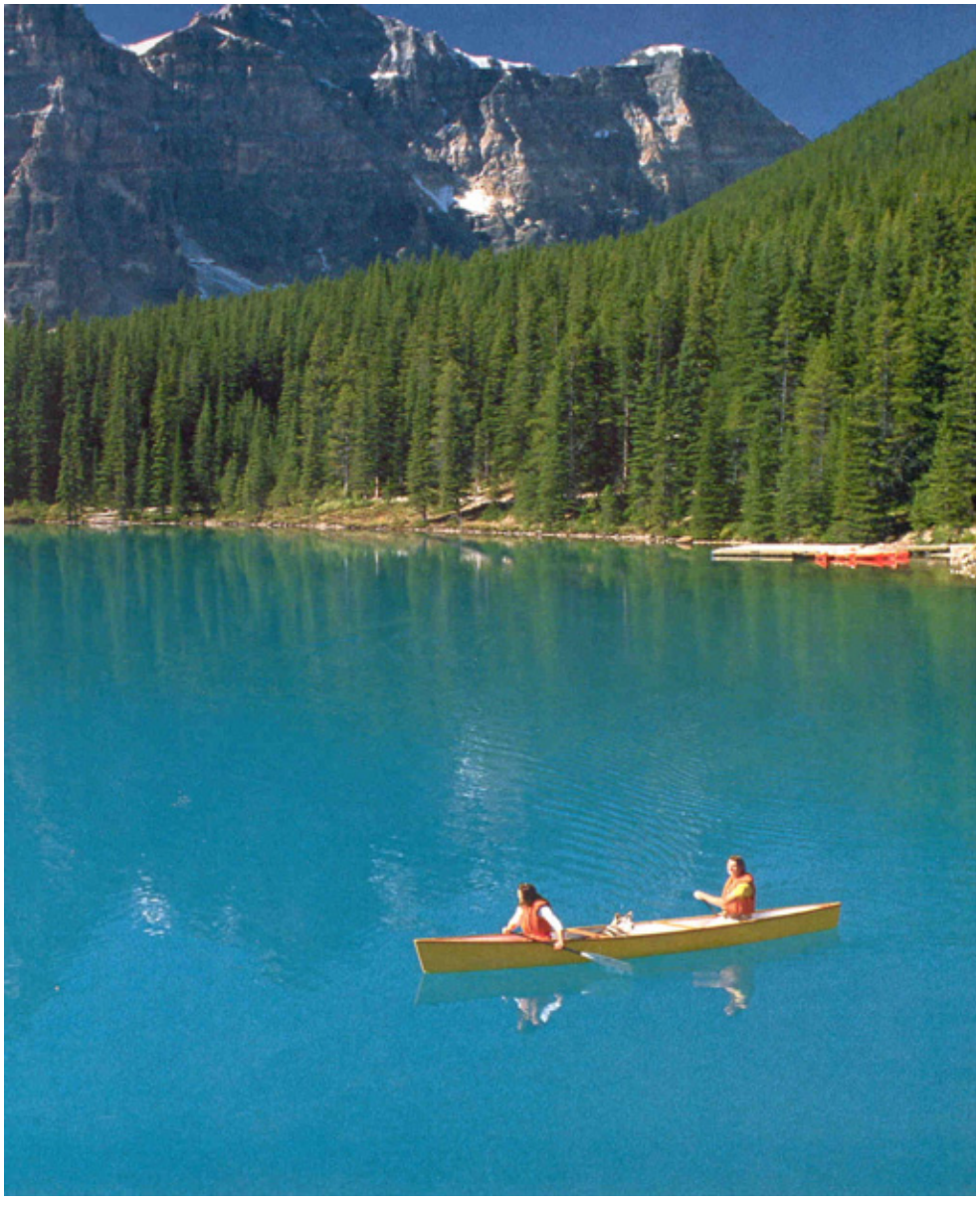
BIRS 2003 Annual Report

Banff International Research Station for Mathematical Innovation and Discovery



MITACS

PIMS

MSRI
Mathematical Sciences Research Institute

Foreword

What a great start for the Banff International Research Station and what an honour it is for me to report to the world about its very first year. BIRS, this unique bi-national partnership between Canada and the US in mathematical research, came into fruition as a result of extensive work and commitment from a great number of dedicated people on both sides of the border.

To all of them, and especially to the first BIRS Scientific Director, Robert V. Moody, we dedicate this very first annual report which confirms what had been envisioned all along: BIRS is already a tremendous international resource that has created new opportunities for mathematical researchers while optimizing the use of these resources to support collaborative scientific inquiries in North America and the world.

BIRS is already the ultimate centre for scientific interaction: a place where promising ideas develop, where lines of thought converge even when coming from different backgrounds (pure, applied, computational or conceptual) or different motivations (curiosity driven or industrially motivated), where people interested in similar problems unite their potentials and join their efforts in order to work on common research projects.

As one can see in this report, key to the meteoric success of BIRS in its very first year, were the breadth, quality and originality of its scientific activities. BIRS interdisciplinary programmes frequently included Fields Medalists, Nevannlina prize winners and Nobel laureates, but the programmes also provided excellent opportunities for training young mathematical scientists as they gained access through BIRS to the world's leading experts in their fields of interest.

BIRS first year witnessed several scientific breakthroughs, but how one can describe the work of 2000 researchers from over 400 institutions in 49 countries participating in 68 programmes spanning every aspect of the mathematical sciences and their applications?

Noteworthy among others was the announcement by Vladimir Voevodsky of his proof of the Bloch-Kato conjecture at the workshop on Quadratic forms, algebraic groups, and Galois cohomology held in October 4-9, 2003. This was an important result, which extends his own work on Milnor's conjecture for which he won a Fields medal in 2002. The Institute of Advanced Study in Princeton is now running a yearlong program devoted to the Bloch-Kato conjecture.

BIRS in 2003 was also the home of a dazzling array of scientific activities: besides the "Oberwolfach-style'' 5-day workshops and "Research-in-Teams" programmes, BIRS hosted Focused Research Groups, national Chairs meetings, gatherings for Women in Mathematics, summer schools in emerging areas, modelling camps for graduate students, training Camps for national Math Olympiads teams, industrial fora, and "ateliers" in scientific writing.

So many opportunities for so many people … let's all wish it a long life!

Nassif Ghoussoub
BIRS Scientific Director

CONTENTS

Banff International Research Station

2003

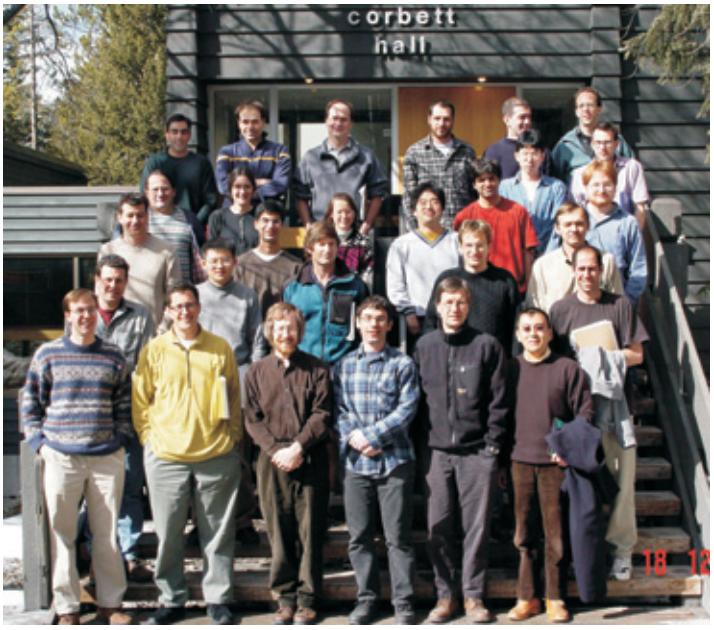
5-DAY WORKSHOPS

Recent Developments in String Theory
March 15–20, 2003

Organizers:

Jim Bryan (University of British Columbia)
Steve Giddings (UC-Santa Barbara)
Mikhail Kapranov (University of Toronto)
Andreas Karch (University of Washington)
Amanda Peet (University of Toronto)
Moshe Rozali (University of British Columbia)
Gordon Semenoff (University of British Columbia)
Mark Van Raamsdonk (University of British Columbia)
K. Viswanathan (Simon Fraser University)

At present, there are a number of important facets of string theory in which physics is related to deeper mathematics. These include the relationship between Yang-Mills theory and gravity (the AdS/CFT correspondence), work on matrix models and supersymmetric gauge theories, mirror symmetry and classification of string compactifications through techniques such as the derived category, topological string theory, and string compactifications with fluxes, with their relationship to cosmology. The workshop provided an opportunity to survey some developments on these subjects, and to catalyze further work in these directions. The workshop provided a first-class atmosphere for interaction between speakers and for research, and was well received. Work performed at the conference included Douglas finishing the paper "The statistics of string/M theory vacua," JHEP 0305 (2003) 046, which discusses a new approach to the study of superstring compactification.



For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5024/report03w5024.pdf

Participants:

Aspinwall, Paul (Duke University)
Brecher, Dominic (University of British Columbia)
Bryan, Jim (University of British Columbia)
Donagi, Ron (University of Pennsylvania)
Douglas, Michael (Rutgers University)
Furuuchi, Kazuyuki (University of British Columbia)
Getzler, E. (Northwestern University)
Giddings, Steve (UC-Santa Barbara)
Gukov, Sergei (Harvard University)
Hellerman, Simeon (Stanford University)
Hori, Kentaro (University of Toronto)
Itzhaki, Sunny (Princeton University)
Kachru, Shamit (Stanford University)
Kapustin, Anton (California Institute of Technology)
Karch, Andreas (University of Washington)
Katz, Sheldon (University of Illinois at Urbana-Champaign)
Kutasov, David (University of Chicago)
Liu, Hong (Rutgers University)
Minwalla, Shiraz (Harvard University)
Morrison, Dave (Duke University)
Myers, Robert (Perimeter Institute)
Ooguri, Hirosi (California Institute of Technology)
Page, David (University of Toronto)
Peet, Amanda (University of Toronto)
Randall, Lisa (Harvard University)
Rozali, Moshe (University of British Columbia)
Schleich, Kristin (University of British Columbia)
Schreiber, Ehud (University of British Columbia)
Semenoff, Gordon (University of British Columbia)
Sethi, Savdeep (University of Chicago)
Sharpe, Eric (Urbana-Champaign)
Silverstein, Eva (Stanford University)
Taylor, Washington (MIT)
Van Raamsdonk, Mark (University of British Columbia)
Walcher, Johannes (UC-Santa Barbara)
Witt, Don (University of British Columbia)
Zaslow, Eric (Northwestern University)

Scattering and Inverse Scattering
March 22–27, 2003

Organizers:

Richard Froese (University of British Columbia)
Gunther Uhlmann (University of Washington)

In the fields of scattering and inverse scattering theory techniques of microlocal analysis, including the use of eikonal equations and of complex geometrical optics solutions to Schrödinger and other equations, has led to substantial progress in recent years. The purpose of the workshop was to bring together people working on different aspects of these fields, to appraise the current status of development and to encourage interaction between mathematicians and scientists and engineers working directly with the applications of scattering and inverse scattering.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5037/report03w5037.pdf

Participants:

Ammari, Habib (Ecole Polytechnique)
Bal, Guillaume (Columbia University)
Colton, David (University of Delaware)
Dobranski, Michael (University of Kentucky)
Donaldson, Roger (University of British Columbia)
Dorn, Oliver (Universidad Carlos 3 de Madrid)
Finch, David (Oregon Sate University)
Frigyik, Bela (University of Washington)
Froese, Richard (University of British Columbia)
Gibson, Peter (University of Calgary)
Graham, Robin (University of Washington)
Grossman, Jeff (University of Calgary)
Hansen, Soenke (Universitaet Paderborn)
Herbst, Ira (University of Virginia)
Hislop, Peter (University of Kentucky)
Hitrik, Michael (MSRI)
Isakov, Victor (Wichita State University)
Ivrii, Victor (University of Toronto)
Kirsch, Andreas (Universität Karlsruhe)
Kusiak, Steven (University of Washington)
Lamoureux, Michael (University of Calgary)
Lin, Chi-Kun (National Cheng Kung University)
Margrave, Gary (University of Calgary)
Mazzeo, Rafe (Stanford University)
McDowall, Stephen (Western Washington University)
Perry, Peter (University of Kentucky)
Ramaseshan, Karthik (University of Washington)
Rundell, William (Texas A&M)
Ryzhik, Lenya (University of Chicago)
Salo, Mikko (University of Washington)
Skokan, Michal (University of Washington)
Stefanov, Plamen (Purdue University)
Sá Barreto, Antônio (Purdue University)
Tamasan, Alexandru (University of Toronto)
Uhlmann, Gunther (University of Washington)
Vodev, Georgi. (Université de Nantes)
Wang, Jenn-Nan (National Taiwan University)
Weder, Ricardo (Universidad Nacional Autonoma de Mexico)
Yedlin, Matt (University of British Columbia)

Noncommutative Geometry
March 22–27, 2003

Organizers:

Alain Connes (Institut des Hautes Etudes Scientifiques)
Joachim Cuntz (Universitat Muenster)
George Elliott (University of Toronto)
Masoud Khalkhali (University of Western Ontario)
Boris Tsygan (Pennsylvania State University)

Noncommutative geometry is a rapidly growing new area of mathematics with links to many disciplines in mathematics and physics. This is a highly interdisciplinary subject which draws its intuitions, ideas and methods from various areas of mathematics and physics and at the same time contributes successfully to the resolution of many of the standard problems and conjectures in these areas. An example of such interactions and contributions is to topology, like with the successful resolution of the Novikov conjecture and the Baum-Connes Conjecture for large classes of groups.

For details, please refer to the report online: http://www.pims.math.ca/birs/workshops/2003/03w5060/report03w5060new.pdf

Participants:

Baum, Paul (Pennsylvania State University)
Brenken, Berndt (University of Calgary)
Bursztyn, Henrique (University of Toronto)
Connes, Alain (Institut des Hautes Etudes Scientifiques)
Consani, Katia (University of Toronto)
Cuntz, Joachim (Universitaet Muenster)
Dean, Andrew (Lakehead University)
Echterhoff, Siegfried (University Muenster)
Elliott, George (University of Toronto)
Gorokhovsky, Alexander (University of Colorado)
Hajac, Piotr M. (Polish Academy of Sciences)
Kaminker, Jerry (Indiana University-Purdue University Indianapolis)
Khalkhali, Masoud (University of Western Ontario)
Kucerovsky, Dan (University of New Brunswick)
Laca, Marcelo (University of Victoria)
Landi, Giovanni (Universita degli Studi di Trieste)
Li, Hanfeng (University of Toronto)
Lott, John (University of Michigan)
Meyer, Ralf (Universitaet Muenster)
Nikolaev, Igor (University Calgary)
Perrot, Denis (Scuola Internazionale Superiore di Studi Avanzati)
Phillips, John (University of Victoria)
Polishchuk, Alexander (Boston University)
Ponge, Raphael (Ohio State University)
Putnam, Ian (University of Victoria)
Rangipour, Bahram (University of Western Ontario)
Retakh, Vladimir (Rutgers University)
Rieffel, Marc (UC - Berkeley)
Thom, Andreas (University Muenster)
Timmermann, Thomas (University Muenster)
Tsygan, Boris (Pennsylvania State University)
Upmeier, Harald (Philipps-University)
Valqui, Christian (Pontificia Universidad Catolica del Peru)
Varilly, Joseph (Universidad de Costa Rica)
Voigt, Christian (Universität Münster)
Wodzicki, Mariusz (UC - Berkeley)
Yu, Guoliang (Vanderbilt University)
Zobin, Nahum (College of William and Mary)

Commutative Algebra and Geometry
March 29–April 3, 2003

Organizers:

Mark Green (UC-Los Angeles)
Jurgen Herzog (Universitat-Gesamthochschule-Essen)
Bernd Sturmfels (UC-Berkeley)

The workshop was intended to focus on the interaction between commutative algebra, algebraic geomtry and combinatorics with a special emphasis on Grbner basis theory, and to give an overview on recent developments and possible future applications. Topics discussed in this workshop: toric rings and varieties, Koszul algebras, toric K-theory, exterior algebra methods, arrangements of linear subspaces, Flag varieties and Schubert varieties, Grobner bases, sagbi bases, zero-dimensional schemes, elimination theory, Hilbert schemes, singularities, invariant theory. All of these topics are highly relevant for applications of commutative algebra, both within mathematics and outside of mathematics.

Participants:

Blickle, Manuel (Mathematical Sciences Research Insititue)
Boij, Mats (Royal Institute of Technology)
Brenner, Holger (Universitaet Bochum)
Bruns, Winfried (University of Osnabruck)
Carrell, James (University of British Columbia)
Cattani, Eduardo (University of Massachusetts)
Charalambous, Hara (State University of New York, Albany)
Conca, Aldo (University of Genova)
Cox, David (Amherst College)
Dickenstein, Alicia (University of Buenos Aires)
Eisenbud, David (MSRI)
Green, Mark (UC)
Gubeladze, Joseph (Mathematical Sciences Research Insititue)
Herzog, Jurgen (Universitat-Gesamthochschule - Essen)
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Hosten, Serkan (San Francisco State University)
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Hulek, Klaus (Fachbereich Mathematik Universitat Hannover)
Iarrobino, Anthony (Northeastern University)
Khovanskii, Askold (University of Toronto)
Kreuzer, Martin (University of Dortmund)
Littelmann, Peter (Mathematical Sciences Research Institute)
Maclagan, Diane (Stanford University)
Migliore, Juan (University of Notre Dame)
Miller, Ezra (MIT)
Mustata, Mircea (Clay Mathematics Institute)
Popescu, Sorin (State University of New York, Stony Brook)
Russell, Peter (McGill University)
Scheiderer, Claus (University of Duisburg)
Schreyer, Frank-Olaf (University of Bayreuth)
Sidman, Jessica (UC-Berkeley)
Smith, Gregory (Columbia University)
Sottile, Frank (University of Massachusetts)
Stillman, Michael (Cornell University)
Sturmfels, Bernd (UC-Berkeley)
Yanagawa, Kohji (Osaka University)
Zelevinsky, Andrei (Northeastern University)

Quantum Mechanics on the Large Scale
April 12–17, 2003

Organizers:

P.C.E. Stamp (University of British Columbia)
G.A. Sawatzky (University of British Columbia)
A.J. Leggett (University Illionois-Urbana)
T. Havel (MIT)
S.Popescu (University of Bristol)
R. Gill (Utrecht University)

There has been great excitement in both the theoretical physics and mathematical communities for some years now, over the possibility of quantum computation and quantum information processing devices. The theoretical interest comes mainly from the promise of enormously enhanced computing power, at least amongst mathematicians and computer scientists. Physicists are excited for an additional reason-the existence of large-scale quantum superpositions, analogous to the famous “Schrödinger’s Cat” state, as well as entanglement between many different degrees of freedom in multi-qubit states, is of great fundamental and even philosophical interest, since it challenges basic pre-conceptions about the nature of physical reality.

Participants:

Aeppli, G. (NEC Research Institute Inc.)
Amin, M. (D-Wave Systems Inc.)
Averin, Dmitri (State University of New York, Stony Brook)
Barbara, Barbara (Centre National de la Recherche Scientifique)
Blais, Alexandre (Yale University)
Chiorescu, Irinel (Delft University of Technology)
Clerk, Aashish (Yale University)
Emerson, Joseph (MIT)
Gill, Richard (University Utrecht)
Giraud, R. (Centre National de la Recherche Scientifique)
Grabert, Hermann (Albert Ludwigs Universitat)
Havel, Timothy (MIT)
Ilichev, E. (Institute for Physical High Technology)
Jos de Jongh, L. (Leiden University)
Joyez, Philippe (Commissariat à l’Énergie Atomique - Saclay)
Kent, Andrew (New York University)
Kitaev, Alexei (California Institute of Technology)
Kohler, Sigmund (Universitat Augsburg)
Leggett, Anthony (University Illionois-Urbana)
Lidar, Dan (University of Toronto)
Marcus, C. (Harvard University)
Milburn, Gerard (University of Queensland)
Morello, Andrea (Leiden Institute of Physics)
Popescu, Sandu (University of Bristol)
Savitt, Steven (University of British Columbia)
Sawatzky, George (University of British Columbia)
Schuetzhold, R. (University of British Columbia)
Schwab, Peter (Universitat Augsburg)
Stamp, Philip (University of British Columbia)
Tupitsyn, Igor (Russian Research Centre Kurchatov Institute)
Unruh, William (University of British Columbia)
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Wernsdorfer, Wolfgang (Centre National de la Recherche Scientifique-Louis Neel)
Zagoskin, A. (D-Wave Systems Inc.)
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Zeilinger, Anton (Institut fur ExperimentAlphysik)
Zhou, Fei (Universiteit van Utrecht)
van der Wal, Caspar (Harvard University)

Computational Fuel Cell Dynamics-II
April 19–24, 2003

Organizers:

John Kenna (Ballard Power Systems)
Trung Van Nguyen (University Kansas)
Keith Promislow (Simon Fraser University)
Brian Wetton (University of British Columbia)

The world's major automotive manufactures are engaged in an historic race to develop Proton Exchange Membrane (PEM) fuel cells as clean, high-efficiency alternatives to internal combustion engines for automotive power. For such an important application, PEM fuel cells have attracted relatively little interest from modelers, both analytic and computational. Until the last few years, the number of rigorous attempts at modeling fuel cell performance were few. It was the goal of the CFCD-II workshop to unite researchers, set a framework for future research directions, and seed multi-disciplinary efforts which will lead to the development of a new generation of analytical and computational tools for PEM fuel cell design.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5060/report03w5060new.pdf

Participants:

Allen, Jeff (National Center for Microgravity Research)
Baker, Daniel (Global Alternative Propulsion Center)
Benziger, Jay (Princeton University)
Berg, Peter (Simon Fraser University)
Beuscher, Uwe (W.L. Gore & Associates, Inc.)
Bradean, Radu (Ballard Power Systems)
Buchi, Felix (Paul Scherrer Institut)
Caglar, Atife (University of Pittsburgh)
Carnes, Brian (Institute for Computational Engineering and Sciences)
Chang, Paul (Simon Fraser University)
Datta, Ravindra (Worcester Polytechnic)
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Fairbairn, Leslie (Simon Fraser University)
Fehribach, Joseph (Worcester Polytechnic Institute)
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Haas, Herwig (Ballard Power Systems)
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Kermani, Mohammad (University of New Brunswick)
Kevrekidis, Yannis (Princeton University)
Li, Xianguo (University of Waterloo)
Lin, Guangyu (University of Kansas)
Liu, Chun (Penn State University)
Myers, Tim (University of Cape Town)
Nadler, Boaz (Yale University)
Novruzi, Arian (University of Ottawa)
Paddison, Stephen (Los Alamos National Laboratory)
Paul, Reginald (University of Calgary)
Promislow, Keith (Simon Fraser University)
Rubinstein, Isaak (J. Blaustein Institute for Desert Research)
St-Pierre, Jean (Ballard Power Systems)
Stockie, John (University of New Brunswick)
Van Nguyen, Trung (University of Kansas)
Van Zee, John (University of South Carolina)
Wetton, Brian (University of British Columbia)
Xu, Jinchao (Penn State University)

The Many Aspects of Mahler's Measure
April 26–May 1, 2003

Organizers:

David Boyd (University of British Columbia)
Doug Lind (University of Washington)
Fernando Rodriguez Villegas (University of Texas at Austin)
Christopher Deninger (University of Meunster)

The idea behind the workshop was to bring together experts specializing in many different fields: dynamical systems, K-theory, number theory, topology, analysis, to explore some of the many apparently different ways that Mahler's measure appears in different areas of Mathematics. The hope was to encourage cross-fertilization between these disciplines and increase our understanding of Mahler's measure. In the space of 4 days at BIRS, many ideas were exchanged and collaborations formed. It is to be hoped that the research inspired by such workshops will continue to unravel the mysteries of Mahler's marvelous measure.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5035/Report03w5035.pdf

Participants:

Baker, Matthew (University of Georgia)
Bertin, Marie Jose (Université de Paris VI)
Besser, Amnon (Ben Gurion University)
Borwein, Peter (Simon Fraser University)
Boyd, David (University of British Columbia)
Choi, Stephen (Simon Fraser University)
Dobrowolski, Edward (College of New Caledonia)
Everest, Graham (University of East Anglia)
Ghate, Eknath (Tata Institute of Fundamental Research)
Ghoussoub, Nassif (PIMS)
Gunnells, Paul (University of Massachusetts)
Kellerhals, Ruth (University of Fribourg)
Lagarias, Jeffrey (American Tel & Tel Laboratories Research)
Lalin, Matilde (University of Texas at Austin)
Lewis, James (University of Alberta)
Lind, Doug (University of Washington)
Maillot, Vincent (Institut de Mathematiques de Jussieu)
Mossinghoff, Michael (Davidson College)
Neumann, Walter (Columbia University)
Osburn, Robert (McMaster University)
Pineiro, Jorge (City University of New York)
Rodriguez-Villegas, Fernando (University of Texas at Austin)
Rolfsen, Dale (University of British Columbia)
Sikora, Adam (Institute for Advanced Study)
Silver, Daniel (University of South Alabama)
Sinclair, Christopher (University of Texas at Austin)
Smyth, Chris (University of Edinburgh)
Stopple, Jeffrey (UC-Santa Barbara)
Vaaler, Jeff (University of Texas at Austin)
Vandervelde, Sam (University of Chicago)
Ward, Thomas (University of East Anglia)
Williams, Susan (University of South Alabama)

Recent Advances in Algebraic and Enumerative Combinatorics
May 3–8, 2003

Organizers:

Sara Billey (University of Washington)
Ian Goulden (University of Waterloo)
Curtis Greene (Haverford College)
David Jackson (University of Waterloo)
Richard Stanley (MIT)

Algebraic and enumerative combinatorics is concerned with objects that have both a combinatorial and an algebraic interpretation. It is a highly active area of the mathematical sciences, with many connections and applications to other areas, including algebraic geometry, representation theory, topology, mathematical physics and statistical mechanics. Enumerative questions arise in the mathematical sciences for a variety of reasons. For example, non-combinatorial structures often have a discrete substructure when they are studied up to topological equivalence. Moreover, some non-combinatorial structures can be discretized, and are therefore susceptible to combinatorial techniques, and the original question is then recovered by the appropriate limit.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5009/report03w5009.pdf

Participants:

Barcelo, Helene (Arizona State University)
Bergeron, Francois (Universite de Quebec)
Bergeron, Nantel (York University)
Bessenrodt, Christine (Universität Hannover)
Billey, Sara (MIT)
Bousquet-Melou, Mireille (Universite Bordeaux 1)
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Diaconis, Persi (Stanford University)
Fomin, Sergey (University of Michigan)
Fulton, William (University of Michigan)
Garsia, Adriano (UC-San Diego)
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Goulden, Ian (University of Waterloo)
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Jackson, David (University of Waterloo)
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Krattenthaler, Christian (Université Claude Bernard Lyon-I)
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Rains, Eric (AT&T Shannon Labs)
Ram, Arun (University of Wisconsin)
Reiner, Vic (University of Minnesota)
Shapiro, Michael (Michigan State University)
Shimozono, Mark (Virginia Polytechnic Institute and State University)
Sottile, Frank (University of Massachusetts)
Speicher, Roland (Queen's University)
Stanley, Richard (MIT)
Stembridge, John (University of Michigan)
Tracy, Craig (UC-Davis)
Vainshtein, Alek (University of Haifa)
Vakil, Ravi (Stanford University)
Wachs, Michelle (University of Miami)

Statistical Mechanics of Polymer Models
May 10–15, 2003

Organizers:

Christine E. Soteros (University of Saskatchewan)
De Witt Sumners (Florida State University)
Stuart G Whittington (University of Toronto)

The standard models used in the statistical mechanics of polymers are combinatorial structures such as self-avoiding walks, lattice polygons and lattice trees. These systems have been studied by combinatorial and probabilistic approaches, by numerical methods including Monte Carlo techniques, and using a variety of techniques from statistical mechanics. There are many challenging open questions, partly motivated by problems from molecular biology, especially for the more physically relevant models in low dimensions. These include questions about entanglement complexity of ring polymers, phase transitions such as polymer adsorption and polymer collapse, and extensions to random copolymers.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5014/WorkshopReport.pdf

Participants:

Bousquet-Mélou, Mireille (Université Bordeaux 1)
Brak, Richard (University of Melbourne)
Brydges, David (University of British Columbia)
Darcy, Isabel K. (University of Texas at Dallas)
Deguchi, Tetsuo (Ochanomizu University)
Diao, Yuanan (University of North Carolina at Charlotte)
Duplantier, Bertrand (Commissariat à l'Énergie Atomique -Saclay)
Guttmann, Tony (University of Melbourne)
Hansmann, Ulrich H. E. (Michigan Technological University)
Holmes, Mark (University of British Columbia)
James, Edna (University of Toronto)
Janse van Rensburg, E.J. (York University)
Jarai, Antal (Centrum voor Wiskunde en Informatica)
Krawczyk, Jaroslav (Department of Theoretical Physics)
Kusner, Rob (University of Massachusetts at Amherst)
Lee, Seung Youn (Ohio State University)
Leroux , Pierre (Laboratoire de combinatoire et d'informatique mathématique)
Madras, Neal (York University)
Mann, Jennifer (Florida State University)
Medikonduri, Ram Kishore (University of Texas at Dallas)
Millett, Kenneth C. (UC)
Navarra-Madsen, Junalyn (University of Texas at Dallas)
Owczarek, Aleks (University of Melbourne)
Prellberg, Thomas (Technische Universität Clausthal)
Rechnitzer, Andrew (University of Melbourne)
Richard, Christoph (Institut fuer Mathematik und Informatik)
Shimamura, Miyuki K. (University of Tokyo)
Slade, Gordon (University of British Columbia)
Soteros, Christine (University of Saskatchewan)
Stasiak, Andrzej (University of Lausanne)
Stella, Attilio L. (Università di Padova)
Sumners, DeWitt (Florida State University)
Szafron, Michael (University of Saskatchewan)
Viennot, Xavier G. (Université Bordeaux I)
Whittington, Stuart (University of Toronto)
den Hollander (European Unit for Research and Analysis of Non-Deterministic Operational Models)

Constraint Programming, Belief Revision, and Combinatorial Optimization
May 24–29, 2003

Organizer:

Randy Goebel (University of Alberta)

There are related concepts and ideas the areas of constraint programming, belief revision, and combinatorial optimization, as well as unique strengths. For example, combinatorial optimization has concentrated on the mathematical formalization of modeling combinatorial problems, so that provable properties of general algorithmic solutions can be established. Constraint programming has taken simple relational formalizations of combinatorial problems, and concentrated on the computational complexity of search within those constraint frameworks, and the logic programming thread has promoted the expressive ease of constraint logic programming systems to help guide search with formalized knowledge of problem domains. Finally, the area of belief revision has concentrated on the formal properties of logical theory change and update, in order to define sensible properties of accumulating beliefs.

Participants:

Brewka, Gerhard (Leipzig University)
Codognet, Phillipe (University of Paris 6)
Colbourn, Charles (University of Arizona)
Culberson, Joe (University of Alberta)
Cunningham, Bill (University of Waterloo)
Delgrande, James (Simon Fraser University)
Furukawa, Koichi (Keio University)
Ghose, Aditya (University of Wollongong)
Goebel, Randy (University of Alberta)
Hare, Donovan (Okanagan University College)
Havens, William (Simon Fraser University)
Hayward, Ryan (University of Alberta)
Hooker, John (Carnegie Mellon University)
Mackworth, Alan (University of British Columbia)
Maher, Michael (Loyola University Chicago)
McCormick, Tom (University of British Columbia)
Meyer, Thomas (National ICT Australia)
Pagnucco, Maurice (University of New South Wales)
Pulleyblank, William (IBM Thomas J. Watson Research Center)
Satoh, Ken (National Institute of Informatics)
Schaub, Torsten (Universitat Potsdam)
Shepherd, F. Bruce (Lucent Technologies)
Swinkels, Frits
Walsh, Toby (Cork Constraint Computation Centre)
van Emden, Maarten (University of Victoria)

Symmetry and Bifurcation in Biology
May 31–June 5, 2003

Organizers:

Martin Golubitsky (University Houston)
William F. Langford (University of Guelph)
Ian Stewart (University of Warwick)

There are two distinct ways to encourage interaction between mathematics and biology. 'Horizontal' programs select specific problems in biology (such as protein-folding) and bring many different mathematical methods to bear. Our workshop was the other kind of meeting: a 'vertical' program organized around a package of general methods that apply to many different biological problems. In this case, the package is the exploitation of symmetries in nonlinear dynamial systems, and the strong relation between symmetry and pattern formation. The point here is not the literal symmetry of a biological system, or an organism, or a process. Hardly anything in biology is exactly symmetric. But a huge range of biological systems possess approximate symmetries (for example all organisms in a species are approximately identical), and the best way to model such systems is to exploit the symmetry of an idealised model, and then consider what changes might occur to the conclusions if the symmetry is close, but not exact.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5075/Report03w5075.pdf

Participants:

Ashwin, Peter (University of Exeter)
Belykh, Igor (Swiss Federal Institute of Technology)
Bressloff, Paul (University of Utah)
Broer, Henk (University of Groningen)
Brown, Eric (Princeton University)
Buono, Pietro-Luciano (Universite de Montreal)
Chacron, Maurice (University of Ottawa)
Cymbalyuk, Gennady (Emory University)
Doiron, Brent (University of Ottawa)
Edwards, Roderick (University of Victoria)
Elmhirst, Toby (University of Warwick)
Field, Mike (University of Houston)
Forger, Michael (Universidade de Sao Paulo)
Gedeon, Tomas (Montana State University)
Glass, Leon (McGill University)
Golubitsky, Martin (University of Houston)
Hoppensteadt, Frank (Arizona State University)
Hornos, Jose (Universidade de Sao Paulo)
Josic, Kresimir (University of Houston)
Kane, Abdoul (Ohio State University)
Laing, Carlo (Massey University)
Lamb, Jeroen (Imperial College London)
Langford, William (University of Guelph)
LeBlanc, Victor (Universite d'Ottawa)
Lewis, Greg (Fields Institute)
Li, Yue-Xian (University of British Columbia)
Melbourne, Ian (University of Surrey)
Moehlis, Jeffrey (Princeton University)
Nagata, Wayne (University of British Columbia)
Pivato, Marcus (Trent University)
Shiau, LieJune (University of Houston-Clear Lake)
Shilnikov, Andrey (Georgia State University)
Tanaka , Reiko (California Technical Institute)
Thomas, Peter (Salk Institute for Biological Studies)
Torok, Andrew (University of Houston)
Wahl, Lindi (University of Western Ontario)
de Vries, Gerda (University of Alberta)

Applicable Harmonic Analysis
June 7–12, 2003

Organizers:

Rong-Qing Jia (University of Alberta)
Sherman D. Riemenschneider (West Virginia University)
M. Victor Wickerhauser (Washington University)

The stated goal of the conference was to build on the great success of applicable harmonic analysis in the last decade by bringing together first-rate senior experts along with promising young researchers in the theory and application of wavelet analysis, non-linear approximation, computational fluid dynamics and other applications with an emphasis on a combination of theoretical development with practical applications. The mix of topics worked out marvelously. Although talks were originally grouped into sessions according to topic, the resolution of various scheduling conflicts mixed up these groupings quite thoroughly. However, since all talks were plenary and well attended, the mixing did not prevent anyone from hearing any talk. It also made the workshop quite lively at times, with the participants sometimes gaining unexpected inspiration from superficially unconnected but in fact surprisingly relevant adjacent talks.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5019/report03w5019.pdf

Participants:

Akay, Metin (Dartmouth College)
Baraniuk, Richard (Rice University)
Binev, Peter (University of South Carolina)
Bownik, Marcin (University of Michigan)
Cannone, Marco (Universite de Marne-la-Vallee)
Chui, Charles (University of Missouri-St. Louis)
Dahmen, Wolfgang (RWTH Aachen)
DeVore, Ronald (University of South Carolina)
Dubuc, Serge (University of Montreal)
Farge, Marie (Ecole Normale Superieure)
Friedlander, Susan (University of Illinois, Chicago)
Gunturk, Sinan (Courant Institute of Mathematical Sciences)
Han, Bin (University of Alberta)
Hardin, Douglas (Vanderbilt University)
Janssen, Guido (Philips Research Laboratories)
Jetter, Kurt (Universitaet Hohenheim)
Jia, Rong-Qing (University of Alberta)
Kevlahan, Nicholas (McMaster University)
Kim, Dohan (Seoul National University)
Kim, Jeong eun (Seoul National University)
Lau, Ka-Sing (Chinese University of Hong Kong)
Lee, Seng Luan (National University of Singapore)
Liandrat, Jacques (University Aix Marseille 2)
Liu, Songtao (University of Alberta)
Mo, Qun (University of Alberta)
Nielsen, Morten (Aalborg University)
Oswald, Peter (Bell Laboratories, Lucent Technologies)
Petrova, Guergana (Texas A&M University)
Riemenschneider, Sherman (West Virginia University)
Ron, Amos (University of Wisconsin-Madison)
Schneider, Kai (Universite de Provence, Aix-Marseillel)
Shen, Zuowei (National University of Singapore)
Temlyakov, Vladimir (University of South Carolina)
Wang, Jianzhong (Sam Houston State University)
Wang, Yang (Georgia Institute of Technology)
Wickerhauser, M. Victor (Washington University)
Xu, Yuesheng (West Virginia University)
Zhou, Ding-Xuan (City University of Hong Kong)

Integration on Arc Spaces, Elliptic Genus and Chiral de Rham Complex
June 14–19, 2003

Organizers:

Mikhail Kapranov (University of Toronto)
Anatoly Libgober (University of Illinois)
Francois Loeser (Ecole Normale Superieure)

Originally introduced by M. Kontsevich, integration on arc spaces ("motivic integration") has become a major tool in algebraic geometry and singularity theory in recent years. Points of the arc space of an algebraic variety just correspond to formal arcs on the original variety (i.e. when the variety is defined by equations, formal power series solutions of these equations). Motivic integration assigns to subsets of the arc space elements of a suitably completed Grothendieck ring of varieties. Classical additive invariants such as the Euler characteristic or the Hodge polynomial factorize through this ring.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5065/report03w5065.pdf

Participants:

Batyrev, Viktor (University of Tübingen)
Berglund, Per (University of New Hampshire)
Bittner, Franziska (University of Essen)
Blickle, Manuel (University of Essen)
Budur, Nero (University of Illinois at Chicago)
Chambert-Loir, Antoine (Ecole Polytechnique)
Dong, Chongying (UC)
Ganter, Nora (MIT)
Gorbounov, Vassily (University of Kentucky)
Gordon, Julia (University of Michigan)
Guibert, Gil (Université de Nice)
Ishii, Shihoko (Tokyo Institute of Technology)
Kapranov, Mikhail (University of Toronto)
Laszlo, Yves (Universite Paris VI)
Lehn, Manfred (University of Mainz)
Lejeune-Jalabert, Monique (Universite de Versailles)
Libgober, Anatoly (University of Illinois-Chicago)
Loeser, Francois (Ecole Normale Superieure)
Malikov, Fyodor (University of Southern California)
Melle Hernández, Alejandro (Universidad Complutense de Madrid)
Merle, Michel (Universite de Nice)
Mustata, Mircea (Clay Mathematical Institute)
Nieper-Wißkirchen, Marc (University of Cambridge)
Reguera, Ana (University of Valladolid)
Sebag, Julien (Ecole Normale Superieure)
Szczesny, Matthew (University of Pennsylvania)
Tamanoi, Hirotaka (UC -Santa Cruz)
Vaintrob, Arkady (University of Oregon)
Van Straten, Duco (Johannes Gutenberg-Universität)
Vasserot, Eric (University of Cergy-Pontoise)
Veys, Wim (University of Leuven)
Wang, Weiqiang (University of Virginia)
Yasuda, Takehiko (University of Tokyo)

Point Processes—Theory and Applications
June 21–26, 2003

Organizers:

Peter Guttorp (University of Washington)
Bruce Smith (Dalhousie University)

The workshop had two objectives: first, to introduce young researchers to an exciting and broad research area at the interface between statistics and the sciences; second, to review the state of the field since the P.A.W. Lewis point process workshop in 1971. A lot of developments have taken place lately, particularly using the martingale theory of counting processes which has seen wide use in biostatitics. Statistical inference has been made easier by use of Markov chain Monte Carlo tools.

The conference was also in honor of David Brillinger, who has spent most of his career working on scientific applications of point processes and time series.

Participants:

Marchetti, Ettore (European Economic Community)
Peng, Roger (UC-Los Angeles)
Aase, Knut (Norwegian School of Economics and Business Administration)
Baddeley, Adrian (University of Western Australia)
Bebbington, Mark (Massey University)
Bhansali, Rajendra (University of Liverpool)
Braun, Willard (University of Western Ontario)
Brillinger, David (UC-Berkeley)
Brown, Emery (Massachusetts General Hospital)
Daley, Daryl (Australian National University)
Enns, Ernest (University of Calgary)
Feuerverger, Andrey (University of Toronto)
Guttorp, Peter (University of Washington)
Hussein, Abdulkadir Ahmed (University of Alberta)
Ihaka, Ross (University of Auckland)
Ionides, Edward (University of Michigan)
Irizarry, Rafael (Johns Hopkins University)
Iyengar, Satish (University of Pittsburgh)
Izenman, Alan (Temple University)
Kass, Rob (Carnegie Mellon University)
Kulperger, Reg (University of Western Ontario)
Lillestol, Jostein (Norwegian School of Economics and Business Administration)
Lindgren, Georg (University of Lund)
Miyaoka, Etsuo (Science University of Tokyo)
Moller, Jesper (Aalborg University)
Ogata, Yosi (Institute of Statistical Mathematics, Tokyo)
Preisler, Haiganoush (United States Department of Agriculture Forest Service)
Quek, S Aik (National University of Singapore)
Rice, John (UC-Berkeley)
Rizzardi, Mark (Humboldt State University)
Schoenberg, Frederic (UC-Los Angeles)
Schweder, Tore (University of Oslo)
Simon de Miranda, José (Universidade de Sao Paulo)
Smith, Bruce (Dalhousie University)
Thrall, Anthony (NCS Learn)
Turner, Rolf (University of New Brunswick)
Vere-Jones, David (Victoria University)
Zhuang, Jiancang (Institute of Statistical Mathematics)
Zitikis, Ricardas (University of Western Ontario)

Joint Dynamics
June 28–July 3, 2003

Organizers:

Douglas Lind (University of Washington)
Daniel Rudolph (University of Maryland)
Klaus Schmidt (University of Vienna)
Boris Solomyak (University of Washington)

Ergodic theory, as it arises in dynamics, concerns itself principally with the existence and structure of invariant probability measures for the dynamics. This study breaks naturally into two parts, the nature and origin of invariant Borel measures for some group or semigroup of continuous actions on some space and the structure and invariants of such an action, up to measurable conjugacy, for some fixed invariant measure. Both these areas were represented in the presentations on the Ergodic Theory day at the workshop.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5122/report03w5122.pdf

Participants:

Ball, Karen (Indiana University)
Bowen, Lewis (UC-Davis)
Connell, Chris (University of Chicago)
Frank, Natalie (Vassar College)
Handelman, David (University of Ottawa)
Hoffman, Chris (University of Washington)
Holton, Charles (University of Texas, Austin)
Johnson, Aimee (Swarthmore College
)**Kalinin, Boris** (University of Michigan)
Kenyon, Richard (University of Paris Sud)
Kitchens, Bruce
Kra, Bryna (Penn State University)
Lee, Jeong-Yup (University of Alberta)
Lightwood, Sam (George Washington University)
Lind, Douglas (University of Washington)
Lindenstrauss, Elon (Stanford University)
Martensen, Brian (University of Texas)
Muchnik, Roman (University of Chicago)
Park, Kyewon (Ajou University)
Petersen, Karl (University of North Carolina)
Putnam, Ian (University of Victoria)
Quas, Anthony (University of Memphis)
Radin, Charles (University of Texas at Austin)
Robinson, E Arthur (George Washington University)
Rudolph, Daniel (University of Maryland)
Sadun, Lorenzo (University of Texas at Austin)
Schmidt, Klaus (University of Vienna)
Silver, Dan (University of South Alabama)
Sirvent, Victor Francisco (Universidad Simon Bolivar)
Solomyak, Boris (University of Washington)
Strungaru, Nicolae (University of Alberta)
Thouvenot, Jean-Paul (Universités Paris 6)
Ward, Thomas (University of East Anglia)
Wierdl, Mate (University of Memphis)
Williams, Susan (University of South Alabama)

Mathematical Biology: From Molecules to Ecosystems; The Legacy of Lee Segel
July 5–10, 2003

Organizers:

Leah Keshet (University of British Columbia)
Simon A. Levin (Princeton University)
Mark Lewis (University of Alberta)

The main purpose of the workshop was to draw on the scientific contributions of a world-leader in applied and mathematical biology, Lee Segel, both in an historical context, and in the context of current day developments. Represented at this workshop were scientists across all ages (from graduate student to emeritus professors), with significant representation from both genders, and with a mixture of talks from novice and experts alike. A uniting common thread linking various contributions was the relationship (via collaboration, citation, extension, or simple admiration) to Prof Segel's numerous areas of expertise. The good grace and indulgence of our "guest of honor" permitted several opportunities for gentle fun and good humor, injected in and between the more formal aspects of the meeting. Setting the tone for the jovial atmosphere was the opening talk by Simon Levin (U Princeton) with a lighthearted review of Lee's illustrious career.

For details, please refer to the report online
http://www.pims.math.ca/birs/workshops/2003/03w5080/Report03w5080.pdf

Participants:

Adler, Fred (University of Utah)
Carrero, Gustavo (University of Alberta)
Cobbold, Christina (University of Alberta)
Cytrynbaum, Eric (UC-Davis)
Dawes, Adriana (University of British Columbia)
Dushoff, Jonathan (Princeton University)
Earn, David (McMaster University)
Eftimie, Raluca
Forrest, Stephanie (University of New Mexico)
Geffen, Nima (Tel Aviv University)
Goldbeter, Albert (Universite Libre de Bruxelles)
Groenenboom, Maria A.C. (Utrecht University)
Gutenkunst, Ryan (Cornell University)
Hogeweg, Paulien (Utrecht University)
Ingalls, Brian (University of Waterloo)
Keshet, Leah (University of British Columbia)
Kublik, Richard (University of Alberta)
Lee, Jungmin (University of Alberta)
Levin, Simon (Princeton University)
Lewis, Mark (University of Alberta)
Lutscher, Frithjof (University of Alberta)
Maini, Philip (Oxford University)
Marée, Stan (University of British Columbia)
Mogilner, Alex (UC-Davis)
Newlands, Nathaniel (University of British Columbia)
Odell, Garry (University of Washington)
Oster, George (UC-Berkeley)
Palsson, Eirikur (Simon Fraser University)
Perelson, Alan (Los Alamos National Laboratory)
Plotkin, Joshua (Princeton University)
Segel, Lee (Weizmann Institute of Science)
Sontag, Eduardo (Rutgers University)
Tyson, Rebecca (Okanagan University College)
Warrender, Christina (University of New Mexico)
Wollkind, David (Washington State University)
Wonham, Marjorie (University of Alberta)
de Boer, Rob (Utrecht University)
de Vries, Gerda (University of Alberta)
de-Camino-Beck, Tomas (University of Alberta)

Perspectives in Differential Geometry
July 12–17, 2003

Organizers:

Richard Schoen (Stanford)
Gang Tian (MIT)
Jingyi Chen (University of British Columbia)

The workshop was mainly on geometric analysis and its applications. It included areas where interesting progress has been made recently, a partial list of these areas includes evolution equations (e.g. the mean curvature flows, Ricci flow on Kahler manifolds with positive first Chern class), minimal surfaces, harmonic maps, J-holomorphic curves in symplectic geometry, General Relativity, and calibrated geometry (e.g. special Lagrangian submanifolds in Calabi-Yau manifolds). All of these topics are some of the typical ones in geometric analysis, and the speakers and participants of the workshop are specialists in at least one of these research areas which are all related in one way or another.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5074/report03w5074.pdf

Participants:

Arezzo, **Claudio** (Universita Degli Studi di Parma)
Bray, **Hubert** (MIT)
Bryant, **Robert** (Duke University)
Cao, **Huai-Dong** (Institute for Pure and Applied Mathematics)
Chen, **Jingyi** (University of British Columbia)
Chen, **Xiuxiong** (University of Wisconsin)
Choe, **Jaigyoung** (Stanford University)
Escobar, **Jose** (Cornell University)
Fraser, **Ailana** (University of British Columbia)
Guan, **Pengfei** (McMaster University)
Gulliver, **Robert** (University of Minnesota)
Huisken, **Gerhard** (Max Planck Institute for Gravitational Physics)
Isenberg, **Jim** (University of Oregon)
Karigiannis, **Spiro** (McMaster University)
Knopf, **Dan** (University of Iowa)
Kovalev, **Alexei** (University of Cambridge)
Li, **Jiayu** (Acadimic Sinica)
Mazzeo, **Rafe** (Stanford University)
Mese, **Chikako** (Connecticut College)
Ni, **Lei** (UC – San Diego)
Pacard, **Frank** (Universite Paris 12)
Paul, **Sean** (Columbia University)
Qing, **Jie** (UC – Santa Cruz)
Qiu, **Weiyang** (Harvard University)
Rollin, **Yann** (MIT)
Schoen, **Richard** (Stanford University)
Smoczyk, **Knut** (Max Planck Gesellschaft)
Tian, **Gang** (MIT)
Topping, **Peter** (University of Warwick)
Viaclovsky, **Jeff** (MIT)
Wang, **Mckenzie** (McMaster University)
Wang, **Xiaodong** (MIT)
White, **Brian** (Stanford University)
Yamada, **Sumio** (University of Alabama at Birmingham)

Differential Invariants and Invariant Differential Equations
July 19–24, 2003

Organizers:

Niky Kamran (McGill University)
Peter J. Olver (University of Minnesota)

The workshop succeeded in its goal to bring together leading geometers, group theorists, analysts and applied mathematicians to discuss the state of the art in the fields of differential invariants and invariant differential equations. A wide range of stimulating issues and applications was presented in the talks and discussed among the participants. Indeed, it was impressive to see so many participants working together late in the evening or early in the morning in the BIRS lounge. The BIRS facilities provided an ideal setting for this kind of exchange, and it was particularly gratifying to see geometers, analysts and applied mathematicians succeeding in communicating their ideas to each other.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5100/report03w5100.pdf

Participants:

Anco, **Stephen** (Brock University)
Anderson, **Ian** (Utah State University)
Boutin, **Mireille** (Max-Planck-Institut Fur Mathematik)
Bryant, **Robert** (Duke University)
Doubrov, **Boris** (International Students at Lewis and Clark)
Eastwood, **Michael** (University of Adelaide)
Ferapontov, **Eugene** (Loughborough University)
Finkel, **Federico** (Universidad Complutense)
Gomez-Ullate, **David** (Centre de Recherches Mathematiques)
Hydon, **Peter** (University of Surrey)
Ivey, **Thomas** (College of Charleston)
Kamran, **Niky** (McGill University)
Karigiannis, **Spiro** (McMaster University)
Khovanskii, **Askold** (University of Toronto)
Kruglikov, **Boris** (University of Tromsoe)
Langer, **Joel** (Case Western Reserve University)
Mansfield, **Elizabeth** (University of Kent, Canterbury)
Mari-Beffa, **Gloria** (University of Wisconsin)
Olver, **Peter** (University of Minnesota)
Phillips, **Carlos** (McGill University)
Pohjanpelto, **Juha** (Oregon State University)
Reid, **Greg** (University of Western Ontario)
Robart, **Thierry** (Howard University)
Sanders, **Jan** (Vrije Universiteit)
Segur, **Harvey** (University of Colorado)
Siddiqi, **Kaleem** (McGill University)
Smaili, **Fatima Drissi** (McGill University)
Tenenblat, **Keti** (Universidade de Brasilia)
The, **Dennis** (McGill University)
Wang, **Jing Ping** (Brock University)
Weiss, **Isaac** (University of Maryland)
Winternitz, **Pavel** (Centre de Recehrches Mathematiques)
Wolf, **Thomas** (Brock University)
Yamaguchi, **Keizo** (Hokkaido University)

Analysis and Geometric Measure Theory
July 26–31, 2003

Organizers:

Ana Granados (University of British Columbia)
Hervé Pajot (University de Cergy-Pontoise)
Tatiana Toro (University of Washington)

The workshop was dedicated to problems where there is strong interplay between analysis (in particular harmonic analysis and complex analysis) and geometric measure theory (in particular rectifiability and variational methods). Topics covered include:
(i) Analytic capacity and rectifiability
(ii) Analysis and rectifiability in singular metric spaces
(iii) Mumford-Shah functional

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5046/Report03w5046.pdf

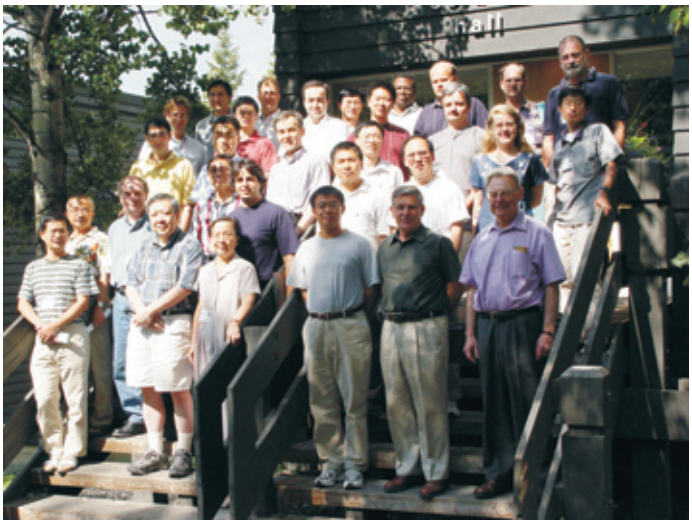
Participants:

Adams, **Tarn** (Stanford University)
Choi, **Sunhi** (UC – Los Angeles)
David, **Guy** (University of Paris-Sud)
De Pauw, **Thierry** (University of Paris-Sud)
Franchi, **Bruno** (University of Bologna)
Garnett, **John** (UC-Los Angeles)
Germinet, **Francois** (Université de Lille I)
Gonzalez, **Maria Jose** (University of Cadiz)
Hardt, **Robert** (Rice University)
Keith, **Stephen** (University of Helsinki)
Kirchheim, **Bernd** (Max Planck Institute Leipzig)
Koskela, **Pekka** (University of Jyvaskyla)
Laba, **Izabella** (University of British Columbia)
Magnani, **Valentino** (Scuola Normale Superiore Pisa)
Mateu, **Joan** (Universitat Autonoma de Barcelona)
Mattila, **Pertti** (University of Jyvaskyla)
Melnikov, **Mark** (Universitat Autonoma de Barcelona)
Meyer, **Daniel** (University of Washington)
O'Neil, **Toby** (Open University)
Pajot, **Herve** (University de Cergy-Pontoise)
Pauls, **Scott** (Darmouth College)
Rios, **Cristian** (McMaster University)
Serapioni, **Raul** (Universita di Trento)
Shanmugalingam, **Nageswari** (University of Cincinnati)
Shi, **Qiyan** (Tsinghua University)
Tyson, **Jeremy** (University of Illinois)
Xia, **Qinglan** (University of Texas at Austin)
Zobin, **Nahum** (College of William and Mary)

Monge-Ampère Type Equations and Applications
August 2–7, 2003

Organizers:

Alice Chang (Princeton University)
Pengfei Guan (McMaster University)
Paul Yang (Princeton University)



The combination of the breadth and the cohesiveness of the field of Monge-Ampère type equations certainly has made the 5-day workshop at BIRS have significant impact on the field. We summarize the main mathematical activities during the workshop around the main theme of Monge-Ampère and fully nonlinear equations (we divide it into to several sections according to the emphasis on different aspects of the field):
1) Monge-Ampère equation and classical differential geometry
2) Fully nonlinear equations in conformal geometry
3) Analysis on subelliptic Monge-Ampère equations
4) Monge-Ampère equation and mass transportation.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5067/Report03w5067.pdf

Participants:

Bland, John (University of Toronto)
Blocki, Zbigniew (Jagiellonian University)
Chang, Alice (Princeton University)
Gangbo, W. (Georgia Institute of Technology)
Ghomi, Mohammad (Georgia Tech and Penn State)
Gonzalez, Maria del Mar (Princeton University)
Greiner, Peter (University of Toronto)
Guan, B. (University of Tennessee)
Guan, Pengfei (McMaster University)
Gursky, M. (University of Notre Dame)
Han, Qing (University of Notre Dame)
Han, Z. (Rutgers University)
Keller, Julien (Toulouse University)
Kim, Seongtag (Princeton University)
Kolodziej, S. (Jagiellonian University)
Li, S. (UC-Irvine)
Lu, Guozhen (East China Normal University)
Martinez-Maure, Y. (Ecole Supérieure d'Informatique Electronique Automatique)
McCann, R. (University of Toronto)
Rios, Cristian (McMaster University)
Sawyer, Eric (McMaster University)
Spruck, J. (Johns Hopkins University)
Trudinger, Neil (Australian National University)
Urbas, J. (Australian National University)
Viaclovsky, Jeff (MIT)
Wang, G. (Max-Planck-Institute for Mathematics in the Sciences)
Wang, Xu-Jia (Australian National University)
Xia, Qinglan (University of Texas, Austin)
Yang, Paul (Princeton University)
Yuan, Yu (University of Washington)

Localization Behavior in Reaction-Diffusion Systems and Applications to the Natural Sciences
August 9–16, 2003

Organizers:

A. Bernoff (Harvey Mudd College)
P. Fife (University of Utah)
T. Hillen (University of Alberta)
M. J. Ward (University of British Columbia)
J. Wei (Chinese University of Hong Kong)

The purpose of this workshop was to discuss advances in the mathematical study of localized structures in reaction-diffusion systems arising in applications. In recent years there have been many important developments in the mathematical treatment of localization phenomena in reaction-diffusion problems, especially those connected with the equilibrium or static theory associated with certain traditional classes of elliptic PDE's. However, many open problems remain, most notably those in the realm of nonlinear dynamics, bifurcation behavior, and the numerical computation of localized structures in reaction-diffusion systems. In addition, there is a strong need for researchers in this area to be exposed to new classes of PDE's involving localization phenomena that arise from a more sophisticated modeling of biological and physical problems.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5078/Report03w5078.pdf

Participants:

Choksi, Rustum (Simon Fraser University)
Cosner, Chris (University of Miami)
Dancer, Edward (University of Sydney)
Fife, Paul (University of Utah)
Guo, Jong-Sheng (National Taiwan Normal University)
Hillen, Thomas (University Alberta)
Horstmann, Dirk (Universitaet zu Koeln)
Kaper, Tasso (Boston University)
Kolokolnikov, Theodore (University of British Columbia)
Kuske, Rachel (University of British Columbia)
Lee, Jung Min (University of Alberta)
Liu, Wenxiang (University of Alberta)
Matkowsky, Bernard (Northwestern University)
Nishiura, Yasumasa (Hokkaido University)
Othmer, Hans (University of Minnesota)
Pearson, John (Los Alamos National Laboratory)
Ren, Xiaofeng (Utah State University)
Stevens, Angela (Max Planck Institute for Mathematics in the Sciences)
Ward, Michael (University of British Columbia)
Wei, Jun Cheng (Chinese University of Hong Kong)

Defects and their Dynamics
August 9–16, 2003

Organizers:

Peter W. Bates (Brigham Young University)
Lia Bronsard (McMaster University)
Changfeng Gui (University of Connecticut)

This workshop brought together mathematicians and other scientists who are making strides in understanding these defects and their motions in their particular areas of expertise. Following are some of the specific mathematical areas we covered:

1) The Allen-Cahn equation and its various generalization
2) Ginzburg-Landau and Nonlinear Shrödinger Equations
3) Gray-Scott and Gierer-Meinhardt Equations

Participants:

Alikakos, Nicholas (University of North Texas)
Bates, Peter (Brigham Young University)
Bronsard, Lia (McMaster University)
Cahn, John (National Institute of Standards and Technology)
Chen, Fengxin (University of Texas, San Antonio)
Chmaj, Adam (Self-supported)
Ei, Shin-Ichiro (Yokohama City University)
Freire, Alexandre (National Science Foundation)
Guan, Bo (University of Tennessee)
Gui, Changfeng (University of Connecticut)
Hilhorst, Danielle (Universite Paris-Sud)
Kawohl, Bernd (Universitat Koln)
Liang, Margaret (University of British Columbia)
Liu, Chun (Penn State University)
Niethammer, Barbara (Universitat Bonn)
Schatzman, Michelle (French National Centrefor Scientific Research)
Shi, Junping (College of William and Mary)
Tonegawa, Yoshihiro (Hokkaido University)
Vainchtein, Anna (University of Pittsburgh)

Current Trends in Arithmetic Geometry and Number Theory August 16–21, 2003

Organizers:

Imin Chen (Simon Fraser University)
Brian Conrad (University of Michigan-Ann Arbor)
Eyal Goren (McGill University)
Adrian Iovita (University of Washington),
Chris Skinner (University of Michigan-Ann Arbor)
Nike Vatsal (University of British Columbia)

The area of arithmetic geometry is motivated by studying questions in number theory through algebraic geometry and representation theory, a viewpoint which was hinted at in the 19th century and which has been brought to fruition very successfully this century.

Due to the variety of the techniques and theory required, it is an area which maintains deep interconnections with other branches of mathematics such as algebra, analysis, and topology. There were two components to the workshop: 1) Three lectures per day on recent developments in the field (a total of 12 lectures), consisting of various mathematicians reporting on their research in the field. 2) A series of instructional lectures on Phi-Gamma modules, period rings, and their applications. These lectures were aimed at those who are not specialists in the field.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5032/Report03w5032.pdf

Participants:

Agboola, Adebisi (UC-Santa Barbara)
Berger, Laurent (Harvard University)
Boeckle, Gebhard (Institute for Experimental Mathematics)
Chang, Seunghwan (Brandeis University)
Chen, Imin (Simon Fraser University)
Chenevier, Gaëtan (Ecole Normale Superieure)
Coleman, Robert (UC-Berkeley)
Colmez, Pierre (Université Pierre et Marie Curie)
Conrad, Brian (University of Michigan-Ann Arbor)
Cornut, Christophe (Jussieu)
Diamond, Fred (Brandeis University)
Edixhoven, Bas (Mathematisch Instituut, Leiden)
Emerton, Matthew (Northwestern University)
Goren, Eyal (McGill University)
Greenberg, Ralph (University of Washington)
Herrick, Graham (Northwestern University)
Hida, Haruzo (UC-Los Angeles)
Iovita, Adrian (University of Washington)
Kassaei, Payman (McGill University)
Kedlaya, Kiran S. (MIT)
Khare, Chandrashekhar (Tata Institute of Fundamental Research)
Kisin, Mark (Westfalische Wilhelms Universitat)
Mailhot, Jim (University of Washington)
Marshall, Susan (University of Texas)
Nichifor, Alexandra (University of Washington)
Niziol, Wieslawa (University of Utah)
Pollack, Robert (University of Chicago)
Ramakrishna, Ravi (McGill University)
Savitt, David (Institut des Hautes Études Scientifiques, Le Bois-Marie)
Schneider, Peter (Mathematisches Institut Muenster)
Skinner, Chris (University of Michigan, Ann Arbor)
Teitelbaum, Jeremy (University of Illinois at Chicago)
Trifkovic, Mak (Harvard University)
Urban, Eric (French National Center for Scientific Research)
Vatsal, Nike (University of British Columbia)
Virdol, Cristian (University of Southern California)
Wach, Nathalie (University of Strasbourg)
Wortmann, Sigrid (Mathematisches Institut Heidelberg)
Zink, Thomas (Universitat Bielefeld)
de Shalit, Ehud (Hebrew University, Giv'at-Ram)

Computational Techniques for Moving Interfaces
August 23–28, 2003

Organizers:

Randy LeVeque (University of Washington)
Robert D. Russell (Simon Fraser University)
Steven Ruuth (Simon Fraser University)

Currently some of the most difficult problems in computational science involve moving interfaces between flowing or deforming media. Typically partial differential equations must be satisfied on each side of the interface (often different equations on each side) and these solutions coupled through relationships or jump conditions that must hold at the interface. These conditions may be in the form of differential equations on the lower-dimensional interface. Often the movement of the interface is unknown in advance and must be determined as part of the solution. The interface shape may be geometrically complex and may change topology with time. Particularly in three space dimensions, the ability to solve such problems accurately is limited. Exciting research is currently underway in the development of better algorithms, the analysis of the accuracy and stability of such algorithms, and the application of these techniques to specific scientific and engineering problems.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5050/Report03w5050.pdf

Participants:

Adalsteinsson, David (University of North Carolina, Chapel Hill)
Baines, Mike (University of Reading)
Bourlioux, Anne (Universite de Montreal)
Budd, Chris (University of Bath)
Calhoun, Donna (University of Washington)
Cao, Weiming (University of Texas at San Antonio)
Chen, Shaohua (University College of Cape Breton)
Cheng, Li-Tien (UC-San Diego)
Cortez, Ricardo (Tulane University)
Dillon, Robert (Washington State University)
Dorn, Oliver (Universidad Carlos III de Madrid)
Fast, Petri (Lawrence Livermore National Laboratory)
Fauci, Lisa (Tulane University)
Huang, Huaxiong (York University)
Huang, Weizhang (University of Kansas)
Karni, Smadar (University of Michigan)
Klapper, Isaac (Montana State University)
Lai, Ming-Chih (Dept. of Applied Mathematics, National Chiao Tung University)
LeVeque, Randy (University of Washington)
Lee, Long (University of North Carolina-Chapel Hill)
Li, Xiaolin (State University of New York, Stony Brook)
Li, Zhilin (North Carolina State University)
Liang, Margaret (University of British Columbia)
Liu, Xu-Dong (UC-Santa Barbara)
Mackenzie, John (University of Strathclyde)
Madzvammuse, Anotida (Auburn University)
Mitchell, Ian (UC-Berkeley)
Ong, Ben (Simon Fraser University)
Russell, Robert (Simon Fraser University)
Ruuth, Steven (Simon Fraser University)
Sethian, Jamie (UC)
Smereka, Peter (University of Michigan)
Stockie, John (University of New Brunswick)
Sulsky, Deborah (University of New Mexico)
Tornberg, Anna-Karin (New York University)
Tryggvason, Gretar (Worcester Polytechnic Institute)
Vladimirova, Natalia (Art & Science Collaborations, Inc. Flash Center)
Williams, J. F. (University of Bath)
Zhang, Jianying (University of British Columbia)
Zhao, Hongkai (UC-Irvine)

A Creative Writing Workshop at BIRS
August 30–September 04, 2003

Organizers:

Marjorie Senechal (Smith College)
Chandler Davis (University of Toronto)

The need to create a poetic-dramatic-narrative literature around mathematics is widely acknowledged by mathematicians and non-mathematicians alike. Yet creative writing about the content of mathematics is extremely rare, and creative writing about the act of mathematical creation even rarer. Despite the lively current interest in mathematics on the part of the non-scientific public, much creative writing in and about mathematics today reinforces the insider/outsider divide. The entrenched presupposition that artistic creation is unrelated to mathematical thought still endures, though some writers are struggling against this bias in various ways. Any effort to address these daunting challenges is necessarily experimental. We were encouraged by the statement on the Banff Centre's website, promising "freedom to experiment, with the knowledge that we learn from our failures as well as our successes. It is hoped that everyone will feel comfortable taking risks and challenging assumptions, creating new and unlikely alliances...."

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5093/Report03w5093.pdf

Participants:

Abate, Marco (Universita di Pisa)
Adams, Colin (Williams College)
Cipra, Barry
Davis, Chandler (University of Toronto)
Diacu, Florin (University of Victoria)
Ekeland, Ivar (PIMS)
Ferguson, Claire
Grosholz, Emily (Pennsylvania State University)
Hoffman, Paul
Maddow, Ellen (New Dramatists)
Osserman, Robert (MSRI)
Pekonen, Osmo (University of Jyvaskyla)
Senechal, Marjorie (Smith College)
Wali, Kameshwar C. (Syracuse University)
Zimet, Paul (Smith College)

Locally Finite Lie Algebras
August 30–September 04, 2003

Organizers:

Yuri Bahturin (Memorial University)
Georgia Benkart (University of Wisconsin-Madison),
Ivan Penkov (UC-Riverside)
Helmut Strade (Hamburg University),
Alexander Zalesskii (University of East Anglia)

Being infinite objects, locally finite Lie algebras are very complicated in comparison with Lie algebras of finite dimension. Not only because the direct limits of finite-dimensional simple Lie algebras are much harder than thier constituent algebras, but also since not every simple locally finite Lie algebras can be represented as a limit of semisimple finite dimensional algebras. Thus, in addition to "classical" methods of Lie Theory in order to successfully study locally finite Lie algebras, it is important to attract methods from other areas of mathematics. These ideas are essentially "in the air" because the other classes of locally finite algebras and the class of locally finite groups have been around for quite a long while.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5095/Report03w5095.pdf

Participants:

Allison, Bruce (University of Alberta)
Bahturin, Yuri (Memorial University)
Baranov, Alexander (University of Leicester)
Benkart, Georgia (University of Wisconsin-Madison)
Bryant, Roger (University of Manchester)
Dimitrov, Ivan (Queen's University)
Elliott, George (University of Toronto)
Glockner, Helge (Technische Universitat Darmstadt)
Grantcharov, Dimitar (University of Alberta)
Handelman, David (University of Ottawa)
Kegel, Otto (Freiburg University)
Leinen , Felix (Johannes Gutenberg-Universität Mainz)
Neeb, Karl-Hermann (Darmstadt University)
Neher, Erhard (University of Ottawa)
Penkov, Ivan (UC-Riverside)
Pianzola, Arturo (University of Alberta)
Shumyatsky, Pavel (University of Brasilia)
Strade, Helmut (University of Hamburg)
Wolf, Joseph (UC-Berkeley)
Zalesskii, Alexander (University of East Anglia)

Topology In and Around Dimension Three
September 13–18, 2003

Organizers:

Steve Boyer (University of Quebec),
Martin Scharlemann (UC- Santa Barbara),
Abigail Thompson (UC-Davis)

The study of 3-dimensional manifolds from a topological and geometrical point of view is a subject rich in technique, application, and connections with other areas of mathematics. Research is driven by various open problems of a foundational nature. The Poincar ìe conjecture and the more general geometrization conjecture of Thurston are the best known. Many individuals and groups have worked on these problems and their approaches have tended to be highly specific. Distinct sub-fields have arisen within 3-manifold theory distinguished not only by techniques and strategies, but also by the background mathematical culture needed to assimilate their methods. Thus, though at one level the goal of the workshop was to provide a forum for the examination of the current state of the field, at another, it was to bring together researchers from the various subfields to share their particular expertise with the other participants. Also included were a handful of researchers whose work focused on other areas, but had a relevance for 3-manifold topology.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5068/Report03w5068.pdf

Participants:

Agol, Ian (University of Illinois at Chicago)
Bigelow, Stephen (UC-Santa Barbara)
Bonahon, Francis (University of Southern California)
Boyer, Steve (University of Quebec)
Calegari, Daniel (California Institute of Technology)
Cochran, Tim (Rice University)
Coffey, James (University of Melbourne)
Collin, Olivier (Université du Québec a Montreal)
Cooper, Daryl (UC-Santa Barbara)
Culler, Marc (University of Illinois at Chicago)
Dunfield, Nathan (Harvard University)
Etnyre, John (University of Pennsylvania)
Eudave-Munoz, Mario (University Nacional Autonoma de Mexico)
Frohman, Charles (University of Iowa)
Rubinstein, J. Hyam (University of Melbourne)
Safnuk, Brad (UC-Davis)
Scharlemann, Martin (UC-Santa Barbara)
Schleimer, Saul (University of Illinois at Chicago)
Schultens, Jennifer (Emory University)
Shalen, Peter (University of Illinois at Chicago)
Hambleton, Ian (McMaster University)
Harvey, Shelley (UC-San Diego)
Indurskis, Gabriel (Universite du Quebec, Montreal)
Johnson, Jesse (UC-Davis)
Kerckhoff, Steven (Stanford University)
Kirby, Rob (UC-Berkeley)
Klaff, Benjamin (University of Illinois at Chicago)
Klodginski, Elizabeth (University of Michigan)
Kobayashi, Tsuyoshi (Nara Women's University)
Krebes, David (University of Calgary)
Lackenby, Marc (University of Oxford)
Long, Darren (UC-Santa Barbara)
Menasco, William (University at Buffalo)
Rolfsen, Dale (University of British Columbia)
Ruberman, Daniel (Brandeis University)
Teichner, Peter (UC-San Diego)
Thompson, Abigail (UC-Davis)
Tillmann, Stephan (Université du Québec, Montreal)
Walsh, Genevieve (UC-Davis)
Wu, Ying-Qing (University of Iowa)
Zhang, Xingru (University at Buffalo)

Structural and Probabilistic Approaches to Graph Colouring
September 20–25, 2003

Organizers:

Bruce Reed (McGill University)
Paul Seymour (Princeton University)

The workshop focussed specifically on two approaches to graph colouring, probabilistic and structural. We brought together the communities who attack graph colouring problems using these two kinds of tools. One aim of the workshop was simply to foster interaction within these two communities. A more ambitious aim was to foster collaborations which involve the joint application of both techniques.
There has been considerable recent progress on structural approaches for graph colouring and in particular their application to the Strong Perfect Graph Conjecture. Important progress has also been made recently using probabilistic techniques. Thus, it seemed an appropriate time to bring together researchers from these two communities to discuss their current research.

Participants:

Addario-Berry, Louigi (McGill University)
Bondy, Adrian (French National Centrefor Scientific Research)
Chudnovsky, Maria (Princeton University)
Chvatal, Vasek (Rutgers University)
Cornuejols, Gerard (Carnegie Mellon University)
DeVos, Matt (Princeton University)
Fountoulakis, Nikolaos (McGill University)
Goddyn, Luis (Simon Fraser University)
Hare, Donovan (Okanagan University College)
Havet, Frederic (l'Institut National de Recherche en Informatique et en Automatique Sophia-Antipolis)
Hayward, Ryan (University of Alberta)
Hoang, Chinh (Wilfred Laurier University)
Kahn, Jeff (Rutgers University)
Vu, Van (UC-San Diego)
Kawarabayashi, Kenichi (Princeton University)
Keevash, Peter (Princeton University)
Kochol, Martin (Slovak Academy of Sciences)
Lohman, Mike (Princeton University)
McCuaig, William (University of Toronto)
McDiarmid, Colin (Oxford University)
Meagher, Conor (McGill University)
Mohar, Bojan (University of Ljubljana)
Molloy, Michael (University of Toronto)
Oum, Sang-il (Princeton University)
Reed, Bruce (McGill University)
Robertson, G. Neil (Ohio State University)
Seymour, Paul (Princeton University)
Sudakov, Benny (Princeton University)
Thomas, Robin (Georgia Institute of Technology)
Welsh, Dominic (University of Oxford)

Stochastic Partial Differential Equations
September 27–October 2, 2003

Organizers:

Martin Barlow (University of British Columbia)
Krzysztof Burdzy (University of Washington),
Robert Dalang (Ecole Polytechnique Federale)
Edwin Perkins (University of British Columbia)

The conference was attended by 41 participants, including Ph.D. students, postdoctoral fellows, young researchers and international leaders in stochastic PDE's and related fields. An attempt was made to introduce new ideas from deterministic PDE (Souganidis' talk on homogenization in PDE) and statistical physics (Thomas' lecture on a stochastic wave equation approach to non-equilibrium heat flow). It was evident that the level of the talks throughout the meeting, both with respect to the science and level of exposition was unusually high. Following are some of the key topic discussed:

1) Stochastic Differential Equations and Partial Differential Equations
2) Superprocesses
3) Parabolic SPDE
4) Hyperbolic SPDE's
5) The Brownian sheet.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5079/Report03w5079.pdf

Participants:

Adler, R. (Technion)
Athreya, Siva (Indian Statistical Institute)
Barlow, Martin (University of British Columbia)
Bass, R.F. (University of Connecticut)
Brydges, D. (University of British Columbia)
Buhr, Kevin (University of British Columbia)
Carmona, R. (Princeton University)
Cinlar, E. (Princeton University)
Dalang, Robert (Ecole Polytechnique de Lausanne)
Dawson, Don (Carleton University)
Durrett, R. (Cornell University)
Evans, Steven (UC-Berkeley)
Khoshnevisan, Davar (University of Utah)
Kouritzin, M. (University of Alberta)
Krylov, N. (University of Minnesota)
Kurtz, T. (University of Wisconsin-Madison)
Le Gall, Jean-Francois (Ecole Normale Superieure)
Leveque, Olivier (Ecole Polytechnique Federale)
Li, Wenbo (University of Delaware)
Limic, Vlada (University of British Columbia)
Lyons, T. (University of Oxford)
McKinley, Scott (Ohio State University)
Mountford, T. (Ecole Polytechnique Federale)
Mueller, C. (University of Rochester)
Mytnik, L. (Technion)
Nualart, Eulalia (Universite de Paris VI)
Pardoux, Etienne (Universite de Provence)
Perkins, Ed (University of British Columbia)
Quastel, J. (University of Toronto)
Rozovskii, Boris (University of Southern California)
Salisbury, Tom (York University)
Souganidis, P. (University of Texas at Austin)
Sturm, Anja (University of British Columbia)
Swanson, Jason (University of Washington)
Thomas, L. (University of Virginia)
Walsh, J. (University of British Columbia)
Xiong, Jie (University of Alberta)
Yu, Feng (University of British Columbia)
Zambotti, Lorenzo (Scuola Normale Superiore)
Zangeneh, Bijan (Sharif University of Technology)
van der Hofstad, R. (Technische Universiteit)

Quadratic Forms, Algebraic Groups, and Galois Cohomology
October 4–9, 2003

Organizers:

Richard Elman (UC, Los Angeles)
Alexander S. Merkurjev (UC, Los Angeles)
Jan Minac (University of Western Ontario)
Carl Riehm (McMaster University)

During the last decade the revolutionary methods of motivic homotopy theory have intervened in the algebraic theory of quadratic forms. Many long-standing conjectures have been solved, as evidenced by this conference. These new methods affirm that even in a subject as well worked-over as the algebraic theory of quadratic forms, significant progress on interesting problems, often in unexpected directions, is still possible, and provide convincing evidence of continuing progress in the future. Of course these methods are producing striking results in many other fields as well, and it may be that those in quadratic forms will, as they have often done in the past, foreshadow similar and analogous progress in fields such as algebraic groups and Galois cohomology. Nevertheless many important open problems remain in the algebraic theory of quadratic forms—for example, description of the generic discrete invariant of a quadratic form—which will be attacked by means of motivic methods as well as by more traditional techniques.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5029/Report03w5029.pdf

Participants:

Arason, Jon (University of Iceland)
Balmer, Paul (Swiss Federal Institute of Technology Zurich)
Berhuy, Gregory (Swiss Federal Institute of Technology Lausanne)
Bhandari, Ganesh (University of Western Ontario)
Brosnan, Patrick (UC-Los Angeles)
Brussel, Eric (Emory University)
Chernousov, Vladimir (University of Alberta)
Elman, Richard (UC-Los Angeles)
Garibaldi, Skip (Emory University)
Gille, Philippe (Universite Paris-Sud)
Gille, Stefan (Universitaet Muenster)
Hoffmann, Detlev (Université de Franche-Comté)
Leep, David (University of Kentucky)
Lewis, David (University College Dublin)
Mahe, Louis (Institut de Recherche Mathématique de Rennes)
Marshall, Murray (University of Saskatchewan)
Merkurjev, Alexander (UC-Los Angeles)
Minac, Jan (University of Western Ontario)
Morales, Jorge (Louisiana State University)
Morel, Fabien (Paris 7)
Nenashev, Alexander (University of Regina)
Parimala, Raman (Tata Institute for Fundamental Research)
Pfister, Albrecht (Universität Mainz)
Rehmann, Ulf (Universitaet Bielefeld)
Reichstein, Zinovy (University of British Columbia)
Riehm, Carl (McMaster University)
Rost, Markus (Ohio State University)
Saltman, David (University of Texas at Austin)
Scheiderer, Claus (Universität Duisburg)
Schultz, Andrew (Stanford University)
Jacob, Bill (UC-Santa Barbara)
Karpenko, Nikita (Université D'Artois)
Knus, Max (Swiss Federal Institute of Technology Zurich)
Smith, Tara (University of Cincinnati)
Suslin, Andrei (Northwestern University)
Swallow, John (Davidson College)
Tignol, Jean-Pierre (Université catholique de Louvain)
Vishik, Alexander (Moscow Independent University)
Voevodsky, Vladimir (Institute for Advanced Study)
Wadsworth, Adrian (UC-San Diego)

BANFF Credit Risk Conference 2003
October 11–16, 2003

Organizers:

Tom Astebro (University of Waterloo)
Peter Beling (University of Virginia)
David Hand (Imperial College)
Robert Oliver (UC Berkeley),
Lyn Thomas (University of Southampton)

The objective of this workshop was to bring together a small group of people interested in the foundations and underlying theory of the mathematical and statistical prediction and decision-making models in Retail Credit Risk, an area whose most important components include the behaviors, actions and preferences of individuals for financial products. We were particularly interested in attempting to understand the similarities, differences, and interactions between retail credit risk and corporate financial risk. Modern portfolio theory, which now has an enormous scientific literature (both theoretical and experimental), plays a central role in investments, trading and valuation of assets through option pricing formulas and arbitrage models. It is worth noting that the Merton and Black-Scholes papers on option pricing and asset valuation are now some of the most widely cited scientific papers and have served as the foundation for the development of a rich theory of corporate risk. Although there are many similarities between retail and corporate risk, the differences are greater still-as the atomic building block of retail credit risk appears to be the account of a single individual with behavioral preferences, whereas in the corporate world the building block for a large portfolio of assets is comprised of shares of stocks or bonds of publicly traded and priced corporations.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5023/Report03w5023.pdf

Participants:

Ansell, Jake (University of Edinburgh)
Astebro, Tom (University of Waterloo)
Baesens, Bart (Katholique University of Leuven)
Beling, Peter (University of Virginia)
Chen, Gongyue (Gary) (University of Waterloo)
Covaliu, Zvi (George Washington University)
Crook, Jonathan (University of Edinburgh)
Crowder, Martin (University of London)
Hand, David (Imperial College)
Ingolfsson, Sigurdur (Riskmanagement Ltd.)
Jiang, Wei (University of Virginia)
Karakoulas, Grigoris (Canadian Imperial Bank of Commerce)
Kelly, Mark (Fair Isaac United Kingdom)
Longhofer, Stanley D. (Witchita State University)
Fahner, Gerald (Fair Isaac)
Feelders, Ad (University of Utrecht)
Overstreet, George (University of Virginia)
Platts, Graham (Scorex)
Scherer, William (University of Virginia)
Stepanova, Maria (UBS Switzerland)
Thomas, Lyn (University of Southampton)
Gayler, Ross (Baycorp Advantage)
Mcdonald, Ross (Imperial College London)
Oliver, Robert (UC-Berkeley)
Till, Robert (Experian)
Van den Poel, Dirk (Ghent University)
Verstraeten, Geert (Ghent University)
Wedling, Fabio (Serasa Brazil)

MITACS Theme and Consortia Meetings
October 18–25, 2003

Organizers:

MITACS
Peter Borwein (Simon Fraser University)
Evangelos Kranakis (Carleton University)
Brian Alspach (University of Regina)
Michael Mackey (McGill University)

Participants:

Ahokas, Graeme (University of Calgary)
Alspach, Brian (University of Regina)
Amiraslani, Amir (University of Western Ontario)
Bajaj, Naresh (University of Calgary)
Barbeau, Michel (Carleton University)
Beauchemin, Catherine (University of Alberta)
Borodin, Allan (Dalhousie University)
Borwein, Peter (Simon Fraser University)
Botting, Brad (Waterloo University)
Bub, Gil (McGill University)
Bull, Shelley (University of Toronto)
Carpenter, Eric (University of Alberta)
Chul, Lee Hyun (Dalhousie University)
Cleve, Richard (University of Calgary)
Coombs, Dan (University of British Columbia)
Corbeil-Letourneau, Simon (McGill University)
Corey, Mary (University of Toronto)
Corless, Rob (University of Western Ontario)
Dyke, Cheryl (University of British Columbia)
Eberly, Ron (University of Calgary)
Fee, Greg (Simon Fraser University)
Ferguson, Ron (Simon Fraser University)
Gerhard, Jurgen (Maplesoft)
Ghavam, Amir (Carleton University)
Giesbrecht, Mark (University of Waterloo)
Glass, Leon (McGill University)
Gomez-Acevedo, Horacio (University of Alberta)
Graham, Jinko (Simon Fraser University)
Hahn, Gena (University of Montreal)
Hall, Jeyanthi (Carleton University)
Hamdy, Safuat (University of Calgary)
Hatfield, Adam (Government of Canada)
Hill, Alan
Hovinen, Bradford (University of Waterloo)
Hu, Nikki (University of Alberta)
Janssen, Jeannette (Dalhousie University)
Jaumard, Brigitte (Ecole Polytechnique de Montreal)
Kalyaniwalla, Nauzer (Dalhousie University)
Keshet, Leah (University of British Columbia)
Kim, Surrey (University of Alberta)
Knauer, Josh (Simon Fraser University)
Kranakis, Evangelos (Carleton University)
Kublik, Richard (University of British Columbia)
Ll, Xiangwen (University of Regina)
Labahn, Georg (Waterloo University)
Larribe, Fabrice (McGill University)
Lee, Sophia (University of Toronto)
Leon, Josh (University of Calgary)
Leung, Henry (University of Calgary)
Li, Michael (University of Alberta)
Li, Zheyin (Grace) (Carleton University)
Lin, Bo (Dalhousie University)
Liu, Hongyu (Dalhousie University)
Liu, R.Long, Hongwei (University of Alberta)
Loredo-Osti, J C. (McGill University)
Luchko, Tyler (University of Alberta)
Luo, Honghui (Carleton University)
M'lan, Cyr Emile (Hospital for Sick Children)
Mackey, Michael (McGill University)
Maree, Stan (University of British Columbia)
Marsh, Rebeccah (University of Alberta)
Milios, Evangelos (Dalhousie University)
Mirea, Lucia (University of Toronto)
Monagan, Mike (Simon Fraser University)
Morgan, Ken (Montreal University)
Mueller, Siguna (University of Calgary)
Ng, Raymond (University of British Columbia)
Nowakowski, Richard (Dalhousie University)
Pike, David (Memorial University of Newfoundland)
Pujo-Menjouet, Laurent (McGill University)
Ramanampanoharana, Tantely (University of Montreal)
Roche, Austin (Simon Fraser University)
Sajna, Mateja (University of Regina)
Schuurmans, Dale (University of Waterloo)
Shin, Jean (Simon Fraser University)
Singh, Karen
Smith, Bruce (Halifax University)
Srinivasan, Raj (University of Saskatchewan)
Storjohann, Arne (University of Waterloo)
Sun, Wei
Syed, Zainab (University of Calgary)
Tang, Helen (Carleton University)
Tritchler, David (University of Toronto)
Tsoi, Vincent (University of Calgary)
Tuszynski, J (University of Alberta)
Tyson, Rebecca (Okanagan University College)
Vigmond, Edward (University of Calgary)
Wan, Tao (Carleton University)
Wan, Xiaomeng (Dalhousie University)
Wang, Changping (Dalhousie University)
Watmough, James (University of New Brunswick)
Whitesides, Sue (McGill University)
Williams, Hugh (University of Calgary)
Wu, Jianhong (York University)
Xu, Dashun (University of New Brunswick)
Xu, Wei (University of Toronto)
Xu, Zhen (Carleton University)
Zeng, QingLing (York University)
Zhang, Richard (Simon Fraser University)
Zhao, Xingqui
Zhu, Huaiping (York University)

Current Trends in Representation Theory of Finite Groups
October 25–30, 2003

Organizers:

Jonathan L. Alperin (University of Chicago)
Michel Broue (University of Paris VII)
Gerald Cliff (University of Alberta)

It is over a century since Frobenius initiated the study of group representations. One feature of the subject in his day was the interplay between the general theory and the study of the important special groups (for Frobenius, the symmetric groups and PSL(2p) for example) and this connection has continued to be a central theme of the field ever since, with ideas, questions and motivation flowing two ways. The conference exhibited this connection in many ways and the program displays the current work on general theories and the study of the special groups, mainly the reflection groups, finite groups of Lie type, and other related groups.

For details, please refer to the report online: http://www.pims.math.ca/birs/workshops/2003/03w5099/Report03w5099.pdf

Participants:

Alperin, Jonathan (University of Chicago)
Ariki, Susumu (Kyoto University)
Bessenrodt, Christine (Universität Hannover)
Bonnafé, Cédric (Université de Franche-Comté)
Bouc, Serge (Universite Paris 7 -Denis Diderot)
Broué, Michel (Institut Henri-Poincaré)
Brundan, Jonathan (University of Oregon)
Carlson, Jon (University of Georgia)
Chuang, Joseph (University of Bristol)
Cliff, Gerald (University of Alberta)
Corran, Ruth (Institut Henri Poincare)
Dipper, Richard (Universitaet Stuttgart)
Erdmann, Karin (Mathematical Institute)
Fong, Paul (University of Illinois at Chicago)
Geck, Meinolf (Université Lyon 1)
Grojnowski, Ian (University of Cambridge)
Henke, Anne (University of Leicester)
Hertweck, Martin (Universitat Stuttgart)
Hiss, Gerhard (Aachen University of Technology)
James, Gordon (Imperial College)
Kessar, Radha (Ohio State University)
Kim, Sungsoon (Universite Paris 7 (et d'Amiens)
Kleshchev, Alexander (University of Oregon)
Koshitani, Shigeo (Chiba University)
Kuelshammer, Burkhard (University of Jena)
Kunugi, Naoko (Aichi University of Education)
Leclerc, Bernard (Universite de Caen)
Malle, Gunter (Universitaet Kassel)
Mathas, Andrew (University of Sydney)
McNeilly, David (University of Alberta)
Michel, Jean (Universite Paris 7)
Miyachi, Hyohe (Institut des Hautes Etudes Scientifiques)
Nebe, Gabriele (Universitaet Ulm)
Parker, Alison (University of Oxford)
Puig, Lluis (French National Centre for Scientific Research)
Rickard, Jeremy (University of Bristol)
Robinson, Geoffrey (University of Birmingham)
Rouquier, Raphael (Institut de Mathematiques de Jussieu)
Shoji, Toshiaki (Nagoya University)
Srinivasan, Bhama (University of Illinois-Chicago)

Galaxy Formation: A Herculean Challenge
November 1–6, 2003

Organizers:

Arif Babul (University of Victoria)
Julio Navarro (University of Victoria)
Jeremiah Ostriker (University of Cambridge)
Tom Quinn (University of Washington),
Frank van den Bosch (University of Victoria)
Neal Katz (University of Massachusetts)

The nearly perfect isotropy of the cosmic microwave background (CMB) tells us that the early universe was, to a high degree, smooth and homogeneous. Explaining the transition from these smooth beginnings to today's highly organized universe consisting of structures that span a range of scales that exceed 10 billion in mass, from sub-galactic systems to clusters of galaxies, from superclusters to giant sheets of galaxies enveloping vast voids millions of light years in size, is one of the Grand Challenges of modern theoretical astrophysics.

Of all the pieces of this fascinating cosmic puzzle, perhaps none is as intriguing as the formation of galaxies like our own Milky Way. The building blocks of cosmic structures, galaxies exhibit a perplexing morphological variety that bears witness to the intricate paths of their formation. As dramatic advances in detector and telescope technologies make it possible to identify galaxies so distant that they are seen at a fraction of the age of nearby systems, they also bring a sense of urgency to questions that only a few years ago seemed confined to the territory of theoretical speculation. How do galaxies form and evolve? How do they acquire their observed structure?

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5302/Report03w5302.pdf

Participants:

Abadi, Mario (University of Victoria)
Abel, Tom (Penn State University)
Babul, Arif (University of Victoria)
Balogh, Michael (University of Durham)
Benson, Andrew (California Institute of Technology)
Chapman, Scott (California Institute of Technology)
Couchman, Hugh (McMaster University)
Cox, T. J. (UC-Santa Cruz)
Dave, Romeel (University of Arizona)
Ellison, Sara (Pontificia Universidad Catolica de Chile)
Fardal, Mark (University of Victoria)
Moustakas, Leonidas (Space Telescope Science Institute)
Navarro, Julio (University of Victoria)
Ostriker, Jeremiah (University of Cambridge)
Pogosyan, Dmitri (University of Alberta)
Primack, Joel (UC-Santa Cruz)
Quinn, Tom (University of Washington)
Rix, Hans-Walter (Max-Planck-Institute for Astronomy)
Sawicki, Marcin (National Research Council)
Scott, Douglas (University of British Columbia)
Shapley, Alice (California Institute of Technology)
Siebert, Arnaud (Steward Observatory)
Ferguson, Harry (Space Telescope Science Institute)
GuhaThakurta, Raja (UC- Santa Cruz)
Hayashi, Eric (University of Victoria)
Hearn, Nathan C. (Washington State University)
Hoekstra, Henk (University of Toronto)
Holley-Bockelmann, Kelly (University of Masachusetts)
Idzi, Rafal (Johns Hopkins University)
Lake, George (Washington State University)
McCarthy, Ian (University of Victoria)
Somerville, Rachel (Space Telescope Science Institute)
Springel, Volker (Max-Planck-Institute for Astrophysics)
Steinmetz, Matthias (Astrophysikalisches Institut Potsdam)
Stern, Luke (University of Victoria)
Stinson, Greg (University of Washington)
Taylor, James (University of Oxford)
Thacker, Robert (McMaster University)
Thanjavur, Karun (University of Victoria)
Wadsley, James (McMaster University)

Floer Homology for 3-manifolds
November 8–13, 2003

Organizers:

Yasha Eliashberg (Standford University),
Robion Kirby (University of British Columbia)
Peter Kronheimer (Harvard University)

This was a lively and productive conference. Perhaps the highlight, described in more detail below, was the discovery (through discussions among the participants) that Eliashberg could prove a theorem on capping off a symplectic 4-manifold with convex boundary, which was then used by Kronheimer and Mrowka to prove Property P for knots, and was also used by Ozsváth and Szabó to determine the genus of a knot by its Floer homology. Property P refers to the 40 year old conjecture that Dehn surgery on a knot in S^3 never gives a homotopy 3-sphere unless the knot is the unknot. It was already known that Dehn surgery did not give S^3, so the Kronheimer-Mrowka result would also follow from Perelman's work once it is approved. The genus of a knot K in S^3 is the minimal genus of a spanning "Seifert" surface F in S^3, dF = K. Arguably this has been the most important invariant of a knot for 80+ year, but is has veen very difficult to calculate. Now it is determined by the "highest" $spin_c$ structure for which the Heegaard Floer homology is non-trivial; this is reasonably calculable.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5303/Report03w5303.pdf

Participants:

Akbulut, Selman (Harvard University)
Collin, Olivier (l'Université du Québec à Montréal)
Crowley, Katherine (Columbia University)
Dragomir, D. (University of Southern California)
Durusoy, David Selahi (Michigan State University)
Eliashberg, Yakov (Stanford University)
Farris, David (UC-Berkeley)
Freedman, Mike (Microsoft Research)
Gay, David (Universite de Quebec a Montreal)
Gornik, Bojan (Princeton University)
Grigsby, Julia (UC-Berkeley)
Hedden, Matthew (Columbia University)
Herald, Christopher (University of Nevada, Reno)
Owens, Brendan (McMaster University)
Ozsvath, Peter (Michigan State University)
Plamenevskaya, Olga (Harvard University)
Rasmussen, Jacob (Princeton University)
Roberts, Lawrence
Rustamov, Raif (Princeton University)
Schoenenberger, S. (University of Pennsylvania)
Himpel, Benjamin (Indiana University)
Jabuka, Stanislav (Columbia University)
Khovanov, Mikhail (UC-Davis)
Kirby, Robion (UC-Berkeley)
Kronheimer, Peter (Harvard University)
Lawson, Terry (Tulane University)
Lee, Yi-Jen (Princeton University)
Lipshitz, Robert (Stanford University)
Manolescu, Ciprian (Harvard University)
Mark, Thomas (Southeastern Louisiana University)
Melvin, Paul (Bryn Mawr College)
Mrowka, Tom (MIT)
Nemethi, Andras (Ohio State University)
Stipsicz, Andras (Hungarian Academy of Sciences)
Strle, Saso (McMaster University)
Sullivan, Michael (Mathematical Sciences Research Institute)
Szabo, Zoltan (Princeton University)
Walker, Kevin
Wand, Andy (UC-Berkeley)
Wehrheim, Katrin (Princeton University)
Weiss, Hartmut (Stanford University)

The Interaction of Finite Type and Gromov-Witten Invariants
November 15–20, 2003

Organizers:

Jim Bryan (University of British Columbia)
David Auckly (Kansas State University)

Before five years ago, there was no interaction between these two distinct fields. In 1998 Gopakumar and Vafa suggested a relation between the GW invariants and certain (integer) counts of BPS states in M-theory [14]. Shortly thereafter work appeared showing that open string theory on O(“1) Å O(“1) is equivalent to Chern-Simons theory [1, 29, 24, 23]. This is a duality between Chern-Simons theory and open string theory built on the conjecture of t’Hooft relating large N gauge theories and string theories. These ideas developed very quickly in the theoretical physics literature. The resulting papers suggest strong links between these distinct mathematical areas. The mathematical communities working on finite-type invariants and Gromov-Witten invariants were and still are largely disjoint. The goal of the workshop was to bring together people working on finite-type invariants, people working on Gromov-Witten invariants and physicists who could explain the recent results in physics linking these two areas.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5020/Report03w5020.pdf

Participants:

Akbulut, Selman (Michigan State University)
Auckly, David (Kansas State University)
Bar-Natan, Dror (University of Toronto)
Behrend, Kai (University of British Columbia)
Boden, H. (McMaster University)
Bryan, Jim (University of British Columbia)
Cavalieri, Renzo (University of Utah)
Durusoy, Selahi (Michigan State University)
Garoufalidis, Stavros (Georgia Institute of Technology)
Gay, David (Universite du Quebec a Montreal)
Gholampour, Amin (University of British Columbia)
Grigsby, Julia Elisenda (UC-Berkeley)
Herald, C. (University of Nevada-Reno)
Hutchings, M. (UC)
Karp, Dagan (University of British Columbia)
Kimura, Takashi (Boston University)
Kirby, Rob (UC-Berkeley)
Koshkin, Sergiy (Kansas State University)
Leung, Naichung Cona (University of Minnesota)
Li, J. (Stanford University)
Liu, Chiu-Chu (Melissa) (Harvard University)
Marino, Marcos (Harvard University)
Ng, Lenny (AIM and Stanford University)
Przytycki, Jozef (George Washington University)
Roberts, Justin (UC-San Diego)
Sawon, Justin (SUNY at Stony Brook)
Shapiro, Jacob (University of British Columbia)**Song, Yinan** (University of British Columbia)
Tralle, Aleksy (University of Warmia and Mazury)
Vaintrob, Arkady (University of Oregon)
Wenzl, Hans (UC-San Diego)
Yu, Edwin (University of British Columbia)

Theory and Numerics of Matrix Eigenvalue Problems
November 22–27, 2003

Organizers:

J. W. Demmel (UC-Berkeley)
N. J. Higham (University of Manchester)
P. Lancaster (University of Calgary)

Matrix eigenvalue problems arise in many applications in science and engineering, ranging from the dynamical analysis of structural systems such as bridges and buildings to theories of elementary particles in atomic physics. Many current engineering design processes depend on the reliable computation of eigenvalues of matrices or matrix polynomials of possibly huge dimensions and often having particular structures. Underlying these computations are theory and numerical algorithms developed over the last 50 years, since the introduction of digital computers. The aim of this workshop was to bring together researchers in the theory and numerical solution of eigenvalue problems with a view to surveying the state of the art, promoting collaboration, and making progress on the many challenging problems in this area. Also invited were users of these algorithms in applications. A unique feature of the workshop was that researchers from all parts of the spectrum from core linear algebra to numerical linear algebra to applications were able to interact and work together intensively for the duration of the workshop.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5008/Report03w5008.pdf

Participants:

Bai, Zhaojun (UC-Davis)
Barlow, Jesse (Penn State University)
Bini, Dario (Universita' di Pisa)
Boulton, Lyonell (University of Calgary)
Byers, Ralph (University of Kansas)
Carrington, Tucker (Universite de Montreal)
Demmel, J.W. (UC-Berkeley)
Dhillon, Inderjit (University of Texas at Austin)
Driessel, Kenneth R. (Colorado State University)
Kirkland, Steve (University of Regina)
Knyazev, Andrew (University of Colorado at Denver)
Koev, Plamen (MIT)
Lancaster, Peter (University of Calgary)
Lehoucq, Richard (Sandia National Laboratories)
Li, Chi-Kwong (College of William and Mary)
Liu, Yifan (Stanford University)
Mackey, Niloufer (Western Michigan University)
Mackey, Steve (Western Michigan University)
Mathias, Roy (College of William and Mary)
Drmac, Zlatko (University of Zagreb)
Frommer, Andreas (Bergische Universitat Wuppertal)
Golub, Gene (Stanford University)
Gu, Ming (UC-Berkeley)
Guo, Chun-Hua (University of Regina)
Higham, N.J. (University of Manchester)
Ipsen, Ilse (North Carolina State University)
Kagstrom, Bo (Umea University)
Meerbergen, Karl (Free Field Technologies)
Mehrmann, Volker (Technische Universitat Berlin)
Parlett, Beresford (UC-Berkeley)
Plestenjak, Bor (University of Ljubljana)
Rodman, Leiba (College of William and Mary)
Sorensen, Danny (Rice University)
Spence, Alastair (University of Bath)
Tisseur, Francoise (University of Manchester)
Tsatsomeros, Michael (Washington State University)
Watkins, David (Washington State University)
Zhou, Fei (University of Calgary)

Nonlinear Dynamics of Thin Films and Fluid Interfaces
November 29–December 4, 2003

Organizers:

A. L. Bertozzi (Duke University)
R. P. Behringer (Duke University)
T. P. Witelski (Duke University)
R. Almgren (University of Toronto)
M. C. Pugh (University of Toronto)
M. Shearer (North Carolina State University)

The mathematics of thin liquid films and fluid interfaces has developed substantially in the last ten years, and is now being pursued by different groups of mathematicians, physicists, and engineers across Canada, Europe, and the United States. The workshop brought together experimentalists, analysts, modelers, and computational fluid dynamics experts for a meeting that yielded a vigorous assessment of the field from many different points of view. The mechanics of fluids with free surfaces or interfaces rests on the largely unexplored area of nonlinear fourth-order partial differential equations. Fourth-order derivatives arise from surface tension, which appears in the equations as gradients of the curvature of the free surface. Fourthorder equations have applications to several active fields of scientific research, including materials science, nanotechnology, and biology. The interaction of physicists and engineers with applied mathematicians and analysts has provided tremendous motivation for the mathematics; the mathematics in turn has contributed substantially to understanding of the wide variety of interesting physical phenomena in this area.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5021/Report03w5021.pdf

Participants:

Behringer, Robert (Duke University)
Ben Amar, Martine (Ecole Normale Supérieure)
Bernoff, Andrew (Harvey Mudd College)
Bowen, Mark (Nottingham University)
Bush, John (MIT)
Cummings, Linda (University of Nottingham)
Diez, Javier Alberto (Instituto de Fisica Arroyo Seco)
Edmonstone, Barry (Imperial College London)
Fontelos, Marco (Universidad Rey Juan Carlos)
Miksis, Michael J. (Northwestern University)
Muench, Andreas (Humboldt-Universitaet Berlin)
Novick-Cohen, Amy (Israel Institute of Technology)
Novruzi, Arian (University of Ottawa)
Pugh, Mary (University of Toronto)
Schatz, Michael (Georgia Institute of Technology)
Schwartz, Leonard W. (University of Delaware)
Shearer, Michael (North Carolina State University)
Slepcev, Dejan (University of Toronto)
Giacomelli, Lorenzo (Universita' di Roma)
Golovin, Alexander A. (Northwestern University)
Grigoriev, Roman (Georgia Institute of Technology)
Gruen, Guenther (University of Bonn)
Haskett, Ryan (Duke University)
Howard, Peter (Texas A&M University)
King, John R. (University of Nottingham)
Kondic, Lou (New Jersey Institute of Technology)
Lathrop, Daniel (University of Maryland)
Levy, Rachel (North Carolina State University)
Smolka, Linda (Duke University)
Tilley, Burt (Franklin W. Olin College of Engineering)
Wagner, Barbara (Weierstrauss Institute for Applied Analysis and Stochastics)
Wetton, Brian (University of British Columbia)
Wieland, Sandra (Institut für Angewandte Mathematik)
Wilson, Stephen (University of Strathclyde)
Witelski, Thomas (Duke University)

Calabi-Yau Varieties and Mirror Symmetry
December 6–11, 2003

Organizers:

Victor Batyrev (University of Tubingen)
Shinobu Hosono (University of Tokyo)
James D. Lewis (University of Alberta)
Bong H. Lian (Brandeis University)
S.-T. Yau (Harvard University)
Noriko Yui (Queen's University)
Don Zagier (Max Planck Institut)

The main themes: 1) Arithmetic of Calabi–Yau varieties and mirror symmetry: Arithmetic of elliptic curves, K3 surfaces, Calabi–Yau threefolds, and higher dimensional Calabi–Yau varieties in connection with mirror symmetry. 2) Algebraic cycles, (classical and p-adic) Hodge theory, K-theory, Quantum cohomology theory for Calabi–Yau varieties. Of particular interest here are the regulators of [higher] algebraic cycles, and some evidence that the Calabi–Yau varieties provide the "most interesting" examples of regulator calculations. 3) Moduli theory for Calabi–Yau manifolds. Moduli of abelian varieties, K3 surfaces and Calabi– Yau threefolds. These will lead to classification problems of Calabi–Yau varieties, e.g., computations of period maps and period domains for K3 surfaces, classification of rigid Calabi–Yau threefolds. 4) Mirror symmetry for Calabi–Yau varieties and modular forms. Characterization of mirror maps in connection with mirror moonshine phenomenon. Rigorous definition of D-branes, and geometry behind D-branes. Borcherds product formula and mirror symmetry. Modular forms in mirror symmetry.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5061/Report03w5061.pdf

Participants:

Archava, Sviatoslav (McMaster University)
Bertin, Marie-Jose (Universite Paris 6)
Borger, James (University of Chicago)
Bryan, J. (University of British Columbia)
Campbell, Bruce (University of Alberta)
Chen, X. (University of Alberta)
Doran, Charles (Columbia University)
Elliott, George A. (University of Toronto)
Forbes, Brian (UC-Los Angeles)
Hori, Kentaro (University of Toronto)
Hosono, Shinobu (University of Tokyo)
Hulek, Klaus (University of Hannover)
Kapranov, S. (University of Toronto)
Kawamata, Yujiro (University of Tokyo)
Kerr, Matthew (UC- Los Angeles)
Kimura, Kenichiro (University of Tsukuba)
Lewis, James (University of Alberta)
McKay, J. (Concordia University)
Meyer, Christian (Johannes Gutenberg-Universitaet Mainz)
Mok, Chung Pang (Harvard University)
Mueller-Stach, Stefan (McMaster University)
Oguiso, K. (University of Tokyo)
Otwinowska, Ania (Universite Paris Sud)
Roan, Shi-shyr (Academia Sinica)
Roth, M. (Queen's University)
Ruan, Wei-Dong (University of Illinois at Chicago)
Scherk, John (University of Toronto)
Schimmirigk, Rolf (Kennsaw State University)
Sebbar, Abdellah (University of Ottawa)
Shepherd-Barron, Nick (University of Cambridge)
Stienstra, J. (Utrecht University)
Szendroi, B. (Utrecht University)
Todorov, A. (UC-Santa Cruz)
Verrill, Helena (Universitaet Essen)
Viehweg, E. (Universitat GHS Essen)
Yui, Noriko (Queen's University)
Zhang, Yi (Zhejiang University)
del Angel, P. Luis (Center of Investigations in Mathematics)
van Straten, D. (Johannes Gutenberg-Universitt Mainz)

p-adic Variation of Motives
December 13–18, 2003

Organizers:

Kevin Buzzard (Imperial College)
Robert Coleman (UC-Berkeley)
Matthew Emerton (Northwestern University)
Eyal Goren (McGill University)

Langlands' conjectures, made in the 1970s, predict an extraordinary link between automorphic forms (essentially analytic objects) and representations of Galois groups (much more algebraic objects). In fact, strictly speaking, the link conjecturally relates automorphic forms to representations of even bigger groups, whose existence is yet to be established and about which we shall say very little. Langlands also made local conjectures and conjectured that the local and global conjectures should be compatible with one another. The link had already been established for automorphic forms on GL_1 when Langlands made his conjectures—indeed the link in this case was essentially equivalent to the main theorems of local and global class field theory. For automorphic forms on other groups, a lot is known about the local case and the function field case, but the conjectures are still wide open in the number field case. One should also add that serious breakthroughs in the mod p version of the local conjectures have been made. The existence of the link (if it could be proved) has many consequences, for example it would give new ways of building automorphic forms via base change and automorphic induction.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5104/Report03w5104.pdf

Participants:

Buzzard, Kevin (Imperial College)
Calegari, Frank (Harvard University)
Coleman, Robert (UC Berkeley)
Goren, Eyal (McGill University)
Gouvea, Fernando (Colby College)
Greenberg, Ralph (University of Washington)
Herrick, Graham (Northwestern University)
Hida, Haruzo (UC)
Iovita, Adrian (University of Washington)
Kassaei, Payman (McGill University)
Kilford, Lloyd (California Institute of Technology)
Kim, Walter (UC Berkeley)
Kisin, Mark (University of Chicago)
Niziol, Wieslawa (University of Utah)
Stevens, Glenn (Boston University)
Tilouine, Jacques (Universite Paris 13)
Urban, Eric (Columbia University)

Coordinate Methods in Nonselfadjoint Operator Algebras
December 13–18, 2003

Organizers:

Allan Donsig (University of Nebraska)
Michael Lamoureux (University of Calgary)

The goal of this workshop is to bring together researchers in nonselfadjoint operator algebras and related areas, to unify and broaden the technical machinery of coordinate methods to a wider class of nonselfadjoint operator algebras. Key problems include classifications of these algebras and precise descriptions of the ideal structure, the family of homomorphisms between algebras, and related properties. Applications to the study of single operators, commuting and noncommuting family of operators, dilations, semigroups, free actions, and dynamical systems, are also of interest.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w5110/Report03w5110.pdf

Participants:

Davidson, Kenneth (Fields Institute)
Donsig, Allan (University of Nebraska)
Duncan, Benton (University of Nebraska)
Erlijman, Juliana (University of Regina)
Forrest, Brian (University of Waterloo)
Grossman, Jeff (University of Calgary)
Haataja, Steve (University of Nebraska)
Hopenwasser, Alan (University of Alabama)
Katavolos, Aristides (University of Athens)
Katsoulis, Elias (East Carolina University)
Kribs, David (University of Guelph)
Lamoureux, Michael (University of Calgary)
Larocque, Philippe (University of Waterloo)
Marcoux, Laurent (University of Waterloo)
Peters, Justin (Iowa State University)
Pitts, David (University of Nebraska)
Solel, Baruch (The Technion)
Todorov, Ivan (Queen's University Belfast)

Banff International Research Station

2003

2-DAY WORKSHOPS

Northwest Functional Analysis Workshop
March 27–29, 2003

Organizers:

Michael Lamoureux (University of Calgary)
Anthony Lau (University of Alberta)
Ian Putnam (University of Victoria)
Nicole Tomczak-Jaegermann (University of Alberta)

The subject of Functional Analysis is now a well-established one and a strength of the Canadian Mathematical community. Western Canada, in particular, has many researchers working in the field and several well-established groups. Roughly speaking, the community can be divided into three distinct groups: C^*-algebras and noncommutative geometry, Banach algebras and amenability and geometric functional analysis.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w2310/Report03w2310.pdf

Participants:

Anisca, Razvan (University of Alberta)
Bami, Mahmood Lashkarizadeh (University of Alberta)
Binding, Paul (University of Calgary)
Brenken, Berndt (University of Calgary)
Dales, Garth (Leeds University)
Erlijman, Juliana (University of Regina)
Farenick, Doug (University of Regina)
Gibson, Peter (University of Calgary)
Goncalves, Daniel (University of Victoria)
Goncalves, Maria Inez Cardoso (University of Victoria)
Gordon, Yehoram (Technion)
Graham, Colin (University of British Columbia)
Ilie, Monica (University of Alberta)
Laca, Marcelo (University of Victoria)
Lamoureux, Michael (University of Calgary)
Lau, Tony (University of Alberta)
Litvak, Alexander (University of Alberta)
Mohanty, Parasar (University of Alberta)
Namioka, Isaac (University of Washington)
Nikolaev, Igor (University of Calgary)
Phillips, John (University of Victoria)
Putnam, Ian (University of Victoria)
Reznikoff, Sarah (University of Victoria)
Runde, Volker (University of Alberta)
Rychtar, Jan (University of Alberta)
Sari, Bunyamin (University of Alberta)
Sourour, Ahmed Ramzi (University of Victoria)
Stokke, Ross (University of Alberta)
Tandra, Haryono (University of Alberta)
Tcaciuc, Adi (University of Alberta)
Tomczak-Jaegermann, Nicole (University of Alberta)
Troitsky, Vladimir (University of Alberta)
Yi, Inhyeop (George Washington University)
Zizler, Peter (Mount Royal College)

BIRS Math Fair Workshop
April 10–12, 2003

Organizers:

Ted Lewis (University of Alberta)
Andy Liu (University of Alberta)

The BIRS Math Fair workshop was unusual for BIRS in that its focus was Education rather than research. The participants were teachers from elementary schools, junior high schools, colleges and universities, and also people from other institutions and organizations that have a deep interest in Mathematics Education. The purpose of the workshop was to help teachers learn how to run a successful math fair, to exchange information about math fairs, and to put the members of this diverse group in contact with each other. The deeper purpose is to change the mathematical culture in the classroom, and after five years of experience we believe that this is beginning to happen.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w2311/Report03w2311.pdf

Participants:

Bessette, Patricia (St. James School)
Borges-Couture, Paula (Good Shepherd)
Darroch, Judy (Lendrum Elementary School)
Dumanski, Micheal (St. Gerard School)
Estabrooks, Manny (Red Deer College)
Ewasiuk, Lindy (St. Clement School)
Friesen, Sharon (Galileo Education Network Association)
Gluwchynski, Jennifer (St. Michael School)
Hartmangatti, Suzanna (St. Philip School)
Hodak, Laura (Lendrum Elementary School)
Hohn, Tiina (Grant McEwan Community College)
Holloway, Tom (University of Alberta)
Kowalchuk, Auriana (Consulting Services, Edmonton Public Schools)
Lagu, Indy (Mt. Royal College)
Lewis, Ted (University of Alberta)
Liu, Andy (University of Alberta)
Lovallo, Patti (Killarney Junior High School)
McCulloch, Chalaine (St. Michael School)
McKie Grenier, Kelly (Galileo Education Network Association)
Melnyk, Linda (St. Francis of Assisi)
Mitchell, Shirley (Pacific Institute for the Mathematical Sciences)
Pawliuk, Heather (St. Dominic School)
Porter, Kyle (St. Patrick School)
Poulin, Tracy (Lorelei School)
Prefontaine, Suzanne (Holyrood School)
Raymaakers, Chris (John Ware Elementary School)
Ritchie, Bill (Binary Arts)
Rozycki, Angela (Edmonton Catholic Schools)
Skinner, Emma (University of Alberta and Malcolm Tweddle Elementary School)
Slen, Gail (John Ware Elementary School)
Springer, Jean (Mt. Royal College)
Sun, Wen-Hsien (Chiu Chang Publishers)
Thiell, Jane (Louis St. Laurent Jr High/High School)

The Regression Discontinuity Method in Economics: Theory and Applications May 15–17, 2003

Organizers:

Thomas Lemieux (University of British Columbia),
David Card (UC - Berkeley)

The objective of the workshop was to bring together a group of applied economists interested in specific applications of the RD method and a group of econometricians interested in the estimation of non-linear and discontinuous regression models. We organized the workshop in such a way as to get a sense of potential applications of state-of-the art econometric techniques.

Participants:

Abadie, Alberto (John F. Kennedy School of Government)
Angrist, Joshua (MIT)
Auld, Christopher (University of Calgary)
Battistin, Erich (Institute for Fiscal Studies)
Card, David (UC Berkeley)
Chen, Susan (University of North Carolina at Chapel Hill)
DiNardo, John (University of Michigan)
Fortin, Nicole (University of British Columbia)
Gyimah-Brempong
Kwabena Hirano, Keisuke (University of Miami)
Imbens, Guido (UC Berkeley)
Kane, Thomas (UC Los Angeles)
Lee, David (UC Berkeley)
Lemieux, Thomas (University of British Columbia)
Matsudaira, Jordan (University of Michigan)
McCrary, Justin (University of Michigan, Ann Arbor)
Porter, Jack (Harvard University)
Rettore, Enrico (University of Padova)
Riddell, Craig (University of British Columbia)
Ridder, Geert (University of Southern California)
Van der Klaauw, Wilbert (University of North Carolina at Chapel Hill)

Theoretical Physics Institute (University of Alberta) Annual Symposium 2003
August 28–30, 2003

Organizers:

Helmy Sherif **(University of Alberta),**
Frank Marsiglio **(University of Alberta)**

The idea of this Symposium was to bring together members of the Institute, their students and postdoctoral fellows, as well as colleagues from other universities in the West, for two days designed to promote exchange of ideas and collaboration. In keeping with this intent the workshop centered around two main activities: Plenary review talks by speakers from institutes in Western Canada and the Western United States • Short presentations by participants; this included presentations from faculty members, visitors, RAs/PDFs, and graduate students. These talks covered topics ranging from theoretical biophysics to advanced loop calculations in particle physics.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w2314/Report03w2314.pdf

Participants:

Blinov, Nicholas (University of Alberta)
Blokland, Ian (University of Alberta)
Boninsegni, Massimo (University of Alberta)
Campbell, Bruce (University of Alberta)
Covaci, Lucian (University of Alberta)
Das, Saurya (University of Lethbridge)
Dixon, John (University of Alberta)
Dogan, Fatih (University of Alberta)
Gannon, Terry (University of Alberta)
Gortel, Zbigniew (University of Alberta)
Hedayati Poor, Mohammad (University of Alberta)
Israel, Werner (University of Victoria)
Johnson, Calvin (San Diego State University)
Kim, Wonkee (University of Alberta)
Knigavko, Anton (McMaster University)
Kovalyov, Mikhail (University of Alberta)
Kryukov, Sergei (University of Lethbridge)
Kunzle, Hans-Peter (University of Alberta)
Legare, Martin (University of Alberta)
Lovallo, Chris (University of Alberta)
Luchko, Tyler (University of Alberta)
Marsiglio, Frank (University of Alberta)
Moody, Robert (University of Alberta)
Moroni, Saverio (University of Alberta)
Page, Don (University of Alberta)
Rezania, Vahid (University of Alberta)
Roy,Pierre-Nicholas (University of Alberta)
Samson, John (University of Alberta)
Sengupta, Supratim (University of Alberta)
Sherif, Helmy (University of Alberta)
Tanaka, Kaori (University of Saskatchewan)
Tran, Chuong (University of Alberta)
Vardarajan, Suneeta (University of Alberta)
Vos, Ken (University of Lethbridge)
Woloshyn, Richard (TRIUMF)
Woolgar, Eric (University of Alberta)
Ziegler, Tom (University of Calgary)

MITACS-PIMS Health Canada Meeting on SARS
September 4–6, 2003

Organizer:

Jianhong Wu (York University)

The main purpose of this workshop was to bring together international leaders and active researchers working in the areas related to the modeling, simulations and analysis of the transmission dynamics of SARS and other infectious diseases, to further the fruitful interplay among mathematical, statistical, epidemiological sciences and operations research, in order to speed up the process of finding effective tests and prevention and control measures.

Participants:

Becker, Niels (Australian National University)
Boer, Rob (RAND)
Brauer, Fred (University of British Columbia)
Cuff, Wilfred (Health Canada)
Curtis, Lori (Health Canada)
Day, Troy (Queen's University)
Earn, David (McMaster University)
Ekeland, Ivar (PIMS & University of British Columbia)
Feng, Zhilan (Purdue University)
Glasser, John (Centers for Disease Control and Prevention)
Gumel, Abba (University of Manitoba)
Gupta, Arvind (MITACS)
Hethcote, Herb (University of Iowa)
Hsieh, Ying-Hen (National Chung Hsing University)
Jacobson, Zack (Health Canada)
Jolly, Ann (Health Canada)
Liu, Rongshen (York University)
Ma, Junling (McMaster University)
Ma, Renjun (University of New Brunswick)
Mykitiuk, Roxanne (York University)
Radoeva, Detelina (York Centre for Health Studies)
Riley, Steven (Imperial College of Science, Technology & Medicine)
Sahai, Beni (Cadham Provincial Laboratory)
Watmough, James (University of New Brunswick)
Wu, Jianhong (York University)
Yan, Ping (Health Canada)
Zeng, Qingling (York University)
Zhang , Shenghai (Health Canada)
Zhu, Huaiping (York University)
van den Driessche, Pauline (University of Victoria)

Canadian Mathematics Chairs Meeting
September 18–20, 2003

Organizers:

Ted Bisztriczky (University of Calgary)
Bob Erdahl (Queens University)
Yvan SaintAubin (University of Montreal)

This was the fifth annual meeting of chairs of Canadian mathematics departments, held at BIRS. Heads got to know each other; found out how other math departments work, and brought this information back to their own department. There was a Special Session on the Math Department Industry Interface. The math institutes have taken the lead in promoting closer ties between universities and industry, and it is important that math departments become aware of the dynamics of these important initiatives. We were able to attract Rob Calderbank, who had a particularly good vantage point to follow the dynamics on the interface between mathematics departments and industry. Rob was formerly Vice President, Research, of A T & T; he reported on the difficulties Bell Labs recently came face-to-face with, and how these calamitous events will result in out-sourcing of industrial research. MITACS was the other main contributor for the Saturday Special Session the contributors described how MITACS is shaping the university-industry interface.

Participants:

Ahmed, S. Ejaz (University of Windsor)
Allen, O. Brian (University of Guelph)
Alvo, Mayer (University of Ottawa)
Anderson, Robert V. (Universite du Quebec a Montreal)
Archibald, Tom (University of Acadia)
Bisztriczky, Tibor T. (University of Calgary)
Bland, John S. (University of Toronto)
Calderbank, Rob (AT & T)
Ekeland, Ivar (PIMS)
Erdahl, Bob (Queens University)
Garner, Cyril W. L. (Carleton University)
Gilligan, Bruce C. (University of Regina)
Gowrisankaran, Kohur (McGill University)
Gupta, Arvind (MITACS)
Hailes, Jarett (MITACS)
Holzmann, Wolfgang H. (University of Lethbridge)
Keast, Patrick (Dalhousie University)
Krause, Guenter (University of Manitoba)
Lau, Anthony T. (University of Alberta)
Leger, Christien (CRM)
Madras, Neal (York University)
Marcus, Brian (University of British Columbia)
Moody, Bob (University of Alberta)
Reilly, Norman (Simon Fraser University)
Saint-Aubin, Yvan (Universite de Montreal)
Teare, Betty (University of Calgary)
Trummer, Manfred (PIMS)
Tuszynski, Jack (MITACS)
Valeriote, Matthew A. (McMaster University)
Vaughan, David C. (Wilfrid Laurier)
Wright, Graham (Canadian Math Society)
Zorozito, Frank (University of Waterloo)

West Coast Operator Algebra
October 16–18, 2003

Organizers:

Berndt Brenken (University of Calgary)
Bruce Blackadar (University of Nevada, Reno)

Participants:

Arveson, William (UC Berkeley)
Blackadar, Bruce (University of Nevada Reno)
Boersema, Jeffrey (Seattle University)
Brenken, Berndt (University of Calgary)
Burns, Michael (University of Victoria)
Deaconu, Valentin (University of Nevada at Reno)
Elliott, George (University of Toronto)
Floricel, Remus (University of Ottawa)
Greene, Devin (UC Irvine)
Hirshberg, Ilan (UC Berkeley)
Itza-Ortiz, Benjamin (University of Ottawa)
Kahng, Byung-Jay (University of Nevada)
Kaliszewski, Steve (Arizona State University)
Katsura, Takeshi (University of Oregon)
Kemp, Todd (Cornell University)
Laca, Marcelo (University of Victoria)
Lamoureux, Michael (University of Calgary)
Latremoliere, Frederic (UC Berkeley)
Lau, Antony To-Ming (University of Alberta)
Lin, Huaxin (University of Oregon)
Matui, Hiroki (Chiba University)
Morrison, Scott (UC Berkeley)
Nikolaev, Igor (University of Calgary)
Ozawa , Narutaka (UC Berkeley)
Packer, Judith (University of Colorado)
Phillips, John (University of Victoria)
Phillips, N. Christopher (University of Oregon)
Putnam, Ian (University of Victoria)
Quigg, John (Arizona State University)
Ramsay, Arlan (University of Colorado Boulder)
Rangipour, Bahram (University of Victoria)
Reznikoff, Sarah (University of Victoria)
Ruiz, Efren (University of Oregon, Mathematics)
Runde, Volker (University of Alberta)
Shlyakhtenko, Dimitri (UCLA)
Sourour, Ahmed Ramzi (University of Victoria)
Spielberg, Jack (Arizona State University)
Takesaki, Masamichi (UCLA)
Ventura, Belisario (California State University, San Bernardino)
Webster, Corran (University of Nevada, Las Vegas)

The World Bank Thailand SEQI Project
October 16–18, 2003

Organizer:

Andy Liu (University of Alberta)

The discussion centered around the disappearance of Euclidean Geometry from the North American school curriculum and what we are doing to try to remedy the situation. The second session was examining a once-experimental course in Discrete Mathematics at the University which uses a mathematical novel as the innovative text. It has had a phenomenally successful ten years and is now a fixture in the department's course offering. At the third session we discussed a course at the University of Alberta for perspective teachers in the elementary classroom, but which has impact on secondary education. A very successful aspect of this course is the concept of a Math Fair.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03w2308/Report03w2308.pdf

Participants:

Akejariyawong, Mana (Thepsatri)
Hematulin, Apichai (Nakonratchasima)
Jinagool, Kannika (Surin)
Kruehong, Chaisongkram (Suratthani)
Liu, Andy (University of Alberta)
Monmongkol, Prasit (Rajanagarindra)
Nitipreecha, Songsak (Nakonratchasima)
Promthai, Poungthong (Chiangmai Rajabhat Inst.)
Ratanaudomchok, Somchit (Sakonnakorn)
Sungamullig, Gobgul (Petburiwitayalongkorn)

Banff International Research Station

2003

Summer Schools

Research In Teams

Focused Research Groups

Summer Schools

6th PIMS-IMA Graduate Industrial Mathematics Modelling Camp May 17–22, 2003

Organizers:

Chris Bose (University of Victoria)
Ian Frigaard (University of British Columbia)
Huaxiong Huang (York University)
Rachel Kuske (University of British Columbia)
Jack Macki (University of Alberta)
Fadil Santosa (Institute for Mathematics & its Applications)

The PIMS-IMA Graduate Industrial Mathematics Modelling Camp (GIMMC) was the first leg of the PIMS-IMA Industrial Mathematics Forum which also included the PIMS-IMA Industrial Problem Solving Workshop (IPSW7) held at the University of Calgary, May 25-29, 2003. GIMMC is designed to give graduate students in the Mathematical Sciences an opportunity to learn techniques of mathematical modelling under the supervision and guidance of experts in the field. In a first session, the mentors presented the problems, and for the remainder of the week, they guided a group of graduate students through to a resolution, this culminated in a group presentation and a written document at the end of the week.

For more information please see www.pims.math.ca/industrial/2003/gimmc/.

Mentors and Problems:

Braun, Richard (University of Delaware): *Thin Fluid Film Drainage Mathematical Models of a Boundary of a Thin Fluid*
Glavaski, Sonja (Honeywell): *Stability of Hybrid Systems using Sum of Squares (SoS) Programming Approach: VCCR System Example*
Misemer, David (3M): *Modelling Polymer Purification by Counter-current Extraction*
Piché, Robert (Tampere University of Technology, Finland): *Converting Machine Tool Measurements into a CAD Model*
Santosa, Fadil (IMA/University of Minnesota): *Solar Car Racing Strategy*
Stone, Emily (Utah State University): *Modelling PCR Devices for Fun and Profit*

Students:

Baamann, Katharina (Georgia Institute of Technology)
Bergeron, Charles (Ecole Polytechnique de Montreal)
Braverman, Mark (University of Toronto)
Burden, Thalya N. (University of Kentucky)
Chen, Shengyuan (University of British Columbia)
Cui, Zhenlu (Florida State University)
Deng, Xinghua (University of Alberta)
Dubois, Olivier (McGill University)
Gameiro, Marcio F. (Georgia Institute of Technology)
Gärtner, Nadine (Clemson University)
Guo, Hongbin (University of Alberta)
Han, Ying (McGill University)
Jin, Yasong (University of Kansas)
Kadioglu, Samet Y. (Florida State University)
Ketelsen, Christian W. (Washington State University)
Kletskin, Ilona (University of Toronto)
Lapin, Serguei (University of Houston)
Lee, Seung Y. (Ohio State University)
Li, Hua (University of Calgary)
Li, Mingfei (Michigan State University)
Li, Qingguo (Simon Fraser University)
Limon, Alfonso L. (Claremont Graduate University)
Liu, Rongsong (York University)
Mileyko, Yuriy (New Jersey Institute of Technology)
Mubayi, Anuj (University of Texas, Arlington)
Taylor, Andrew C. (University of Calgary)
Vassilev, Tzvetalin S. (University of Saskatchewan)
Wang, Qian (University of Alberta)
Widjaya, Haris (Simon Fraser University)
Wu, Yujun (University of Kentucky)
Yewchuk, Kerianne (University of Alberta)
Youbissi, Fabien Mesmin (Laval University)
Zhou, Lin (New Jersey Institute of Technology)

Preparatory Workshop for the 2003 AMS/MSRI von Neumann Symposium June 22–26, 2003

Organizer:

Robert Bryant (Mathematical Sciences Research Institute)

This small workshop for about fifteen participants was designed to allow a more leisurely introduction to the background material of the von Neumann symposium for the benefit of graduate students and postdoctoral mathematicians who were interested in attending the symposium (at MSRI in Berkeley, Aug. 11-20, 2003).
Topics covered included an introduction to minimal submanifolds and calibrations, holonomy, examples, fiber bundles and connections, and symplectic geometry. In addition, reading material was recommended for further preparation for the Von Neumann Symposium.

2003 Summer IMO Training Camp June 28–July 10, 2003

Organizer:

Bill Sands (University of Calgary)

The IMO Training Camp was an intensive two-week preparation for the six Canadian students attending the 2003 IMO, and also to allow these students to get to know each other well.
As well as the six student Team members, the Camp will also contain up to 6 adults, most of whom will be going to the IMO with the students. In recent years we have also been inviting three or four "local" high school students to attend the Camp for the first two days or so, to give them the experience and to let them meet the IMO Team firsthand, with the hope that it will inspire such students to aspire to make the Team themselves in a future year.

Participants:

Bormashenko, Olena
Braverman, Elena (University of Calgary)
Gannon, Terry (University of Alberta)
Han, Tianyi (David)
Hoshino, Richard (University of Dalhousie)
Ivrii, Oleg
Kramar, Janos
Leigh, RobertBarrington
Liu, Andy (University of Alberta)
Morewood, Robert (University of British Columbia)
Sands, Bill (University of Calgary)
Tsimerman, Jacob

Research In Teams

Restricting Syzygies of Algebraic Varieties April 3–6, 2003

Organizers/Participants:

Green , Mark (UC-Los Angeles)
Eisenbud, David (MSRI)
Hulek, Klaus (Fachbereich Mathematik Universitat Hannover)
Popescu, Sorin (SUNY, Stony Brook)

Asymptotic Dynamics of Dispersive Equations with Solitons
April 18–26, 2003

Organizers/Participants:

Gustafson, Stephen (University of British Columbia)
Nakanishi, Kenji (Nagoya and Princeton Universities)
Tsai, Tai-Peng (University of British Columbia)

Solutions of dispersive partial differential equations (with repulsive nonlinearities) tend to spread out in space, although they often have conserved L 2 mass. There has been extensive study in this subject, usually referred to as scattering theory. These equations include Schr odinger equations, wave equations and KdV equations. When the nonlinearity is attractive, however, these equations possess solitary wave solutions (solitons) which have localized spatial profiles that are constant in time. To understand the asymptotic dynamics of general solutions, it is essential to study the interaction between the solitary waves and dispersive waves. The matter becomes more involved when the linearized operator around the solitary wave possesses multiple eigenvalues which correspond to excited states.

Topological Orbit Equivalence for Dynamical Systems
April 26–May 10, 2003

Organizers/Participants:

Giordano, Thierry (University of Ottawa)
Putnam, Ian (University of Victoria)
Skau, Christian (Norwegian University of Science and Technology)

We consider dynamical systems, usually minimal, on a Cantor set. By a Cantor set, we mean a compact, totally disconnected metric space with no isolated points. For dynamical systems, we include free actions of a countable group by homeomorphisms. However, our definition, which follows below, will include more general systems. The main problem is to understand the orbit structure of such systems. Specifically, if we are given two such systems, is there a homeomorphisms between the underlying spaces which carries the orbits of one system to the orbits of the other? This is the natural extension to the topological case of the program in ergodic theory initiated by Henry Dye, who considered invertible measure preserving transformations of a Lebesgue space. This was continued by many others, most notably Krieger and Connes, Feldman and Weiss. In another direction is the Borel case.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03rit002/Report03rit002.pdf

Field Theory and Cohomology of Groups
April 26–May 10, 2003

Organizers/Participants:

Karagueuzian , Dikran (Binghamton University)
Labute, John (McGill University)
Minac, Jan (University of Western Ontario)

Most of our time at the BIRS was spent investigating a conjecture which suggests that the Galois group of the maximal quadratic extension of a field has a strong regularity property. Specifically, the conjecture states that if 1–>R–>S–>G–>1 is a minimal presentation of G = Gal(F_q/F), where F_q is the maximal quadratic extension of F, then the lower-2central series of S has a regular intersection with R, in the following sense. Let $R^{(1,S)}$ = R, and $R^{(n+1,S)}$ be the subgroup of $R^{(n,S)}$ generated by $[R^{(n,S)}]^2$ and [S, $R^{(n,S)}$]. Let <S (n)|n >= 1> be the lower-2-central series of S. Then we have Conjecture. $RnS^{(n+1)}=R^{(n,S)}$. It should be noted that this is a very special property, which is not true for just any group. For example, if G is described as the quotient Z/4Z, with S=R=Z, then $RnS^{(3)}=R^{(2,S)}$.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03rit305/Report03rit305.pdf

Representation Theory of Linearly Compact Lie Superalgebras and the Standard Model
July 26–August 16, 2003

Organizers/Participants:

De Sole, Alberto (MIT)
Kac, Victor (MIT)
Rudakov, Alexei (Norweigan U.of Science and Technology)
Wakimoto, Minoru

A linearly compact Lie algebra is a topological Lie algebra whose underlying space is a topological space isomorphic to the space of formal power series over C in finite number of variables with formal topology. Examples include the Lie algebra of formal vector fields W_n on an n-dimensional manifold M and its closed infinite-dimensional subalgebras. Cartan's list of simple linearly compact Lie algebras consists of four series: W_n and its subalgebras of divergence 0 vector fields, Hamiltonian vector fields and contact vector fields

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For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03rit004/Report03rit004.pdf

Variance of Quasi-Coherent Torsion Cousin Complexes
August 2–16, 2003

Organizers/Participants:

Lipman, Joseph (Purdue University)
Nayak, Suresh (Chennai Mathematical Institute)
Sastry, Pramathanath (University of Toronto)

Our project is a long-term one. A manuscript of 100+ pages will be needed to expose the results. Grothendieck Duality is a subject having numerous applications in Algebraic Geometry, as well as its own intrinsic attractiveness. The basic ideas are well known, but because of the underlying complexity in the details, the situation with respect to full expositions is not yet entirely satisfactory. We are convinced that the project will lead to significant new insights and understanding in this area.

Invariant Manifolds for Stochastic Partial Differential Equations
August 16–30, 2003

Organizers/Participants:

Caraballo, Tomas (Universidad de Sevilla)
Duan, Jinqiao (Illinois Institute of Technology)
Lu, Kening (Michigan State University)
Schmalfuss, Bjorn (University of Applied Sciences, Merseburg)

Randomness or uncertainty is ubiquitous in scientific and engineering systems. Stochastic effects are not just introduced to compensate for defects in deterministic models, but are often rather intrinsic phenomena. Taking stochastic effects into account is of central importance for the development of mathematical models of many phenomena in physics, mechanics, biology, economics and other disciplines. Macroscopic models in the form of partial differential equations for these systems contain such randomness as stochastic forcing, uncertain parameters, random sources or inputs, and random initial and boundary conditions. Stochastic partial differential equations are appropriate models for randomly influenced systems.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03rit003/Report03rit003.pdf

Local Uniformization and Resolution of Singularities
August 16–September 6, 2003

Organizers/Participants:

Abhyankar, Shreeram (Purdue University)
Cutkosky, Steven (University of Missouri-Columbia)
Knaf, Hagen (Fraunhofer Institute Techno- und Wirtschaftsmathematik)
Kuhlmann, Franz-Viktor (University of Saskatchewan)
Teissier, Bernard (Centre National de la Recherche Scientifique)

This research in teams project was devoted to a seemingly impossible classical problem, for which there has recently been encouraging progress: local uniformization (a local form of resolution of singularities) in positive characteristic. In recent years, the participants have made independent progress on this problem, and the main purpose of this meeting was to share the insights and methods that have been developed. One of our participants, Shreeram Abhyankar has proven local uniformization up through dimension 3 in positive characteristic [1]. Although this theorem was proven in the mid 1960s, this is still the strongest general result.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03rit006/Report03rit006.pdf

Modular invariants and NIM-reps
October 3–18, 2003

Organizers/Participants:

Gaberdiel , Matthias (Eidgenössische Technische Hochschule Zürich)
Gannon, Terry (University of Alberta)

Most of our time during this program was directed at extending the known results on D-brane charges of WZW models in string theory. String theory contains two sorts of strings: open strings (i.e. strings with two end-points), and closed strings (i.e. strings that have the topology of a circle). These strings propagate in some background space (such as for example Minkowski space). The end-points of open strings lie on in general multi-dimensional hupersurfaces that are called D-branes. D-branes are dynamical structures in their own right, and much of their behaviour is captured by their charges. At least for certain examples, the charges q_a in Z associated to a brane labelled by a, obey an identity of the form

$$D_a\, q_b \;=\; \text{Sum}\; N^c_{ab}\, q_c \;(\text{mod } M),$$

where D_a and M are integers, and the coefficients N^c_{ab} are the so-called fusion coefficients (or more generally, NIM-reps). Understanding D-brane charges is a natural and fundamental problem in string theory.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03rit552/Report03rit552.pdf

Focused Research Groups

Regularity for Hypergraphs
May 10–24, 2003

Organizers:

P. Haxell (University of Waterloo)
V. Rodl (Emory University)
J. Skokan (University of Illinois at Urbana-Chamaign)
L. Thoma (University of Rhode Island)

The Regularity Method for hypergraphs is a newly emerging technique that grew out of the famous Regularity Lemma of Szemer ìedi for graphs [53]. The purpose of this Focused Research Group was to bring together the experts who developed the Regularity Method for hypergraphs with some other leading researchers in extremal hypergraph theory, so that all participants could learn the technical details of the new method, and so that new applications of the method to important extremal problems in hypergraphs could be found. The workshop was structured in a way that allowed a lot of informal discussion. Each session was led by a workshop participant, who usually spent some time giving something like a formal lecture on the session topic, but also strongly encouraged the other participants to contribute ideas, ask questions and make suggestions. No time limits were imposed on sessions and each typically lasted several hours.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03frg004/Report03frg004.pdf

Participants:

Haxell, Penny (University of Waterloo)
Luczak, Tomasz (Adam Mickiewicz University)
Mubayi, Dhruv (Universiy of Illinois, Chicago)
Nagle, B. (University of Nevada)
Peng, Y. (Indiana State University)
Rodl, V. (Emory University)
Rucinski, A. (Emory University)
Schacht, Mathias (Emory University)
Simonovits, Miklos
Skokan, Jozef (University of Illinois at Urbana-Champaign)
Szemeredi, E. (Rutgers, State University of New Jersey)

Topology and Analysis: Complementary Approaches to the Baum-Connes and Novikov Conjectures
May 24–June 7, 2003

Organizers:

Nigel Higson (Pennsylvania State University)
Jerry Kaminker (Indiana University)
Shmuel Weinberger (University of Chicago)

The specific objectives of the workshop were to merge more closely the geometric and analytic approaches to the study of discrete groups from the point of view of the Novikov conjecture. The analytic approach is based on studying the set of irreducible representations of the fundamental group of a manifold as a dual object for the group. The geometric approach is based on Gromov's notion of asymptotic properties of groups. While some connections have been made, there is much remaining to be developed.

Participants:

Davis, Jim (Indiana University)
Guentner, Erik (University of Hawaii)
Higson, Nigel (Pennsylvania State University)
Julg, Pierre (Universite d'Orleans)
Kaminker, Jerry (Purdue University Indianapolis)
Khalkhali, Masoud (University of Western Ontario)
Nest, Ryszard (University of Copenhagen)
Valette, Alain (Universite de Neuchatel)
Yu, Guoliang (Vanderbilt University)

Quantum Algorithms and Complexity Theory
June 7–21, 2003

Organizers:

Richard Cleve (University of Calgary)
Umesh Vazirani (UC-Berkeley),
John Watrous (University of Calgary)

The objective was to further develop the theory of quantum algorithms and complexity theory, as well as quantum information theory and cryptography. BIRS offers a unique opportunity for a small number of outstanding researchers in quantum computing to interact intensively for a period of a couple of weeks.

Participants:

Aaronson, Scott (UC - Berkeley)
Aharonov, Dorit (Hebrew University)
Ambainis, Andris (University of Latvia)
Buhrman, Harry (CWI, Amsterdam)
Cleve, Richard (University of Calgary)
Farhi, Edward (MIT)
Hoyer, Peter (University of Calgary)
Klauck, Hartmut (Princeton University)
Mosca, Michele (University of Waterloo)
Regev, Oded (Institute for Advanced Study)
Santha, Miklos (Universite Paris-Sud)
Tamon, Christino (Clarkson University)
Tapp, Alain (Universite de Montreal)
Vazirani, Umesh (UC Berkeley)
Watrous, John (University of Calgary)
Yao, Andrew (Princeton University)
de Wolf, Ronald (National Research Institute for Mathematics and Computer Science, Amsterdam)

Problems in Discrete Probability
July 12–26, 2003

Organizers:

Robin Pemantle (Ohio State University)
Yuval Peres (UC-Berkeley)
Peter Winkler (Bell Labs, Lucent Technologies)

The purpose of the Institute for Elementary Studies series of workshops is to bring together talent from different fields (esp. combinatorics, probability, computer science and statistical physics) to solve problems and pursue new ideas in discrete probability. Since its creation in 1992, the group has opened up new fields (e.g. dynamic percolation) and produced numerous results in Markov chains, physical models, and randomized algorithms. One focus of the planned meeting involved Markov fields on general graphs, which have many current algorithmic applications. In these models a large network of nodes is given, where each node can be in a small number of possible states. Every node interacts only with its immediate neighbors, yet from this local interaction, global structure can emerge when the interactions are strong enough. Such models have been studied for decades by mathematical physicists who focussed on the case where the underlying network was an Euclidean lattice. Some of the concepts from the physics literature (phase transitions, critical exponents) retain their importance far beyond the domain where they were created, but other concepts from the geometry of graphs (isoperimetric inequalities, flows) are important as well.

Participants:

Achlioptas, Dimitris (Microsoft)
Galvin, David (Microsoft Research)
Holroyd, Alexander (University of British Columbia)
Kenyon, Claire (Ecole Polytechnique)
Lyons, Russell (Indiana University)
Pemantle, Robin (Ohio State University)
Peres, Yuval (UC - Berkeley)
Pippenger, Nicholas (University of British Columbia)
Propp, Jim (University of Wisconsin)
Randall, Dana (Georgia Institute of Technology)
Virag, Balint (MIT)
Winkler, Peter (Bell Labs, Lucent Technologies)

Arithmetic of fundamental groups
September 6–20, 2003

Organizers:

David Harbater (University of Pennsylvania)

Florian Pop (University of Bonn)

There were several topics we considered:
1) Open aspects of the anabelian conjecture, particularly concerning affine curves over algebraically closed fields of characteristic p.
2) The study of embedding problems for varieties, as a way of understanding their fundamental groups and the realization of Galois groups.
3) The Galois action on the Teichmuller tower of covers. In particular, we would like to study the arithmetic of the moduli spaces M(g,r) via special loci in moduli.
4) Other topics relating to the arithmetic of fundamental groups, including methods of constructive Galois theory, such as rigidity; the lifting and reduction of covers, with consideration of the resulting arithmetic and geometry; the ramification behavior of covers, especially in chararacteristic p; Galois deformations, from the point of view both of moduli spaces and universal deformation spaces; Galois representations and Galois modules.

Participants:

Abhyankar, Shreeram (Purdue University)
Bouw, Irene (University of Essen)
Chinburg, Ted (University of Pennsylvania)
Guralnick, Robert (University of Southern California)
Harbater, David (University Pennsyvania)
Kani, Ernst (Queen's University)
Koenigsmann, Jochen (University of Freiburg)
Lehr, Claus (Universit de Bordeaux I)
Matignon, Michel (Universite de Bordeaux I)
Minac, Jan (The University of Western Ontario)
Nakamura, Hiroaki (Max-Planck-Institut fur Mathematik)
Pop, Florian (University of Bonn)
Pries, Rachel (Columbia University)
Saidi, Mohamed (Max-Planck-Institut fur Mathematik)
Schneps, Leila (Universite de Paris 6)
Stevenson, Katherine (California State University)
Stix, Jakob (University of Bonn)
Szamuely, Tamas (Alfred Renyi Institute of Mathematics, Hungarian Academy of Sciences)
Tamagawa, Akio (Kyoto University)
Wewers, Stefan (University of Bonn)

Mathematical Models for Plant Dispersal
September 20–October 2, 2003

Organizers:

Mark Lewis (University of Alberta)

James Bullock (NERC Centre for Ecology and Hydrology)

The meeting brought together mathematicians and quantitative biologists. This cross-disciplinary research environment led to specific advances in the modeling of plant dispersal. Prior to the FRG, each group member had made significant contributions to the study of long-distance dispersal and biological invasions. The composition was divided evenly between senior and junior researchers.
The group tackled three major problems: (1) How to accurately estimate population spread rates using empirical dispersal data, fitted to to nonlinear integrodifference models, (2) The formulation of a generalized dispersal function that precisely predicts long-distance wind-mediated seed dispersal, based on physics of the atmospheric boundary layer, (3) Comparison of computational models for wind-mediated seed dispersal.

For details, please refer to the report online:
http://www.pims.math.ca/birs/workshops/2003/03frg304/Report03frg304.pdf

Participants:

Bullock, James (NERC Centre for Ecology and Hydrology)
Greene, David (Concordia University)
Higgins, Steven (UFZ-Centre for Environmental Research)
Lewis, Mark (University of Alberta)
Pielaat, Annemarie (University of Alberta)
Robbins, Tom (University of Utah)
Soons, Merel
Tackenberg, Oliver (Universitaet Regensburg)

Front and back cover photos kindly provided by **Douglas Leighton**

The **Banff International Research Station for Mathematical Innovation and Discovery** (**BIRS**) is a collaborative Canada-US venture that provides an environment for creative interaction and the exchange of ideas, knowledge, and methods within the mathematical sciences and with related disciplines and industry. Every year, BIRS runs 36 five-day workshops ("Oberwolfach-Luminy mode"), 3 summer schools and training camps, and about 10–15 short two day events, often involving industry-academic collaborations. The station also hosts a dozen Research in Teams/Focused Research Groups who live and do research together ("Aspen mode") in a non-workshop/non-conference style setting at the BIRS facility for periods of 2 to 4 weeks. In its first two years of operations, already more than 4000 researchers from all over the world have participated in the BIRS scientific programme.

BIRS is located on the site of the world-renowned Banff Centre in Banff, Alberta. It has its own building (Corbett Hall) and facilities which allow mathematical scientists a secluded environment, complete with accommodation and board, for uninterrupted research activities in a variety of formats, all in a magnificent mountain setting.

The BIRS mandate is to embrace all aspects of the mathematical and statistical sciences from pure and applied mathematics, theoretical and applied statistics to mathematical physics, financial and industrial mathematics, the mathematics of information technology, computer science, and bio-mathematics.

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