: Qualitative Properties
September 28 - October 05, 2008

Organizers:

David Nualart (University of Kansas)
Björn Schmalfuß (University of Paderborn)
Frederi Viens (Purdue University)

The focused research group on Stochastic Differential Equations driven by Fractional Brownian Motion as Random Dynamical Systems included eight participants and one observer. The goal of the group was to exchange ideas between two largely distinct aspects of differential systems driven by self-similar stochastic processes: the stochastic analysis angle and the theory of random dynamical systems. Each of the nine people gave talks on various topics in each of these aspects. These talks were not aimed at presenting individual research results, rather they were meant to introduce the audience to the general theory, and to present the most current tools being used. Thereafter, the nine met in smaller groups to discuss ways of exploiting synergies within the collective expertise, dening strategies for solving major problems in stochastic differential equations with fractional Brownian motion.

For details, please refer to the workshop webpage
http://www.birs.ca/workshops/2008/08frg140/

Participants:

Baudoin, Fabrice (Universite de Toulouse III)
Duan, Jinqiao (Illinois Institute of Technology)
Garrido-Atienza, Maria Jose (Universidad de Sevilla)
Lu, Kening (Brigham Young University)
Nourdin, Ivan (University de Paris VI)
Nualart, David (University of Kansas)
Schmalfuß, Björn (University of Paderborn)
Tudor, Ciprian (Universite de Paris I, Pantheon-Sorbonne)
Viens, Frederi (Purdue University)

Front: Photo kindly provided by Brent Kearney
Back: Banff mountains by Gordon Weber; and
deer and magpie by Brent Kearney

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's Advanced Education and Technology, and Mexico's Consejo Nacional de Ciencia y Tecnología (CONACYT).

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