

BIRS-CMO 2017 Annual Report



Banff International Research Station
for Mathematical Innovation and Discovery



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Consejo Nacional de Ciencia y Tecnología

Alberta
Government



Casa Matemática Oaxaca
Centro de investigación y enseñanza



75
años



**INSTITUTO DE
MATEMÁTICAS**



CONACYT
Consejo Nacional de Ciencia y Tecnología

BIRS 2017 Program

5-Day Workshops 2017

Jan 15	Jan 20	Transport in Unsteady Flows: from Deterministic Structures to Stochastic Models and Back Again
Jan 22	Jan 27	String and M-theory geometries: Double Field Theory, Exceptional Field Theory and their Applications
Jan 22	Jan 27	Combinatorial Reconfiguration
Jan 29	Feb 3	Data-Driven Methods for Reduced-Order Modeling and Stochastic Partial Differential Equations
Feb 5	Feb 10	Newton-Okounkov Bodies, Test Configurations, and Diophantine Geometry
Feb 12	Feb 17	Mathematical Approaches to Evolutionary Trees and Networks
Feb 19	Feb 24	Validating and Expanding Approximate Bayesian Computation Methods
Feb 26	Mar 3	Brain Dynamics and Statistics: Simulation versus Data
Mar 5	Mar 10	Optimization and Inference for Physical Flows on Networks
Mar 12	Mar 17	New Trends in Arithmetic and Geometry of Algebraic Surfaces
Mar 19	Mar 24	Communication Complexity and Applications, II
Mar 26	Mar 31	Statistical and Computational Challenges in Large Scale Molecular Biology
Apr 2	Apr 7	Mostly Maximum Principle
Apr 9	Apr 14	Generated Jacobian Equations: from Geometric Optics to Economics
Apr 16	Apr 21	Geometric Structures on Lie Groupoids
Apr 23	Apr 28	Quantum Field Framework for Structured Light Interactions
Apr 30	May 5	Phase Transitions Models
May 7	May 12	Topological Methods in Brain Network Analysis
May 7	May 12	Rigorous Numerics for Infinite Dimensional Nonlinear Dynamics
May 14	May 19	Algebraic Combinatorixx 2
May 21	May 26	Recent Advances in Discrete and Analytic Aspects of Convexity
May 28	Jun 2	Arithmetic Aspects of Explicit Moduli Problems
Jun 4	Jun 9	Mathematical Analysis of Biological Interaction Networks
Jun 11	Jun 16	Connections in Geometric Numerical Integration and Structure-Preserving Discretization
Jun 18	Jun 23	Nilpotent Fundamental Groups
Jun 25	Jun 30	Mathematical Approaches to Interfacial Dynamics in Complex Fluids
Jul 2	Jul 7	Diophantine Approximation and Algebraic Curves
Jul 9	Jul 14	Challenges in the Statistical Modeling of Stochastic Processes for the Natural Sciences
Jul 16	Jul 21	Women in Control: New Trends in Infinite Dimensions
Jul 23	Jul 28	Mean Dimension and Sofic Entropy Meet Dynamical Systems, Geometric Analysis and Information Theory
Jul 30	Aug 4	Topological Data Analysis: Developing Abstract Foundations
Aug 6	Aug 11	Latest Advances in the Theory and Applications of Design and Analysis of Experiments
Aug 13	Aug 18	WIN4: Women in Numbers 4
Aug 20	Aug 25	Geometric and Structural Graph Theory
Aug 27	Sep 1	The Analysis of Gauge-Theoretic Moduli Spaces
Sep 3	Sep 8	Future Targets in the Classification Program for Amenable C*-Algebras
Sep 10	Sep 15	Photonic Topological Insulators
Sep 17	Sep 22	Lattice walks at the Interface of Algebra, Analysis and Combinatorics
Sep 24	Sep 29	Symmetries of Surfaces, Maps and Dessins
Oct 1	Oct 6	p -adic Cohomology and Arithmetic Applications
Oct 8	Oct 13	Computational Uncertainty Quantification
Oct 15	Oct 20	New Perspectives in Representation Theory of Finite Groups
Oct 22	Oct 27	Stochastic Analysis and its Applications
Oct 29	Nov 3	Automorphic Forms, Mock Modular Forms and String Theory
Nov 5	Nov 10	Forest and Wildland Fire Management: a Risk Management Perspective
Nov 12	Nov 17	Approximation Algorithms and the Hardness of Approximation
Nov 19	Nov 24	Nonlinear and Stochastic Problems in Atmospheric and Oceanic Prediction
Nov 26	Dec 1	Partial Order in Materials: at the Triple Point of Mathematics, Physics and Applications
Dec 3	Dec 8	Inferential Challenges for Large Spatio-Temporal Data Structures
Dec 10	Dec 15	Mathematics for Developmental Biology

2-Day Workshops 2017

Mar 17 Mar 19 Alberta Number Theory Days (ANTD IX)
Apr 21 Apr 23 Ted Lewis SNAP Math Fair Workshop 2017
Apr 28 Apr 30 Future Research Directions in Digital Simulation Methodology for the Next 10 Years
Jul 7 Jul 9 Special Western Canada Linear Algebra meeting
Sep 1 Sep 3 Modelling and Simulation: Practical Engineering Applications
Sep 29 Oct 1 Open Source Computation and Algebraic Surfaces
Oct 6 Oct 8 Transdisciplinary Approaches to Integrating Policy and Science for Sustainability
Oct 20 Oct 22 Retreat for Young Researchers in Stochastics
Oct 27 Oct 29 Contemporary Topics in Mathematical Physics

Research In Teams

June 4 June 11 Derivative Free and Black Box Optimization
Jul 23 Jul 30 Gravity as an Effective Medium
Aug 6 Aug 13 The Structure of Finite Algebras and the Constraint Satisfaction Problem
Aug 20 Aug 27 Some intermittency problems for parabolic SPDE
Oct 15 Oct 22 Bounds for Restrictions of Laplace Eigenfunctions
Dec 3 Dec 10 Nikol'skii inequalities and their applications

Focused Research Groups

Jun 11 Jun 18 Material Evolution from Plasticity to Morphogenesis
Jun 18 Jun 25 Extensions of index theory inspired by scattering theory
Sep 10 Sep 17 Stochastic Lattice Differential Equations and Applications

Banff International Research Station

2017

5-Day Workshops

Transport in Unsteady Flows: from Deterministic Structures to Stochastic Models and Back Again

January 15 - 20, 2017

Organizers:

Sanjeeva Balasuriya (University of Adelaide)
Adam Monahan (University of Victoria)
Daan Crommelin (CWI Amsterdam)

Nicholas Ouellette (Stanford University)
Laure Zanna (University of Oxford)
Gary Froyland (University of New South Wales)



This workshop stemmed from the pressing need to understand fluid transport at both the geophysical and the small scales, with importance respectively in the global climate and environment, and in fluidic devices down to the micro- and nano-scales. The scientific necessity for incorporating both larger scale coherent structures and smaller scale unresolved motions in such an assessment is becoming more apparent. There is for example a growing urgency in being able to incorporate, in a scientifically rigorous way, the stochastic/probabilistic/statistical models associated with small scale motion into large scale climate models. The complementary advances in the areas of coherent structures and stochastic analysis, and the fledgling dialogue between researchers from the two communities, renders this proposal particularly timely.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5048>

Participants:

Abernathey, Ryan (Columbia University)
Allshouse, Michael (Northeastern University)
Aluie, Hussein (University of Rochester)
Balasuriya, Sanjeeva (University of Adelaide)
Berner, Judith (National Center for Atmospheric Research - Boulder)
Boffetta, Guido (Universita degli Studi di Torino)
Braverman, Elena (University of Calgary)
Crommelin, Daan (CWI Amsterdam)
Frank, Jason (Utrecht University)
Froyland, Gary (University of New South Wales)
Ghil, Michael (University of California at Los Angeles)
Gonzalez-Tokman, Cecilia (The University of Queensland)
Gottwald, Georg (The University of Sydney)
Griffies, Stephen (National Oceanic & Atmospheric Administration)
Holdsworth, Amber (University of Victoria)
Junge, Oliver (Technical University of Munich)
Karrasch, Daniel (Technische Universität München)
Keating, Shane (University of New South Wales)

Kelley, Douglas (University of Rochester)
Koltai, Péter (Freie Universität Berlin)
Lilly, Jonathan (NorthWest Research Associates)
Lucarini, Valerio (University Hamburg)
Miron, Philippe (University of Miami)
Monahan, Adam (University of Victoria)
Ouellette, Nicholas (Stanford University)
Padberg-Gehle, Kathrin (TU Dresden)
Peacock, Thomas (Massachusetts Institute of Technology)
Penland, Cecile (NOAA)
Rypina, Irina (Woods Hole Oceanographic Institution)
Schmalfluss, Bjorn (Friedrich-Schiller-University Jena)
Stastna, Marek (University of Waterloo)
Tantet, Alexis (Utrecht University)
Tarshish, Nathaniel (Princeton University)
Thiffeault, Jean-Luc (University of Wisconsin)
Vanneste, Jacques (University of Edinburgh)
Vercauteren, Nikki (Freie Universität Berlin)
Wouters, Jeroen (University of Sydney)

String and M-theory geometries: Double Field Theory, Exceptional Field Theory and their Applications

January 22 - 27, 2017

Organizers:

David Berman (Queen Mary University of London)
Jeong-Hyuck Park (Sogang University)

Martin Cederwall (Chalmers University of
Technology)



This workshop focused on how the idea of geometry can change when strings are our basic unit. As such, it was about the development of new mathematics inspired by how nature may work at very small distances and how spacetime itself may be very different if viewed from the perspectives of these fundamental strings. The general goal of the workshop was to bring together experts in different aspects of this field. The idea was to create overlaps between the formal and more physically motivated approaches and apply the formalism that has been recently developed in extended geometries and double field theory to show how they can exhibit new physical phenomena and answer some of the above questions. This is a growing emerging area coming out of string theory.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5018>

Participants:

Bandos, Igor (Ikerbasque and University of the Basque Country (UPV/EHU))
Berman, David (Queen Mary, University of London)
Blair, Chris (Vrije Universiteit Brussel)
Brandenberger, Robert (McGill)
Cederwall, Martin (Chalmers University of Technology)
Franzmann, Guilherme (McGill)
Gualtieri, Marco (University of Toronto)
Hohm, Olaf (Simons Center for Geometry and Physics, Stony Brook)
Hull, Chris (Imperial College London)
Lee, Kanghoon (KIAS)

Malek, Emanuel (LMU Munich)
Marques, Diego (Instituto de Astronomia y Fisica del Espacio)
Otsuki, Ray (Queen Mary University of London)
Palmkvist, Jakob (Texas A&M University)
Park, Jeong-Hyuck (Sogang University)
Rosabal Rodriguez, Jose Alejandro (IBS Center for Theoretical Physics of the Universe)
Rudolph, Felix (LMU Munich)
Samtleben, Henning (Ecole Normale Supérieure de Lyon)
Strickland-Constable, Charles (CEA/Saclay)
Waldram, Daniel (Imperial College London)

Combinatorial Reconfiguration

January 22 - 27, 2017

Organizers:

Naomi Nishimura (University of Waterloo)
Amer Mouawad (University of Bergen)

Takehiro Ito (Tohoku University)



The goal of the workshop was to bring together researchers in this new field, helping us to develop general approaches to reconfiguration problems as well as to understand what properties of problems make reconfiguration more or less difficult to accomplish.

The objectives of the workshop can be summarized as follows:

- Providing an opportunity for joint discussion by researchers in reconfiguration from all over the world; the organizers alone represent Europe, Asia, and North America. (This expanded upon CoRe 2015, held in February 2015 in Sendai, Japan, with twenty participants.)
- Identifying future research directions. To support this objective, the workshop included open problem sessions, in which participants gave presentations on the background of such problems.
- Deepening the area by establishing a set of common methods and algorithmic techniques. Tutorials and invited lectures served this aim.
- Broadening the area by making connections to related areas and problems. We wished to emphasize questions that have received little study and stress application domains. To this end, our invitation list included experts from related areas.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5066>

Participants:

Bousquet, Nicolas (Ecole Centrale de Lyon)
Fernau, Henning (Universität Trier)
Haas, Ruth (Smith College)
Hatanaka, Tatsuhiko (Tohoku University)
Ito, Takehiro (Tohoku University)
Johnson, Matthew (Durham University)
Mizuta, Haruka (Tohoku University)
Moore, Benjamin (Simon Fraser University)
Muehlenthaler, Moritz (University of Erlangen-Nuremberg)
Nishimura, Naomi (University of Waterloo)
Ono, Hirota (Kyushu University)

Otachi, Yota (Japan Advanced Institute of Science and Technology)
Seyffarth, Karen (University of Calgary)
Subramanya, Vijay (University of Waterloo)
Suzuki, Akira (Tohoku University)
Uehara, Ryuhei (Japan Advanced Institute of Science and Technology)
Vaidyanathan, Krishna (University of Waterloo)
van den Heuvel, Jan (The London School of Economics and Political Science)
Wasa, Kunihiko (National Institute of Informatics)

Data-Driven Methods for Reduced-Order Modeling and Stochastic Partial Differential Equations

January 29 - February 3, 2017

Organizers:

J. Nathan Kutz (University of Washington)
Karen Willcox (Massachusetts Institute of Technology)

Rachel Kuske (University of British Columbia)



Data methods are leading to transformative changes across the engineering, physical and biological sciences. Our objective was to bring together leading experts in various fields of mathematical sciences with the goal of integrating state-of-the-art methods across mathematical fields and scientific disciplines. This is the time for such an effort as many transformative innovations are emerging across disciplines but have yet to migrate more broadly across the mathematical sciences and/or domain sciences. Mathematical strategies that rely on dimensionality reduction techniques that are of growing importance given the continued demand for methods capable of handling what has become ubiquitous, big-data sets in every field of science. The development of experimental tools capable of generating enormous amounts of data, coupled with the plummeting cost of storing, analyzing and dispensing these data enable scientists to grapple with problems that were out of reach only 10 years ago.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5140>

Participants:

Alexander, Romeo (Courant Institute)
Alla, Alessandro (Florida State University)
Askham, Travis (University of Washington)
Bhat, Harish S. (University of California, Merced)
Brunton, Bing (University of Washington)
Brunton, Steven (University of Washington)
Carlberg, Kevin (Sandia National Laboratories)
Duraisamy, Karthik (University of Michigan)
Farhat, Charbel (Stanford University)
Fitzgibbon, Andrew (Microsoft)
Garcia, Juan (Simon Fraser University)
Giannakis, Dimitris (New York University)
Grepl, Martin (Aachen)
Grundel, Sara (Max Planck Institute)
Gugercin, Serkan (Virginia Polytechnic Institute)
Kaiser, Eurika (University of Washington)
Kapteyn, Michael (MIT)
Kevrekidis, Ioannis (Princeton University)
Kramer, Boris (Massachusetts Institute of

Technology)
Kunert-Graf, James (Pacific Northwest Research Institute)
Kuske, Rachel (University of British Columbia)
Kutz, J. Nathan (University of Washington)
Lederman, Roy (Princeton)
Maday, Yvon (University Paris 6)
Manohar, Krithika (University of Washington)
Mohamad, Mustafa (MIT)
Proctor, Joshua L. (Institute for Disease Modeling)
Rudy, Sam (University of Washington)
Slawinska, Joanna (Rutgers)
Slivinski, Laura (NOAA)
Taira, Kunihiko (Florida State University)
Williams, Matthew (United Technologies Research Center)
Zahr, Matthew (Lawrence Berkeley National Laboratory)

Newton-Okounkov Bodies, Test Configurations, and Diophantine Geometry

February 5 - 10, 2017

Organizers:

Alex Küronya (Goethe Universität Frankfurt)

Michael Roth (Queen's University)

Tomasz Szemberg (Pedagogical University of Cracow)



The aim of the workshop was to bring together mathematicians from seemingly distant areas to study certain recently discovered connections between algebraic and differential geometry, convex bodies, and number theory. The relation between the areas in question rests on exploring how certain functions vanish on interesting spaces, and gives us some hope to understand 'simple' points given by rational numbers these shapes. Global sections of line bundles on varieties play a distinguished role in much of geometry. A good way to control all global sections of all multiples of a given bundle is to look at the graded ring they form with respect to multiplication of sections, the so called section ring of the line bundle. A particularly important instance is the ring associated to the canonical line bundle, the canonical ring.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5046>

Participants:

Altmann, Klaus (Freie Universität Berlin)
Anderson, David (The Ohio State University)
Bossinger, Lara (University of Cologne)
Eckl, Thomas (University of Liverpool)
Fang, Xin (University of Cologne)
Fulger, Mihai (Princeton University)
Gonzalez, Jose (Yale University)
Gounelas, Frank (Humboldt Universität zu Berlin)
Ito, Atsushi (Kyoto University)
Jabusch, Kelly (University of Michigan - Dearborn)
Kasprzyk, Alexander (The University of Nottingham)
Kaveh, Kiumars (University of Pittsburgh)
Keller, Julien (Aix-Marseille-University)
Küronya, Alex (Goethe Universität Frankfurt)
Laface, Roberto (Leibniz Universität Hannover)
Lanini, Martina (Università degli Studi di Roma Tor Vergata)
Lazić, Vladimir (Universität Bonn)
Lehmann, Brian (Boston College)
Malara, Grzegorz (Pedagogical University of Cracow)

McKinnon, David (University of Waterloo)
Moriwaki, Atsushi (Kyoto University)
Mustata, Mircea (University of Michigan)
Ottem, John Christian (University of Oslo)
Paul, Sean (University of Wisconsin, Madison)
Pokora, Piotr (Johannes-Gutenberg-Universität Mainz)
Roé, Joaquim (Universitat Autònoma de Barcelona)
Roth, Michael (Queen's University)
Sektan, Lars Martin (CIRGET)
Szemberg, Tomasz (Pedagogical University of Cracow)
Szpond, Justyna (Pedagogical University of Cracow)
Turchet, Amos (University of Washington)
Urbinati, Stefano (Università degli Studi di Padova)
Walter, Lena (Freie Universität Berlin)
Wang, Xiaowei (Rutgers University)
Wüstholtz, Gisbert (Eidgenössische Technische Hochschule Zürich)

Mathematical Approaches to Evolutionary Trees and Networks

February 12 - 17, 2017

Organizers:

Caroline Colijn (Imperial College London)
Marta Luksza (Princeton University)
Leonid Chindelevitch (Simon Fraser University)

Vincent Moulton (University of East Anglia)
Amaury Lambert (UPMC Université Paris 06)
Tandy Warnow (University of Illinois)



The objectives of the workshop were to bring mathematicians working in three key areas together to make progress in these problems. We also invited several biologists who were keen to engage with mathematicians on the challenges posed by new data on evolutionary processes. New technologies for sequencing DNA mean that we can probe evolution in more detail than ever before. By sequencing hundreds, thousands or even tens of thousands of individual viruses or bacteria, we can learn how these pathogens evade immune systems, gain resistance to vaccines and drugs, and more fundamentally, how they evolve. This understanding is gained with the help of evolutionary trees, like the “tree of life”. These trees describe the ancestry of a group of organisms back through time. This can provide information about how an infection spreads, where drug resistance comes from, and can even help us to predict which strains of a virus we should be worried about next.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5104>

Participants:

Allman, Elizabeth (University of Alaska Fairbanks)
Britton, Tom (Stockholms University)
Brown, Dan (University of Waterloo)
Chauve, Cedric (Simon Fraser University)
Chindelevitch, Leonid (Simon Fraser University)
Colijn, Caroline (Imperial College, London)
Degnan, James (University of New Mexico)
El-Mabrouk, Nadia (University of Montreal)
Evans, Steve (University of California, Berkeley)
Feijao, Pedro (Simon Fraser University)
Fischer, Mareike (Greifswald University, Germany)
Fuchs, Michael (National Chiao Tung University)
Gascuel, Olivier (Centre Nationale de la Recherche Scientifique et Institut Pasteur)
Gusfield, Dan (University of California, Davis)
Hall, Matthew (University of Oxford)
Holmes, Susan (Stanford University)
Huber, Katharina (University of East Anglia)
Koelle, Katia (Duke University)

Lambert, Amaury (UPMC Univ Paris 06)
Moulton, Vincent (University of East Anglia)
Owen, Megan (Lehman College, CUNY)
Plazzotta, Giacomo (Imperial College London)
Pond, Sergei (Temple University)
Poon, Art (Western University)
Roos, Teemu (University of Helsinki)
Rosenberg, Noah (Stanford University)
Schertzer, Emmanuel (Universite Pierre et Marie Curie Paris 6)
Semple, Charles (University of Canterbury)
Solis Lemus, Claudia (University of Wisconsin-Madison)
Stadler, Tanja (ETH(Swiss Federal Institute of Technology)-Zurich)
Véber, Amandine (Ecole Polytechnique)
Whidden, Chris (Fred Hutchinson Cancer Research Center)
Yang, Ziheng (University College London)

Validating and Expanding Approximate Bayesian Computation Methods

February 19 - 24, 2017

Organizers:

Christian Robert (Universite Paris Dauphine)
Dennis Prangle (University of Newcastle)
Luke Bornn (Simon Fraser University)

Richard Wilkinson (University of Sheffield)
Jukka Corander (University of Helsinki)
Gael Martin (Monash University)



The aim of the workshop was to gather an audience of experts made of statisticians and of machine-learning experts who are using and developing computational methods, and of applied mathematicians and computer-scientists studying approximation techniques, towards a clearer picture of the challenges and research directions of the convergence of ABC methods. The increasing computational power at our disposal allows us to simulate many aspects of life -- ranging from the common ancestry of far-away communities of invasive insects to handling data bases such as those of a search-engine daily search patterns or of a major on-line retailer customer browsing habits. It is nowadays possible to quantitatively predict the behavior of systems without performing experiments, or to efficiently complement experiences. For example, new drugs are now pre-selected based on molecular models, while the advertising focus behind social networks like Facebook rely on simulated designs of experiment. ABC (Approximate Bayesian computation) methods are generic algorithms that can handle such complex structures with a reduced amount of calibration and monitoring, provided the connected models can be simulated on computers.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5025>

Participants:

Cameron, Ewan (University of Oxford)
Chkrebtii, Oksana (The Ohio State University)
Corander, Jukka (University of Helsinki)
Craiu, Radu V. (University of Toronto)
Cranmer, Kyle (New York University)
Cusumano-Towner, Marco (Massachusetts Institute of Technology)
Czellar, Veronika (EDHEC Lille)
Fearnhead, Paul (Lancaster University)
Frazier, David (Monash University)
Golchi, Shirin (UBC)
Graham, Matt (University of Edinburgh)
Grazian, Clara (La Sapienza Univesità di Roma)
Gutmann, Michael (University of Edinburgh)
Jacob, Pierre (Harvard University)
Kaski, Samuel (Aalto University)
Lee, Anthony (University of Warwick)

Li, Wentao (Lancaster University)
Mansinghka, Vikash (MIT)
Marin, Jean-Michel (Universite de Montpellier)
Martin, Gael (Monash University)
Mengersen, Kerrie (Queensland University of Technology)
Muchmore, Patrick (University of Southern California)
Papamakarios, George (University of Edinburgh)
Pensar, Johan (University of Helsinki)
Prangle, Dennis (University of Newcastle)
Robert, Christian (Universite Paris Dauphine)
Rousseau, Judith (Université Paris-Dauphine)
Shapovalova, Yuliya (Maastricht University)
Sisson, Scott (University of New South Wales)
Wilkinson, Richard (University of Sheffield)

Brain Dynamics and Statistics: Simulation versus Data

February 26 - March 3, 2017

Organizers:

Susanne Ditlevsen (University of Copenhagen)
Priscilla Greenwood (University of British Columbia)

Andre Longtin (University of Ottawa)



The goal of this workshop was to develop methods to characterize these components, how they interact with each other, and how this interaction changes when stimuli impinge on the brain or the brain acts upon its environment. The techniques and advances discussed are at the forefront of two fields that seldom come together, namely dynamics and statistics, which respectively address the predictable and unpredictable aspects of the brain's behaviour. The rising and established experts brought together by this workshop aimed to gain a deeper understanding of the brain's operational principles in the presence of variability, an understanding grounded in quantifiable "statistical" certainty. The group was also driven by potential novel directions in mathematics that the intersection of concepts from dynamics and statistics will offer.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5036>

Participants:

Berg, Rune W (University of Copenhagen)
Best, Janet (Ohio State University)
Braun, Wilhelm (University of Ottawa)
Ditlevsen, Susanne (University of Copenhagen)
Greenwood, Priscilla (University of British Columbia)
Grosse Ruse, Mareile (University of Copenhagen)
Guillamon, Antoni (Universitat Politècnica de Catalunya)
Hofmann, Volker (McGill University)
Hutt, Axel (German Weather Service)
Kilpatrick, Zachary (University of Colorado)
Lefebvre, Jeremie (Kremling Research Institute)
Li, Kang (University of Copenhagen)
Lindner, Benjamin (Bernstein Center for Computational Neuroscience Berlin / Humboldt-Universität zu Berlin)
Löcherbach, Eva (Université de Cergy-Pontoise)
Longtin, Andre (University of Ottawa)

McDonnell, Mark (University of South Australia)
Naud, Richard (University of Ottawa)
Orlandi, Javier (University of Calgary)
Østergaard, Jacob (University of Copenhagen)
Quaglio, Pietro (Juelich Research Centre)
René, Alexandre (Forschungszentrum caesar)
Rowat, Peter (University of California San Diego)
Sacerdote, Laura (University of Torino)
Samson, Adeline (Universite Grenoble Alpes)
Shinomoto, Shigeru (Kyoto University)
Tamborrino, Massimiliano (Johannes Kepler University Linz)
Thomas, Peter (Case Western Reserve University)
Touboul, Jonathan (Collège de France & Inria)
Veltz, Romain (Inria Sophia Antipolis Méditerranée)
Vich, Catalina (Universitat de les Illes Balears)
Victor, Jonathan D. (Weill Cornell Medical College)
Ward, Lawrence (University of British Columbia)
Whalen, Timothy (Carnegie Mellon University)

Optimization and Inference for Physical Flows on Networks

March 5 - 10, 2017

Organizers:

Michael Chertkov (Los Alamos National Laboratory)
Marc Vuffray (Los Alamos National Laboratory)

Sidhant Misra (Los Alamos National Laboratory)
Anatoly Zlotnik (Los Alamos National Laboratory)



The primary objective of the workshop was to bring together an interdisciplinary community of researchers working in the fields of network science, optimization, dynamical systems, optimal control, machine learning, and statistical physics to provide an environment of interaction at the interfaces of these fields. The purpose was to exchange and combine new and emerging ideas with particular focus on inference, learning and optimization for physical networks characterized by dynamics and uncertainty. The schedule involved surveys of mathematical fields and motivating applications so that all participants could learn the fundamental assumptions and perspectives of each field. In addition, leaders in each area delivered focused technical presentations of recent ideas, techniques, and research results that could be adopted by participants from other fields and disciplines.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5165>

Participants:

Ahn, Sung-Soo (KAIST)
Bolognani, Saverio (Swiss Federal Institute of Technology)
Chertkov, Michael (Los Alamos National Laboratory)
Deka, Deepjoti (Los Alamos National Lab)
Dörfler, Florian (Swiss Federal Institute of Technology)
Flötteröd, Gunnar (KTH Royal Institute of Technology)
Gayme, Dennis (Johns Hopkins University)
Gorodnitskii, Oleg (Skoltech)
Herty, Michael (RWTH Aachen University)
Jacquod, Philippe (U of Applied Sciences of Western Switzerland)
Josz, Cédric (LAAS CNRS)
Jovanovic, Mihailo (University of Minnesota)
Krishnamurthy, Dvijotham (California Institute of Technology)
Lasserre, Jean-Bernard (LAAS-CNRS 7, Toulouse)
Lee, Dongchan (MIT)
Lokhov, Andrey (Los Alamos National Laboratory)

Lubin, Miles (Massachusetts Institute of Technology)
Maximov, Yury (Skolkovo Institute of Science and Technology)
Misra, Sidhant (Los Alamos National Laboratory)
Molzahn, Daniel (Argonne National Laboratory)
Rantzer, Anders (Lund University)
Rebeschini, Patrick (Yale University)
Roald, Line (ETH Zurich)
Ruozzi, Nicholas (UT Dallas)
Savla, Ketan (University of Southern California)
Scaglione, Anna (Arizona State University)
Subramanian, Vijay (University of Michigan, Ann Arbor)
Sun, X. Andy (Georgia Institute of Technology)
talukdar, saurav (University of Minnesota)
Vuffray, Marc (Los Alamos National Laboratory)
Yang, Shuoguang (Columbia University)
Yu, Suhyoun (MIT)
Zlotnik, Anatoly (Los Alamos National Laboratory)

New Trends in Arithmetic and Geometry of Algebraic Surfaces

March 12 - 17, 2017

Organizers:

Matthias Schuett (Leibniz University Hannover)
Noam D. Elkies (Harvard University)

Keiji Oguiso (The University of Tokyo)



The interplay of arithmetic and geometry has been a driving force in the study of algebraic curves, culminating in Faltings' finiteness theorem for rational points on curves of general type. For algebraic surfaces, such deep structures are mostly still conjectural, but great progress has been made in recent years following this leitmotif. The most spectacular achievement of the last few years might have been the proof of the Tate conjecture for K3 surfaces due to Madapusi, Maulik and Charles. However, this is only the brightest star among a plentitude of amazing results manifesting the intertwining of arithmetic and geometry (and also initiating new directions, for instance in dynamics).

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5146>

Participants:

Auel, Asher (Yale University)
Bauer, Ingrid (University of Bayreuth)
Brandhorst, Simon (Leibniz University Hannover)
Brunyate, Adrian (Stony Brook)
Casalaina-Martin, Sebastian (University of Colorado at Boulder)
Catanese, Fabrizio (University of Bayreuth)
Costa, Edgar (Dartmouth College)
Dembélé, Lassina (Warwick University)
Elkies, Noam D. (Harvard University)
Elsenhans, Andreas-Stephan (Universität Paderborn)
Garbagnati, Alice (Università Statale di Milano)
Hulek, Klaus (Fakultaet fuer Mathematik und Physik)
Huybrechts, Daniel (Universität Bonn)
Ito, Kazuhiro (Kyoto University)
Jahnel, Joerg (University of Siegen)
Katsura, Toshiyuki (Hosei University Japan)
Kostiuk, Jordan (University of Alberta)
Kuwata, Masato (Chuo University)
Laface, Roberto (Leibniz Universität Hannover)
Lieblich, Max (University of Washington)
Logan, Adam (Government of Canada)

Matsumoto, Yuya (University of Tokyo)
McMullen, Curtis (Harvard University)
Mukamel, Ronen (Rice University)
Nasrecki, Bartosz (University of Bristol)
Oguiso, Keiji (The University of Tokyo)
Ohashi, Hisanori (Tokyo University of Science, Faculty of Science and Technology)
Ouchi, Genki (IPMU, The university of Tokyo)
Rams, Slawomir (Jagiellonian University)
Rouleau, Xavier (University of Marseille)
Sarti, Alessandra (University of Poitiers, Laboratoire de Mathématiques et Applications)
Schuett, Matthias (Leibniz University Hannover)
Shepherd-Barron, Nicholas (King's College London)
Shioda, Tetsuji (Rikkyo University)
Taelman, Lenny (Universiteit van Amsterdam)
Tayou, Salim (Université Paris-Sud)
van Luijk, Ronald (Universiteit Leiden)
Varilly-Alvarado, Anthony (Rice University)
Veniani, Davide Cesare (University of Mainz)
Voight, John (Dartmouth College)
Whitcher, Ursula (American Mathematical Society)
Yu, Xun (Tianjin University)

Communication Complexity and Applications, II

March 19 - 24, 2017

Organizers:

Amit Chakrabarti (Dartmouth College)
Andrew McGregor (University of Massachusetts Amherst)

Anup Rao (University of Washington)
Funda Ergun (Simon Fraser University)



In August 2014 we organized the first ever workshop on Communication Complexity and Applications at BIRS, with the objective of bringing together researchers working on foundational questions about communication with researchers using communication complexity techniques and results in other areas of theoretical computer science. We proposed a second edition of the workshop to capitalize on the success of the inaugural one and bring other new groups of researchers into the fold. Communication complexity is the study of communication-efficient solutions for computational problems whose input is split amongst two or more players. Over the last three decades, it has proved itself to be among the most useful of abstractions in computer science. Communication is inherent to any computational task and quantifying this communication bounds the computational complexity of the task.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5147>

Participants:

Beame, Paul (University of Washington)
BERA, SUMAN (Dartmouth College)
Braverman, Vladimir (Johns Hopkins University)
Braverman, Mark (Princeton University)
Brody, Joshua (Swarthmore College)
Chakrabarti, Amit (Dartmouth College)
Chattopadhyay, Arkadev (Tata Institute of Fundamental Research)
Ergun, Funda (Simon Fraser University)
Garg, Ankit (Microsoft Research New England)
Göös, Mika (Harvard University)
Guha, Sudipto (University of Pennsylvania)
Jain, Rahul (National University of Singapore)
Jayram, T.S. (IBM Almaden Research Center)
Kale, Sagar (Dartmouth College)
Kapralov, Michael (EPFL)
King, Valerie (University of Victoria)
Kol, Gillat (Princeton University)

Larsen, Kasper Green (Aarhus University)
Natarajan Ramamoorthy, Sivaramakrishnan (University of Washington)
Nayak, Ashwin (University of Waterloo)
Nelson, Jelani (Harvard University)
Onak, Krzysztof (IBM TJ Watson Research Center)
Oshman, Rotem (Tel-Aviv University)
Pokutta, Sebastian (Georgia Tech)
Rosen, Adi (CNRS and U. Paris Diderot)
Sherstov, Alexander (UCLA)
Thaler, Justin (Georgetown University)
Vorotnikova, Sofya (University of Massachusetts Amherst)
Watson, Thomas (University of Memphis)
Weinstein, Omri (Columbia University)
Woodruff, David (IBM)
Yaroslavtsev, Grigory (Indiana University)
Zhang, Qin (Indiana University)

Statistical and Computational Challenges in Large Scale Molecular Biology

March 26 - 31, 2017

Organizers:

Laurent Jacob (Centre national de la recherche scientifique)

Anna Goldenberg (University of Toronto)

Manolis Kellis (Massachusetts Institute of Technology and Broad Institute)

Jeff Leek (Johns Hopkins Bloomberg School of Public Health)

Stephen Montgomery (Stanford University)

Barbara Engelhardt (Princeton University)



Recent technological advances have allowed companies and public consortiums to describe increasingly large numbers of samples at the genetic level through typically thousands or millions of descriptors. These descriptors are relevant to key issues like the optimal treatment when they depict a tumor or a bacteria, or the susceptibility to a disease when they depict a person. The availability of this data therefore holds great promises in terms of health improvement and our understanding of biology, but major challenges remain to their full exploitation. Our workshop brought together experts in computational biology as well as other connected fields dealing with similar challenges and experimental biologists to identify roadblocks and propose innovative solutions.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5131>

Participants:

Balliu, Brunilda (Stanford University)

Bonnet, Anna (Université Lyon 1)

Brown, Christopher (University of Pennsylvania)

Curtis, Christina (Stanford University)

Ellis, Shannon (Johns Hopkins)

Engelhardt, Barbara (Princeton University)

Ernst, Jason (UCLA)

Gilad, Yoav (University of Chicago)

Goldenberg, Anna (University of Toronto)

Haibe Kains, Benjamin (University Health Network)

Hansen, Kasper (Johns Hopkins University)

Hughes, Tim (University of Toronto)

Im, Hae Kyung (University of Chicago)

Jacob, Laurent (Centre national de la recherche scientifique)

Kelley, David (Calico Labs)

Kellis, Manolis (Massachusetts Institute of Technology and Broad Institute)

Knowles, David (Stanford University)

Kundaje, Anshul (Stanford University)

Langmead, Ben (Johns Hopkins University)

Leek, Jeffrey (Johns Hopkins Bloomberg School of Public Health)

Li, Gen (Columbia University)

Li, Yang (Stanford)

Montgomery, Stephen (Stanford University)

Moreau, Yves (KU Leuven)

Neuvial, Pierre (CNRS)

Pai, Athma (Massachusetts Institute of Technology)

Platig, John (Dana-Farber/Harvard School of Public Health)

Przulj, Natasa (University College London)

Purdom, Elizabeth (University of California, Berkeley)

Quinlan, Aaron (University of Utah)

Raphael, Ben (Princeton University)

Sheehan, Sara (Smith College)

Shen, Ronglai (Memorial Sloan-Kettering Cancer Center)

Stuart, Josh (UCSC)

Taylor, James (Johns Hopkins University)

Varoquaux, Nelle (UC Berkeley)

Vert, Jean-Philippe (MINES ParisTech)

Wang, Wenyi (The University of Texas MD Anderson Cancer Center)

Xing, Eric (Carnegie Mellon University)

Zou, James (Stanford)

Mostly Maximum Principle

April 2 - 7, 2017

Organizers:

Isabeau Birindelli (Sapienza Università di Roma)
Antonio Vitolo (Università di Salerno)

Italo Capuzzo Dolcetta (Sapienza Università di Roma)



The scope of this meeting was to gather researchers interested in the study of elliptic equations via the Maximum Principle. This conference was in spirit a sequel to the conferences “Positivity: a key to fully-nonlinear equations” (Vetri 2010), “Mostly Maximum Principle” (Roma 2012), “Mostly Maximum Principle” (Agropoli 2015). This series has started as a relatively small gathering of high level mathematicians working in areas related with the maximum principle, and has expanded in themes and number of participants, but without diminishing the level of the mathematicians involved and without losing the original spirit. The thematic focus of this 5-days workshop was on recent developments and applications of advanced methods and techniques related to the Maximum Principle. The aim was gathering world leading experts as well as a number of junior researchers active in the broad field of nonlinear elliptic partial differential equations.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5116>

Participants:

Birindelli, Isabeau (Sapienza Università di Roma)
Boroushaki, Shirin (UBC)
Cabre, Xavier (ICREA and Universitat Politècnica de Catalunya)
Capuzzo Dolcetta, Italo (Sapienza Università di Roma)
Cassani, Daniele (Università degli Studi dell’Insubria)
Clutterbuck, Julie (Monash University)
Da Lio, Francesca (ETH,Zurich)
del Pino, Manuel (University of Chile)
Feng, Zhaosheng (University of Texas Rio Grande Valley)
Ferrari, Fausto (Università di Bologna)
Galise, Giulio (Sapienza Università di Roma)
Ghoussoub, Nassif (University of British Columbia)
Imbert, Cyril (Ecole Normale Supérieure)
Ishii, Hitoshi (Waseda University)
Kosugi, Takahiro (Mathematical Institute, Tohoku University)
Ley, Olivier (Institut National Sciences Appliquées)

Mari, Luciano (Scuola Normale Superiore)
Moreira, Diego (Universidade Federal do Ceará)
Pacella, Filomena (University of Roma “Sapienza”)
Patrizi, Stefania (University of Texas at Austin)
Payne, Kevin (Università degli Studi di Milano)
Pimentel, Edgard (Pontifical Catholic University of Rio de Janeiro)
Pinchover, Yehuda (Technion Israel Institute of Technology Haifa)
Polacik, Peter (University of Minnesota)
Quaas, Alexander (Valparaiso (Chile))
Rossi, Luca (Ecoles Hautes Etudes en Sciences Sociales)
Shafir, Itai (Technion-Israel Institute of Technology)
Shakerian, Shaya (UBC)
Sirakov, Boyan (PUC-Rio de Janeiro)
Souplet, Philippe (Université Paris 13)
Wiech, Andrzej (Georgia Institute of Technology)
Tateyama, Shota (Tohoku University)
Tralli, Giulio (Sapienza Università di Roma)
Vitolo, Antonio (Università di Salerno)

Generated Jacobian Equations: from Geometric Optics to Economics

April 9 - 14, 2017

Organizers:

Nestor Guillen (University of Massachusetts Amherst) **Jun Kitagawa** (Michigan State University)
Robert McCann (University of Toronto)



A major objective of the workshop was to bring together and foster interaction between researchers working in the general theory of GJEs, the theory for specific problems in engineering and economics that can be modeled by certain GJEs, the numerical analysis of OT and/or geometric optics problems, and related geometric and variational problems. This workshop gathered experts from across the world with background in areas such as mathematics, economics, and engineering to discuss deep connections between their respective fields with the aim of developing new theoretical frameworks, practical models, and numerical algorithms. New avenues of research resulting from this meeting could potentially lead to improvements in a diverse area of practical applications, for example: the development of new engineering tools in laser optics, more efficient satellite receivers, better car headlights, lenses and optical instruments (telescopes and microscopes); or the development of tools in the analysis of a wider variety of economic markets.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5078>

Participants:

Abedin, Farhan (Temple University)
Acciaio, Beatrice (London School of Economics)
Bowles, Malcolm (University of British Columbia)
Carlier, Guillaume (Université Paris Dauphine)
Chen, Eric (Princeton University)
Cotar, Codina (University College London)
Craig, Katy (University of California Santa Barbara)
Figalli, Alessio (ETH Zurich)
Froese, Brittany (New Jersey Institute of Technology)
Galichon, Alfred (New York University)
Guillen, Nestor (University of Massachusetts Amherst)
Gutierrez, Cristian (Temple University)
Jhaveri, Yash (ETH Zurich)
Karakhanyan, Aram (University of Edinburgh)
Kim, Young-Heon (University of British Columbia)
Kitagawa, Jun (Michigan State University)
Mawi, Henok (Howard University)
McCann, Robert (University of Toronto)
Mérigot, Quentin (Université Paris-Dauphine / CNRS)
Neumayer, Robin (University of Texas)
Pass, Brendan (Univ. Alberta)
Sabra, Ahmad (University of Warsaw)
Saldanha Salvador, Tiago Miguel (Mcgill University)
Samuelson, Larry (Yale University)
Schmitzer, Bernhard (University of Münster)
Thibert, Boris (LJK Université Grenoble)
Wang, Yi (Johns Hopkins University)
Warren, Micah (University of Oregon)
Yang, Deane (NYU Tandon School of Engineering)
Zhang, Shuangjian (University of Toronto)

Geometric Structures on Lie Groupoids

April 16 - 21, 2017

Organizers:

Rui Loja Fernandes (University of Illinois at Urbana-Champaign)

Henrique Bursztyn (Instituto Nacional de Matemática Pura e Aplicada)
Eckhard Meinrenken (University of Toronto)



The aim of this workshop was to bring together mathematicians working on the foundational aspects of Lie groupoids with researchers working on applications. We believe that there is a vast potential of this theory, much of which remains to be discovered. Hence, given the current interest by different groups of people and different viewpoints, there was a need for a focused workshop which could bring together the top researchers, promising young researchers, and students in these very active fields. We organized the workshop around five different topics, each day devoted to a main theme. Each day started with a keynote lecture by a top researcher in the field. This workshop brought together researchers using Lie groupoids and Lie algebroids as tools in their work, with leading experts on their properties and structural theory. Among the themes explored in this meeting were multiplicative differential forms on groupoids, compatible measures and metrics on groupoids, as well as symplectic and complex structures on groupoids. Throughout, there was an emphasis on concrete applications.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5023>

Participants:

Alexeev, Anton (University of Geneva)
Arias-Abad, Camilo (Medelin)
Bischoff, Francis (University of Toronto)
Bursztyn, Henrique (Instituto Nacional de Matemática Pura e Aplicada)
Cabrera, Alejandro (U F Rio de Janeiro)
Cattaneo, Alberto (Zurich University)
Crainic, Marius (Utrecht)
Debord, Claire (Université Blaise Pascal, Clermont-Ferrand)
del Hoyo, Matias Luis (Universidade Federal Fluminense)
Drummond, Thiago (U F Rio de Janeiro)
Fernandes, Rui Loja (University of Illinois at Urbana-Champaign)
Grabowski, Janusz (Polish Academy of Sciences)
Gualtieri, Marco (University of Toronto)
Iglesias-Ponte, David (University of La Laguna)
Kirchhoff-Lukat, Charlotte (University of Cambridge)
Lerman, Eugene (University of Illinois)
Lu, Jiang-Hua (University of Hong Kong)
Marcut, Ioan (Radboud University)

Marrero, Juan Carlos (University of La Laguna)
Martinez Torres, David (PUC Rio de Janeiro)
Mehta, Rajan (Smith College)
Meinrenken, Eckhard (University of Toronto)
Mestre, Joao Nuno (University of Coimbra)
Michiels, Daan (University of Illinois at Urbana-Champaign)
Miranda, Eva (Universitat Politecnica de Catalunya)
Ortiz, Cristian (University of Sao Paulo)
Pflaum, Markus (University of Colorado Boulder)
Pike, Jeffrey (University of Toronto)
Pronk, Dorette (Dalhousie University)
Scott, Geoffrey (Toronto)
Skandalis, Georges (Universite Paris 7)
Struchiner, Ivan (University of Sao Paulo)
Tang, Xiang (Washington University)
van Erp, Erik (Dartmouth College)
Villatoro, Joel (Illinois)
Weinstein, Alan (UC Berkeley)
Yuncken, Robert (Université Clermont Auvergne)
Zambon, Marco (KU Leuven)
Zhu, Chenchang (Göttingen)
Zung, Nguyen (University of Toulouse)

Quantum Field Framework for Structured Light Interactions

April 23 - 28, 2017

Organizers:

David Andrews (University of East Anglia)
Duncan O'Dell (McMaster University)
Alexander Lvovsky (University of Calgary)

Robert Boyd (University of Ottawa)
Mark Dennis (University of Bristol)
Konstantin Bliokh (RIKEN and ANU)



The ultimate objectives were to achieve a more cohesive formulation of structured light quantization, and a consistent framework with which to describe the fundamental photon interactions of such light – in a form that is suitable and amenable to technical and experimental application. The course of discussion also aimed to identify flaws, shortcomings, oversights and physically unsupportable assumptions in some existing areas of theory. The community has identified a wide range of issues demanding attention. At this early point in the twenty-first century it is already apparent that a paradigm shift is taking place in numerous areas of technology, as the new science of photonics increasingly outperforms and displaces twentieth century electronics. Prominent examples are high throughput nanoscale connectivity in IT systems, secure and enhanced telecommunications, and quantum computing. Some of the latest advances, aiming to exploit the distinctive quantum properties of light, convey information in the form of highly unconventional structured beams of light.

For details, please refer to the workshop webpage

<http://www.birs.ca/events/2017/5-day-workshops/17w5079>

Participants:

Alonso, Miguel (University of Rochester)
Andrews, David (University of East Anglia)
Babiker, Mohamed (University of York)
Banzer, Peter (MPI for the Science of Light)
Bialynicki-Birula, Iwo (Center for Theoretical Physics Polish Academy of Sciences)
Bliokh, Konstantin (RIKEN and ANU)
Boyd, Robert (University of Ottawa)
Carmichael, Howard (University of Auckland)
Coles, Matt (University of East Anglia)
Desyatnikov, Anton (Nazarbayev University)
Engheta, Nader (University of Pennsylvania)
Fernandez-Corbaton, Ivan (Karlsruhe Institute of Technology)
Fickler, Robert (University of Ottawa)
Galvez, Enrique (Colgate University)
Gotte, Jörg (University of Glasgow)
Gutierrez-Cuevas, Rodrigo (University of Rochester)
Jones, Garth (University of East Anglia)
Karimi, Ebrahim (University of Ottawa)

Khanikaev, Alexander B. (Queens College of CUNY)
Kuipers, Kobus (Kavli institute Delft)
Lavery, Martin (University of Glasgow)
Leader, Elliot (Imperial College London)
Leykam, Daniel (Nanyang Technological University)
Loeffler, Wolfgang (Leiden University)
Lvovsky, Alexander (University of Calgary)
Mansuripur, Masud (University of Arizona)
Mazilu, Michael (University of St Andrews)
O'Dell, Duncan (McMaster University)
Rubinsztein-Dunlop, Halina (University of Queensland)
Salam, Akbar (Wake Forest University)
Sanders, Barry (University of Calgary)
Sang-Nourpour, Nafiseh (Institute for Quantum Science and Technology (IQST), U. of Calgary)
Tijssen, Teuntje (University of Bristol)
van Kruining, Koen (Max Planck Institute for the Physics of Complex Systems)
Yao, Alison (University of Strathclyde)

Phase Transitions Models

April 30 - May 5, 2017

Organizers:

Petru Mironescu (University Claude Bernard Lyon 1) **Yaniv Almog** (Louisiana State University)



Phase transition models are frequently used in various applications in material science such as superfluidity, superconductivity, liquid crystals, micromagnetism etc. One of the most popular models was introduced in the 50s by the Russian Nobel prize winners Ginzburg and Landau and is used in the theoretical study of superconductors (metals that lose their electrical resistivity at very low temperatures). Models presenting similar features are used to describe liquid crystals, micromagnetism, superfluids, and many other physical phenomena. The meeting brought together people from four distinct communities (superconductivity and related models, liquid crystals, semi-classical analysis, fractional problems) which either share a common mathematical background or tackle similar problems, but do not usually attend the same meetings or work together. It was one of the very first meetings to gather all these communities, which clearly have intersecting working agendas and an important collaboration potential.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5110>

Participants:

Alama, Stanley (McMaster University)
Almog, Yaniv (Louisiana State University)
Bauman, Patricia (Purdue University)
Berlyand, Leonid (Pennsylvania State University)
Bonnaillie-Noël, Virginie (CNRS, École normale supérieure)
Bronsard, Lia (McMaster University)
Canevari, Giacomo (University of Oxford)
Chipot, Michel (University of Zurich)
Correggi, Michele (Roma Tre University)
Fournais, Søren (University of Aarhus)
Golovaty, Dmitry (University of Akron)
Helffer, Bernard (Université de Nantes)
Ignat, Radu (Université Paul Sabatier - Toulouse 3)
Jerrard, Robert (University of Toronto)
Kachmar, Ayman (Lebanese University)
Kovarik, Hynek (Università degli studi di Brescia)
Mironescu, Petru (University Claude Bernard Lyon 1)

Nguyen, Luc (University of Oxford)
Orlandi, Giandomenico (University of Verona)
Palfy-Muhoray, Peter (Kent State University)
Park, Jinhae (Chungnam National University)
Phillips, Daniel (Purdue University)
Raymond, Nicolas (Université Rennes 1)
Rougerie, Nicolas (Université Grenoble-Alpes and CNRS, LPMMC)
Samokhin, Kirill (Brock University)
Sandier, Etienne (Université Paris Est Créteil)
Shafirir, Itai (Technion-Israel Institute of Technology)
Siegl, Petr (University of Bern)
Sternberg, Peter (Indiana University)
Wolansky, Gershon (Technion-Israel Institute of Technology)
Zarnescu, Arghir (Basque Center for Applied Mathematics)
Zheng, Xiaoyu (Kent State University)

Topological Methods in Brain Network Analysis

May 7 - 12, 2017

Organizers:

Mark Daley (University of Western Ontario)
Isabel Darcy (University of Iowa)

Natasa Jonoska (University of South Florida)



We live in a world of connections: social networks have been used everywhere from the study and prediction of the spread of diseases to the development of product advertising targeted at the individual level. The application of these methods to networks in the brain is leading a revolution in neuroscience which is providing a set of approaches for better understanding how the brain works and how to diagnose and potentially treat complex neuropsychiatric diseases. This workshop developed /combined topological approaches to the study of brain networks. Topology is the study of shapes, but allows for distortions. Data normally contains small inaccuracies (called noise). These inaccuracies can affect the geometrical shape of the data, but since topology allows for distortions, we can use topology to better understand networks. Topological methods have been used to study a variety of important applications including protein-protein interactions, gene regulation, DNA knotting, as well as to understand the shape of data.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5043>

Participants:

Baryshnikov, Yuliy (University of Illinois at Urbana-Champaign)
Curto, Carina (PennState)
Dabaghian, Yuri (Rice University)
Daley, Mark (University of Western Ontario)
Darcy, Isabel (University of Iowa)
Dlotko, Pawel (Swansea University)
Gommel, Maria (University of Iowa)
Griffiths, John (Rotman Research Institute)
Henselman, Gregory (University of Pennsylvania)
Itskov, Vladimir (The Pennsylvania State University)
Jonoska, Natasa (University of South Florida)

Kim, Jisu (Carnegie Mellon University)
Longtin, Andre (University of Ottawa)
Olsen, Rosanna (Baycrest)
Reininghaus, Jan (CD-adapco)
Saito, Masahico (University of South Florida)
Sazdanovic, Radmila (North Carolina State University)
Scharein, Rob (Hypnagogic Software)
Sellers, Kristin (University of California, San Francisco)
Tereshchenko, Alexander (University of Iowa)
Wang, Bei (University of Utah)

Rigorous Numerics for Infinite Dimensional Nonlinear Dynamics

May 7 - 12, 2017

Organizers:

Jean-Philippe Lessard (Université Laval)
Michael Plum (Karlsruhe Institute of Technology)
Konstantin Mischaikow (Rutgers University)

JF Williams (Simon Fraser University)
Jan Bouwe van den Berg (Vrije Universiteit Amsterdam)



Nonlinear dynamics shape the world around us, from the harmonious movements of celestial bodies, via the swirling motions in fluid flows, to the complicated biochemistry in the living cell. Mathematically these beautiful phenomena are modelled by nonlinear dynamical systems, mainly in the form of ordinary differential equations, partial differential equations and delay differential equations. This workshop focused on tightly integrating abstract mathematics with computer simulations to improve our fundamental understanding of the complex nonlinear phenomena displayed by these mathematical models.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5141>

Participants:

Breden, Maxime (ENS Paris-Saclay and Université Laval)
Cyranka, Jacek (Rutgers University)
Groothedde, Chris (VU University Amsterdam)
Jaquette, Jonathan (Rutgers University)
Lessard, Jean-Philippe (Université Laval)
Liu, Xuefeng (Niigata University)
Mireles James, Jason D. (Florida Atlantic University)
Mischaikow, Konstantin (Rutgers University, USA)
Nagatou, Kaori (Karlsruhe Institute of Technology)
Nakao, Mitsuhiro (Waseda University)
Plum, Michael (Karlsruhe Institute of Technology)

Queirolo, Elena (VU University Amsterdam)
Sheombarsing, Ray (VU University Amsterdam)
van den Berg, Jan Bouwe (Vrije Universiteit Amsterdam)
Wanner, Thomas (George Mason University)
Watanabe, Yoshitaka (Kyushu University)
Wilczak, Daniel (Jagiellonian University)
Williams, JF (Simon Fraser University)
Wunderlich, Jonathan (Karlsruhe Institute of Technology)
Zgliczynski, Piotr (Jagiellonian University)

Algebraic Combinatorixx 2

May 14 - 19, 2017

Organizers:

Julie Beier (Earlham College)
Rosa Orellana (Dartmouth College)

Stephanie van Willigenburg (University of British Columbia)
Tricia Brown (Armstrong State University)



Algebraic combinatorics is a branch of mathematics that utilizes interesting mathematical objects, like dominoes, to better understand problems in algebra and vice versa. It has connections to many other areas including computer science and mathematical physics. The goal of this workshop was to bring together women from a wide variety of backgrounds and experiences to strengthen and increase their presence in the mathematical community. Participants spent time engaged in many activities including listening to research talks, working on problems in algebraic combinatorics, discussing issues of particular importance to women in mathematics and building community.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5012>

Participants:

Ballantine, Cristina (College of the Holy Cross)
Barcelo, Helene (Mathematical Sciences Research Institute)
Barnard, Emily (North Carolina State University)
Beier, Julie (Earlham College)
Benedetti, Carolina (Fields Institute)
Benkart, Georgia (University of Wisconsin-Madison)
Bernstein, Megan (Georgia Institute of Technology)
Bockting-Conrad, Sarah (DePaul University)
Brown, Tricia (Armstrong State University)
Cai, Yue (Texas A&M University)
Chavez, Anastasia (University of California - Berkeley)
Cho, Soojin (Ajou University, South Korea)
Colmenarejo, Laura (York University)
Dahlberg, Samantha (University of British Columbia)
Daugherty, Zaji (City College of New York)
Fishel, Susanna (Arizona State University)
Gillespie, Maria (University of California - Davis)
Hamel, Angele (Wilfrid Laurier University)
Harris, Pamela (Williams College)
Hicks, Angela (Lehigh University)
Karaali, Gizem (Pomona College)
Mason, Sarah (Wake Forest University)
McNicholas, Erin (Willamette University)
Milicevic, Elizabeth (Haverford College)
Mishna, Marni (Simon Fraser University)
Niese, Elizabeth (Marshall University)
Nyman, Kathryn (Willamette University)
Orellana, Rosa (Dartmouth College)
Panova, Greta (University of Pennsylvania)
Park, Kyoungsook (IDECCA Inc.)
Patrias, Rebecca (Université du Québec à Montréal)
Readdy, Margaret (University of Kentucky)
Rosas, Mercedes (University of Sevilla)
Russell, Heather (University of Richmond)
Schilling, Anne (University of California Davis)
Sundaram, Sheila (Pierrepont School)
Tenner, Bridget (DePaul University)
van Willigenburg, Stephanie (University of British Columbia)
Viel, Shira (North Carolina State University)
Yip, Martha (University of Kentucky)
Yoo, Meesue (Universität Wien)
Yu, Josephine (Georgia Institute of Technology)

Recent Advances in Discrete and Analytic Aspects of Convexity

May 21 - 26, 2017

Organizers:

Vladyslav Yaskin (University of Alberta)
Artem Zvavitch (Kent State University)
Alexander Koldobsky (University of Missouri)

Ryabogin Dmitry (Kent State University)
Karoly Bezdek (University of Calgary)



Convex Geometry is the branch of geometry studying convex sets. It overlaps with many fields of Mathematics, such as Differential and Discrete Geometries, Functional Analysis, Harmonic Analysis, Combinatorics, Probability, and Classical Mechanics. The aim of the meeting was to discuss most recent developments in the area and to interrelate the new analytic and discrete methods. The main goal of the workshop at BIRS was to bring together the leading experts and young researchers in the area to coordinate the new applications of Harmonic Analysis, Discrete Geometry and Symplectic Geometry to Convexity. The workshop focused on the mixture of several topics in discrete and analytic Convexity, but will also have very close relation to Harmonic, Geometric and Functional Analysis.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5074>

Participants:

Akopyan, Arseniy (IST Austria)
Alexander, Matt (Kent State University)
Alfonseca-Cubero, Maria de los Angeles (North Dakota State University)
Artstein-Avidan, Shiri (Tel Aviv University)
Bezdek, Karoly (University of Calgary)
Connelly, Robert (Cornell University)
Dann, Susanna (Vienna Institute of Technology)
Dmitry, Ryabogin (Kent State University)
Florentin, Dan (Kent State University)
Gorbovickis, Igors (Uppsala University)
Henk, Martin (Technische Universität Berlin)
Khan, Muhammad (University of Calgary)
Kim, Jaegil (University of Alberta)
Klartag, Boaz (Tel Aviv University)
Koenig, Hermann (Universitaet Kiel)
Koldobsky, Alexander (University of Missouri)
Litvak, Alexander (University of Alberta)
Livshyts, Galyna (Georgia Institute of Technology)
Ludwig, Monika (Technische Universität Wien)
Musin, Oleg (University of Texas Rio Grande Valley)
Myroshnychenko, Sergii (Kent State University)
Naszodi, Marton (Eötvös University)
Oliwa, Michael (University of Calgary)

Pach, Janos (Ecole Polytechnique Federale de Lausanne)
Paouris, Grigoris (Texas A&M University)
Pivovarov, Peter (University of Missouri)
Rotem, Liran (University of Minnesota)
Saroglou, Christos (Kent State University)
Schechtman, Gideon (Weizmann Institute of Science)
Schuett, Carsten (Christian-Albrechts-Universitaet)
Schuster, Franz (Vienna University of Technology)
Slomka, Boaz (University of Michigan)
Stancu, Alina (Concordia University)
Stephen, Matthew (University of Alberta)
Tikhomirov, Konstantin (Princeton University)
Tomczak-Jaegermann, Nicole (University of Alberta)
Valettas, Petros (University of Missouri)
Vritisou, Beatrice (University of Alberta)
Weil, Wolfgang (Karlsruhe Institute of Technology)
Werner, Elisabeth (Case Western Reserve University)
Yaskin, Vladyslav (University of Alberta)
Zhang, Ning (University of Alberta)

Arithmetic Aspects of Explicit Moduli Problems

May 28 - June 2, 2017

Organizers:

Samir Siksek (University of Warwick)
Kiran Kedlaya (University of California, San Diego)

John Voight (Dartmouth College)
Nils Bruin (Simon Fraser University)



Explicit work on moduli problems has yielded powerful new theorems in arithmetic geometry that have eluded a purely theoretical approach. The moduli approach converts the problem of classifying objects of arithmetic interest into the problem of studying rational points on varieties, to which the methods of algebraic and arithmetic geometry may be applied. There is an active community, including many young researchers, dedicated to explicitly studying rational points. This workshop brought together researchers working on explicit moduli problems with those working on rational points to establish collaborations and stimulate further research. In addition to providing a platform for communicating new developments, the workshop gave young researchers the opportunity to gain a strong foundation in moduli spaces going beyond those traditionally studied computationally.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5065>

Participants:

Achter, Jeff (Colorado State University)
Anni, Samuele (Heidelberg University)
Arias-de-Reyna, Sara (University of Sevilla)
Balakrishnan, Jennifer (Boston University)
Bruin, Nils (Simon Fraser University)
Bruin, Peter (Universiteit Leiden)
Brumer, Armand (Fordham University)
Cesnavicius, Kestutis (University of California, Berkeley)
Derickx, Maarten (Universiteit Leiden)
Edixhoven, Bas (Universiteit Leiden)
Elkies, Noam D. (Harvard University)
Fite, Francesc (Essen)
Goren, Eyal (McGill University)
Harvey, David (University of New South Wales)
Ho, Wei (University of Michigan)
Johnson-Leung, Jennifer (University of Idaho)
Kani, Ernst (Queen's University)
Katz, Eric (Ohio State University)
Kedlaya, Kiran (University of California, San Diego)
Khuri-Makdisi, Kamal (American University of Beirut)
Lorenzo Garcia, Elisa (Universite de Rennes 1)
Mueller, Jan Steffen (Universitat Oldenburg)

Najman, Filip (University of Zagreb)
Newton, Rachel (University of Reading)
Ozman, Ekin (Bogazici University)
Parent, Pierre (Universite de Bordeaux)
Park, Jennifer (University of Michigan)
Poonen, Bjorn (Massachusetts Institute of Technology)
Pries, Rachel (Colorado State University)
Rebolledo, Marusia (Université B. Pascal Clermont-Ferrand)
Ritzenthaler, Christophe (Rennes)
Schoof, Rene (University of Rome II)
Sijsling, Jeroen (Universität Ulm)
Siksek, Samir (University of Warwick)
Stoll, Michael (Universität Bayreuth)
Sutherland, Andrew (Massachusetts Institute of Technology)
Top, Jaap (University of Groningen)
van Hoeij, Mark (Florida State University)
Viray, Bianca (University of Washington)
Voight, John (Dartmouth College)
Zureick-Brown, David (Emory University)
Zywina, David (Cornell University)

Mathematical Analysis of Biological Interaction Networks

June 4 - 9, 2017

Organizers:

David Anderson (University of Wisconsin-Madison)
Anne Shiu (Texas A&M University)
Casian Pantea (West Virginia University)

Lea Popovic (Concordia University)
Matthew Johnston (San Jose State University)



Mathematics has emerged as a pivotal player in analyzing complex biological interaction systems, and is a cornerstone of current systems biology research. The interaction networks governing critical cellular functions are often extremely complex, consisting of dozens of proteins, enzymes and metabolites interacting via hundreds of interdependent reactions. The goal of this workshop was to bring together researchers with expertise in a variety of mathematical areas to address major open questions of biological interaction modeling. The participants included researchers working in dynamical systems and control theory, probability and stochastic processes, computational algebraic geometry, optimization and computation, and systems biology. The focus of the workshop was on discussion and collaboration among these areas of expertise to solve important problems of common interest.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5099>

Participants:

Anderson, David (University of Wisconsin-Madison)
Boros, Balazs (Johann Radon Institute for Computational and Applied Mathematics)
Brijder, Robert (Hasselt University)
Brunner, Jim (University of Wisconsin-Madison)
Cappelletti, Daniele (University of Copenhagen)
Condon, Anne (University of British Columbia)
Conradi, Carsten (Hochschule für Technik und Wirtschaft Berlin)
Craciun, Gheorghe (University of Wisconsin Madison)
Dickenstein, Alicia (Universidad de Buenos Aires)
Enciso, German (University of California Irvine)
Giaroli, Magali (University of Buenos Aires)
Gupta, Ankit (ETH Zurich)
Johnson, Robert (California Institute of Technology)
Johnston, Matthew (San Jose State University)
Joshi, Badal (California State University San Marcos)
Kang, Hye-Won (University of Maryland, Baltimore County)
Kaznessis, Yiannis (University of Minnesota)
Kim, Jinsu Kim (University of Wisconsin-Madison)
Koepl, Heinz (Technische Universität Darmstadt)
Kurtz, Thomas (University of Wisconsin)
Meshkat, Nicolette (Santa Clara University)

Mincheva, Maya (Northern Illinois University)
Mochizuki, Atsushi (RIKEN)
Mueller, Stefan (RICAM, Austrian Academy of Sciences)
Ortiz Muñoz, Andrés (California Institute of Technology)
Pantea, Casian (West Virginia University)
Perez Millan, Mercedes (Universidad de Buenos Aires)
Popovic, Lea (Concordia University)
Regensburger, Georg (Johannes Kepler University Linz)
Rempala, Grzegorz (The Ohio State University)
Rendall, Alan (Johannes Gutenberg-Universität Mainz)
Schnoerr, David (University of Edinburgh)
Shiu, Anne (Texas A&M University)
Siegel, David (University of Waterloo)
Snarski, Michael (Brown University)
Sontag, Eduardo (Rutgers University)
Szederkenyi, Gabor (Computer and Automation Research Institute)
Tang, Xiaoxian (Texas A&M University)
Tonello, Elisa (University of Nottingham)
Winfree, Erik (California Institute of Technology)
Yu, Polly (University of Wisconsin-Madison)

Connections in Geometric Numerical Integration and Structure-Preserving Discretization

June 11 - 16, 2017

Organizers:

Jean-Christophe Nave (McGill University)
Stanly Steinberg (University of New Mexico)
Andy Wan (Centre de Recherche Mathématiques)

Alexander Bihlo (Memorial University of Newfoundland)
Christopher Budd (University of Bath)



Given the recent research activities in both geometric numerical integration and structure-preserving discretization, we are now at an important junction to bring together these two groups. So far, most work on geometric numerical integration has focused on preserving geometrical structures across each time step, while structure-preserving discretizations have centered on preserving differential structures in spatial discretizations. It was therefore the goal for this workshop to connect scientists working in these areas. Such interaction from these two groups will have impact in computational mathematics and in fields of science and engineering where long time accuracy and stability is sought after. The main objective of this workshop was to bring together applied mathematicians, engineers and computational scientists for the first time in:

- 1) areas of symplectic integration, variational integration, Lie group methods, and conservative methods with emphasis on long time accuracy and stability,
- 2) areas of mimetic discretizations, discrete exterior calculus, and finite element exterior calculus with keen interests in application of structure-preserving methods.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5152>

Participants:

Appelo, Daniel (University of New Mexico)
Arnold, Douglas (University of Minnesota)
Bauer, Werner (Imperial College London)
Bihlo, Alexander (Memorial University of Newfoundland)
Budd, Christopher (University of Bath)
Cardoso, Elsa (University of Vienna)
Castillo, Jose (San Diego State University)
Celledoni, Elena (Trondheim Norway)
Donzelli, Fabrizio (Memorial University)
Dziubek, Andrea (SUNY Polytechnic Institute)
Falk, Richard S. (Rutgers, the State University of New Jersey)
Frank, Jason (Utrecht University)
Furihata, Daisuke (Osaka University)
Gander, Martin (Université de Genève)
Hairer, Ernst (University of Geneva)

Munthe-Kaas, Hans (University of Bergen Norway)
Nave, Jean-Christophe (McGill University)
Owren, Brynjulf (Norwegian Institute of Science and Technology)
Palha, Artur (Eindhoven University of Technology)
Perot, Blair (University of Massachusetts, Amherst)
Putkaradze, Vakhtang (University of Alberta)
Quispel, Reinout (La Trobe University)
Steinberg, Stanly (University of New Mexico)
Stern, Ari (Washington University in St. Louis)
Trask, Nathaniel (Sandia National Labs)
Tsogtgerel, Gantumur (McGill University)
Valiquette, Francis (State University of New York at New Paltz)
Wan, Andy (Centre de Recherche Mathématiques)
Wanner, Gerhard (University Geneva)

Nilpotent Fundamental Groups

June 18 - 23, 2017

Organizers:

Adam Topaz (University of Oxford)
Ján Mináč (Western University)

Florian Pop (University of Pennsylvania)
Kirsten Wickelgren (Georgia Institute of Technology)



Algebraic Geometry studies solutions to systems of polynomial equations using algebraic and geometric methods, and Galois theory studies the symmetries of such solutions. In general, studying the full collection of such symmetries is extremely difficult. By passing to so-called nilpotent quotients, one “linearizes” the set of symmetries to make it much more tractable from a computational point of view. The primary objective of this workshop was to bring together experts and young researchers who study the interaction between nilpotent/unipotent fundamental groups and arithmetic and/or geometry. We hoped that increased interaction between the three subjects discussed in the overview could lead to new collaborations and new research directions, by rethinking current research areas from new points of view. All three subjects discussed in the overview are now developing rapidly, so we believe that the workshop was timely. The speakers in our workshop included mathematicians at various stages in their career, ranging from graduate students and postdocs to leading experts. Most of the workshop comprised of research-level talks.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5112>

Participants:

Bayer-Fluckiger, Eva (Ecole Polytechnique Federale de Lausanne)
Betts, Alexander (University of Oxford)
Bogomolov, Fedor (New York University)
Chebolu, Sunil (Illinois State University)
Chetard, Béatrice (The University of Western Ontario)
Dan-Cohen, Ishai (Ben Gurion University of the Negev)
Davis, Rachel (University of Wisconsin-Madison)
Feng, Tony (Stanford University)
Florence, Mathieu (Université Paris 6)
Frankel, Brett (Northwestern University)
Gille, Stefan (University of Alberta)
Guillot, Pierre (Universite de Strasbourg)
Haase, Bastian (Emory University)
Hall, Chris (Western University)
Harbater, David (University of Pennsylvania)
Hoshi, Yuichiro (Kyoto University)
Litt, Daniel (Columbia University)
Lüdtke, Martin (Universität Frankfurt)
Matzri, Eliyahu (Bar-Ilan University)

Merling, Mona (Johns Hopkins University)
Mináč, Ján (Western University)
Neftin, Danny (Technion)
Obus, Andrew (University of Virginia)
Palaisti, Marina (The University of Western Ontario)
Pop, Florian (University of Pennsylvania)
Quadrelli, Claudio (University of Milan-Bicocca)
Schultz, Andrew (Wellesley College)
Silberstein, Aaron (University of Chicago)
Srinivasan, Padmavathi (Georgia Institute of Technology)
Stix, Jakob (Goethe-Universität Frankfurt)
Suciu, Alexandru (Northeastern University)
Szamuely, Tamás (Rényi Institute, Hungarian Academy of Sciences)
Topaz, Adam (University of Oxford)
Tripathy, Arnav (Harvard University)
Vogt, Isabel (Massachusetts Institute of Technology)
Wickelgren, Kirsten (Georgia Institute of Technology)
Wittenberg, Olivier (École normale supérieure)

Mathematical Approaches to Interfacial Dynamics in Complex Fluids

June 25 - 30 , 2017

Organizers:

Chun Liu (Department of Applied Mathematics,
Illinois Institute of Technology, Chicago, USA)

Jie Shen (Purdue University)



The general objective of this workshop was to bring together the leading and up-and-coming researchers in soft matter and interfacial dynamics, across several disciplines, to foster awareness and the cross-disciplinary transfer of ideas. The problem of interfacial dynamics in complex fluids is clearly multi-disciplinary. But so far the work done by mathematicians, engineers, physicists and biologists has largely been independent of one another. The sharp-interface methods have been used extensively by physicists and engineers, while the interface regularization methods have been developed mostly by mathematicians. Experimentalists, on the other hand, have documented the physical and biological processes and identified the most important problems that need to be solved.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5057>

Participants:

Afkhami, Shahriar (New Jersey Institute of Technology)

Chen, Min (Purdue University)

Chen, Long-Qing (The Pennsylvania State University)

Dey, Mohar (UBC)

Dong, Steven Suchuan (Purdue University)

Epshteyn, Yekaterina (University of Utah)

Feng, James J (University of British Columbia)

Gavish, Nir (Technion)

Gruen, Guenther (Universität Erlangen-Nürnberg)

Hu, Xianpeng (City University of Hong Kong)

Kirshtein, Arkadz (Pennsylvania State University)

Kusumaatmaja, Halim (Durham University)

Lee, Chiun-Chang (National Hsinchu University of Education in Taiwan)

Liang, Jie (University of Illinois at Chicago)

Lin, Ping (University of Dundee)

Lin, Tai-Chia (National Taiwan University)

Lin, Guang (Purdue University)

Lin, Yumin (Xiamen University)

Liu, Chun (Illinois Institute of Technology, Chicago)

Luijten, Erik (Northwestern University)

Luo, Li-Shi (Beijing Computational Science Research Center)

Mizuno, Masashi (Nihon University)

Ou, M. Yvonne (University of Delaware)

Pismen, Len (Technion)

Qian, Tiezheng (Hong Kong University of Science and Technology)

Ramchandran, Arun (University of Toronto)

Renardy, Yuriko (Virginia Polytechnic Institute and State University)

Renardy, Michael (Virginia Tech)

Schlömerkemper, Anja (University of Würzburg)

Shen, Jie (Purdue University)

Song, Zilong (York University)

Stevens, Angela (University of Münster)

Wang, Qi (University of South Carolina)

Wu, Hao (Fudan University)

Xu, Zhiliang (Notre Dame University)

Xu, Chuanju (Xiamen University)

Yue, Pengtao (Virginia Polytechnic Institute and State University)

Zhu, Yi (York University)

Diophantine Approximation and Algebraic Curves

July 2 - 7, 2017

Organizers:

Michael Bennett (University of British Columbia)
Jeff Thunder (Northern Illinois University)

Aaron Levin (Michigan State University)



The main objectives of the conference on Diophantine approximation and algebraic curves was the study of rational and integral solutions to Diophantine equations and inequalities and the connection with algebraic curves. Since early last century and even before, Diophantine approximation has played a large role in the study of solutions to Diophantine equations, a very old and influential topic in number theory. Thue's famous theorem was subsequently refined and expanded upon, culminating in Roth's celebrated result and his winning of the Fields medal. During the conference, experts in the areas of linear forms in logarithms, heights, the subspace theorem, the connections between Diophantine approximation and Nevanlinna theory, and others came together with those in elliptic curves, abelian varieties and other closely related subjects in algebraic geometry.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5045>

Participants:

Akhtari, Shabnam (University of Oregon)
Bauer, Mark (University of Calgary)
Bennett, Michae (University of British Columbia)
Bremner, Andrew (Arizona State University)
Bugeaud, Yann (Université de Strasbourg)
Capuano, Laura (Oxford University)
Coons, Michael (University of Newcastle)
Evertse, Jan-Hendrik (Universiteit Leiden)
Gherga, Adela (University of British Columbia)
Guy, Richard (The University of Calgary)
Hajdu, Lajos (university of Debrecen)
HIRATA-Kohno, Noriko (Nihon University)
Ingram, Patrick (York University)
Javanpeykar, Ariyan (University of Mainz)
Kundu, Debanjana (University of Toronto)
Le Fourn, Samuel (University of Lyon (ENS de Lyon))
Levesque, Claude (Université Laval)
Levin, Aaron (Michigan State University)
Malmskog, Beth (Villanova University)
Matschke, Benjamin (University of Bordeaux)
McKinnon, David (University of Waterloo)

Morrow, Jackson (Emory University)
Mosunov, Anton (University of Waterloo)
Nguyen, Dang Khoa (UBC and PIMS)
Park, Jennifer (University of Michigan)
Pazuki, Fabien (University of Copenhagen)
Pinter, Akos (University of Debrecen)
Plante, Thomas (Michigan State University)
Sharma, Divyum (University of Waterloo)
Stewart, Cameron (University of Waterloo)
Thunder, Jeff (Northern Illinois University)
Troncoso, Sebastian (Michigan State University)
Tucker, Tom (University of Rochester)
Turchet, Amos (University of Washington)
Tzanakis, Nikos (University of Crete)
Vojta, Paul (University of California at Berkeley)
Walsh, Gary (University of Ottawa)
Wang, Julie Tzu-Yueh (Academia Sinica)
Widmer, Martin (Royal Holloway, University of London)
Yasufuku, Yu (Nihon University)
Yazdani, Soroosh (University of Waterloo)

Challenges in the Statistical Modeling of Stochastic Processes for the Natural Sciences

July 9 - 14, 2017

Organizers:

Peter Craigmile (The Ohio State University)
Paul Sampson (University of Washington)
Richard Lockhart (Simon Fraser University)

Vladimir Minin (University of Washington)
Debashis Mondal (Oregon State University)
Wendy Meiring (University of California, Santa Barbara)



In recent years there have been a number of statistics workshops focused on a particular application area in the Natural Sciences. The workshop focussed on cross-pollination, encouraging statisticians with an expertise in a given scientific field (e.g., biology, climate, ecology, geophysics, hydrology) to learn about the exciting problems in other scientific fields. Earlier days in the workshop contained a mix of talks, a poster session, and roundtable discussions in assorted fields. Researchers with different skill sets in the statistical modeling of stochastic processes had an opportunity to draw parallels to problems in their own areas.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5107>

Participants:

Abkowitz, Janis (University of Washington)
Bolin, David (Chalmers University of Technology)
Catlin, Sandra (University of Nevada Las Vegas)
Chiu, Grace (Australian National University)
Craigmile, Peter (The Ohio State University)
Faulkner, Jim (University of Washington)
Foufoula-Georgiou, Efi (University of California, Irvine)
Ganguly, Shreyan (The Ohio State University)
Guttorp, Peter (Norwegian Computing Center)
Hewitt, Josh (Colorado State University)
Hoeting, Jennifer (Colorado State University)
Holst, Ulla (Lund University)
Kuusela, Mikael (University of Chicago)
Lindgren, Finn (University of Edinburgh)
Lindgren, Georg (University of Lund)
Lockhart, Richard (Simon Fraser University)
Meiring, Wendy (University of California, Santa Barbara)
Minin, Vladimir (University of Washington)

Mondal, Debashis (Oregon State University)
Morita, June (University of Washington)
Paige, Johnny (University of Washington)
Percival, Donald (University of Washington)
Rootzen, Holger (Chalmers Institute of Technology)
Ruiz, Trevor (Oregon State University)
Sampson, Paul (University of Washington)
Särkkä, Aila (Chalmers University of Technology)
Schmidt, Alexandra Mello (McGill University)
Schneider, Max (University of Washington)
Shen, Sam (San Diego State University)
Stein, Michael (University of Chicago)
Thorarinsdottir, Thordis (Norwegian Computing Center)
Tucker, Tyler (San Diego State University)
Wallin, Jonas (Lund University)
Whitfield, Paul (University of Saskatchewan)
Xu, Jason (University of California Los Angeles)
Zidek, James (University of British Columbia Freiburg)

Women in Control: New Trends in Infinite Dimensions

July 16 - 21, 2017

Organizers:

Luz de Teresa (Universidad Nacional Autonoma de Mexico)

Kirsten Morris (University of Waterloo)
Irena Lasiecka (University of Memphis)



This workshop had a very specific focus; control of partial differential equations (PDE's). The technical content of this workshop was on several open issues in control of infinite-dimensional systems: controllability for nonlinear systems, estimation and related computational issues. These issues are strongly connected and rely upon developments in other areas of mathematics such as analysis, geometry, topology. A synergistic effect, cross-fertilization and interdisciplinary approach has an immense and beneficial effect on the development of control theory and in the sciences in general. The workshop had several inter-connected objectives: to show young women interested in this field that they are not alone, introduce young female graduate students to potential future advisers and collaborators, as well as to increase the participation of women in research activities in control of PDE's in the long term.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5123>

Participants:

Apraiz, Jone (University of the Basque Country)
Belkhatir, Zehor (King Abdullah University of Science and Technology (KAUST))
Benabdallah, Assia (Aix Marseille University)
Bociu, Lorena (NC State University)
Bucci, Francesca (Universita' degli Studi di Firenze)
Calsavara, Bianca (University of Campinas)
Cavalcanti, Valéria Neves Domingos (University of Maringá Brazil)
de Teresa, Luz (Universidad Nacional Autonoma de Mexico)
Ding, Wandi (Middle Tennessee State University)
Dobova, Anna (Universidad de Sevilla Spain)
Fu, Xiaoyu (Sichuan University China)
Gomes, Susana N. (Imperial College London)
Hu, Weiwei (Oklahoma State University)
Jacob, Birgit (University of Wuppertal)
Jamieson, Jessie (University of Nebraska-Lincoln)

Laasri, Hafida (Fern Universität Hagen)
Lasiecka, Irena (University of Memphis)
Lebiedzik, Catherine (Wayne State University USA)
Lenhart, Suzanne (University of Tennessee)
Loreti, Paola (University of Rome)
Morris, Kirsten (University of Waterloo)
Rivas, Ivonne (Universidad del Valle Colombia)
Ryzhkova-Gerasymova, Iryna (Kharkiv National University)
Sánchez de la Vega, Constanza (FCEyN, Universidad de Buenos Aires Argentina)
Scherpen, Jacqueline (University of Groningen)
Sforza, Daniela (Sapienza Università di Roma)
Szulc, Katarzyna (Polish Academy of Sciences)
Tang, Shuxia (University of Waterloo)
Tegling, Emma (KTH Royal Institute of Technology)
Zhang, Jing (Virginia State University)

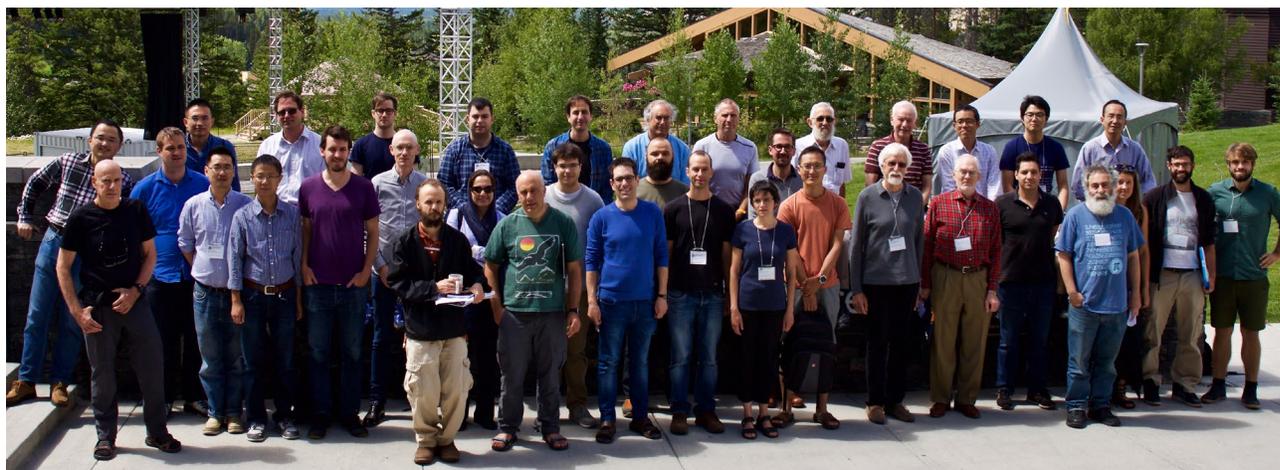
Mean Dimension and Sofic Entropy Meet Dynamical Systems, Geometric Analysis and Information Theory

July 23 - 28, 2017

Organizers:

Elon Lindenstrauss (Hebrew University)
Masaki Tsukamoto (Hebrew University)

Yonatan Gutman (Institute of Mathematics, Polish Academy of Sciences)



Mean dimension and its interaction with all the areas outlined above do not fit easily with the usual division of mathematical subfields. To the best of our knowledge there has not been the a conference where mean dimension was a major topic. To a large extent, the fact that there has been relatively little direct interaction between people working on the theory of mean dimension and researchers who found that mean dimension was relevant to a problem they have been studying has been a limiting factor on the growth of this emerging area. It seems also that an important connection with research in information theory has barely been developed. In the workshop we devoted considerable time to introductory talks explaining in each field what are the major problems, the major challenges, and the major advances, in addition to having people explain the specifics of much of the recent results mentioned above.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5068>

Participants:

Bowen, Lewis (University of Texas)
Downarowicz, Tomasz (Wrocław U of Science and Technology)
Elliott, George (University of Toronto)
Glasner, Eli (Tel Aviv University)
Glasner, Yair (Ben Gurion University of the Negev)
Gutman, Yonatan (Polish Academy of Sciences)
Handelman, David (University of Ottawa)
Hayes, Ben (Vanderbilt)
Hirshberg, Ilan (Ben Gurion University of the Negev)
Hosseini, Maryam (Institute for Research in Fundamental Sciences)
Huang, Wen (University of Science and Technology of China)
Kerr, David (Texas A&M University)
Kwietnak, Dominik (Jagiellonian University)
Li, Hanfeng (SUNY at Buffalo)
Lian, Zhengxing (University of Alberta)
Liang, Bingbing (Max Planck Institute for Mathematics in Bonn)
Lind, Douglas (University of Washington)
Lindenstrauss, Elon (Hebrew University)

Lutley, James (University of Toronto)
Matsuo, Shinichiroh (Nagoya University)
Meyerovitch, Tom (Ben Gurion University)
Niu, Zhuang (University of Wyoming)
Oppelmayer, Hanna (Chalmers University)
Phillips, N. Christopher (University of Oregon)
Pogorzelski, Felix (Technion)
Rainone, Timothy (Arizona State University)
Savu, Anamaria (University of Alberta)
Schmidt, Klaus (University of Vienna)
Schneider, Friedrich Martin (Technische Universität Dresden)
Seward, Brandon (Courant Institute of Mathematical Sciences)
Shao, Song (U of Science and Technology of China)
Śpiewak, Adam (University of Warsaw)
Szabo, Gabor (University of Münster)
Tsukamoto, Masaki (Hebrew University)
Weiss, Benjamin (Hebrew University of Jerusalem)
Winter, Wilhelm (Munster)

Topological Data Analysis: Developing Abstract Foundations

July 30 - August 4, 2017

Organizers:

Anthea Monod (Columbia University)

Ulrich Bauer (Technische Universität München)



This workshop brought together two strands of research in applied algebraic topology. The first strand is the theory of topological persistence. Launched by Edelsbrunner, Letscher and Zomorodian in 1999 (with antecedents in work by Frosini in the early 1990s and by Bradley and Robins in the late 1990s), persistence has evolved through several phases: algorithmic, algebraic, category theoretic, sheaf theoretic. Persistence solves the problem of the topological instability of real-world data by adopting a multiscale framework where instability can be quantified and filtered out. Of course, it has raised many new questions. The second strand is statistical and probabilistic topology, characterized for instance by the sharp results of Kahle on random simplicial complexes, the inference theorems of Niyogi, Smale and Weinberger, and more recent work that focuses on classical questions of probability and statistics, including the construction of statistical summaries and sufficient statistics, addressing issues of dimension reduction, and the establishment of probabilistic limit theorems for topological quantities.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5108>

Participants:

Baryshnikov, Yuliy (University of Illinois at Urbana-Champaign)

Bauer, Ulrich (Technische Universität München)

Berkouk, Nicolas (INRIA Saclay)

Bobrowski, Omer (Technion - Israel Institute of Technology)

Botnan, Magnus Bakke (Technical University Munich/VU Amsterdam)

Brodzki, Jacek (University of Southampton)

Bubenik, Peter (University of Florida)

Chen, Chao (CUNY Queens College)

Curry, Justin (Duke University)

Dey, Tamal (Ohio State University)

Dhandapani, Yogeshwaran (Indian Statistical Institute)

Fraser, Maia (University of Ottawa)

Kalisnik Verovsek, Sara (Brown University)

Knudson, Kevin (University of Florida)

Kraft, Rami (University of Loughborough)

Landi, Claudia (University of Modena and Reggio Emilia)

Lazovskis, Janis (University of Illinois at Chicago)

Lesnick, Michael (Princeton University)

Levanger, Rachel (Rutgers University)

Memoli, Facundo (The Ohio State University)

Miller, Ezra (Duke University)

Monod, Anthea (Columbia University)

Oppermann, Steffen (Norwegian University of Science and Technology)

Otter, Nina (University of Oxford)

Oudot, Steve (Inria Saclay)

Patel, Amit (Colorado State University)

Rathod, Abishek (Indian Institute of Science)

Rieser, Antonio (CONACYT-CIMAT)

Sheehy, Don (University of Connecticut)

Skraba, Primoz (Jozef Stefan Institute)

Steen, Johan (NTNU, Trondheim)

Tamaskar, Abhinav (New York University)

Vaccarino, Francesco (Politecnico di Torino)

Wang, Yusu (Ohio State University)

Wang, Bei (University of Utah)

Wright, Matthew (St. Olaf College)

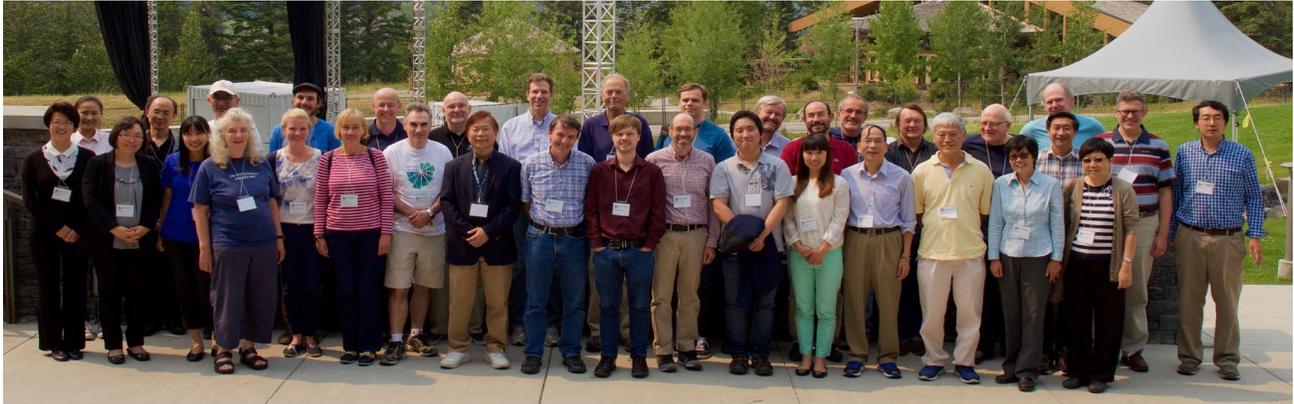
Latest Advances in the Theory and Applications of Design and Analysis of Experiments

August 6 - 11, 2017

Organizers:

Douglas Wiens (University of Alberta)
Weng Kee Wong (University of California, Los Angeles)

Holger Dette (Ruhr-Universität Bochum)



Experimental costs are rapidly rising and research questions must be answered using appropriate statistical techniques to draw the most accurate inference. Design issues are extremely important because a poorly designed study cannot provide valid inferences for the scientific questions of interest or answer these questions with credibility. Every scientific study should therefore be carefully designed by using minimal resources for maximum gain. While great advances in solving statistical estimation problems are continually made, research in design technology has relatively lagged. The workshop was timely and promoted state-of-the-art research in design by bringing many world experts in one place to exchange ideas, discuss challenging issues and most importantly, expose and groom new and young researchers to work in this important area.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5007>

Participants:

Bailey, Rosemary (University of St Andrews)
Biedermann, Stefanie (University of Southampton)
Bingham, Derek (Simon Fraser University)
Chien, Peter (University of Wisconsin-Madison)
Dette, Holger (Ruhr-Universität Bochum)
Gao, Lucy (University of Washington)
Gilmour, Steven (Kings College London)
Harman, Radoslav (Comenius University)
Hu, Rui (MacEwan University)
Huang, Mong-Na Lo (National Sun Yat-sen University)
Kim, Seongho (Wayne State University)
Kim, Skim (University of Alberta)
Kunert, Joachim (TU Dortmund)
Lin, Devon (Queen's University)
Lin, Dennis (PennState)
Lopez-Fidalgo, Jesus (University of Navarre)
Lu, Xuewen (University of Calgary)
Mentré, France (University Paris Diderot and INSERM)
Müller, Werner (Johannes Kepler Universität Linz)
Plagemann, Angela (Canadian Statistical Sciences Institute)
Pronzato, Luc (CNRS/Université de Nice–Sophia Antipolis)

Prus, Maryna (Otto von Guericke Universität Magdeburg)
Sagnol, Guillaume (Technical University of Berlin)
Schorning, Kirsten (Ruhr-Universität Bochum)
Schwabe, Rainer (Otto von Guericke Universität Magdeburg)
Shi, Yu (UCLA)
Stufken, John (Arizona State University)
Tang, Boxin (Simon Fraser University)
Vandenberghe, Lieven (UCLA)
Waite, Timothy (University of Manchester)
Welch, Will (University of British Columbia)
Wiens, Douglas (University of Alberta)
Wong, Weng Kee (University of California, Los Angeles)
Woods, Dave (University of Southampton)
Wu, Jeff (Georgia Institute of Technology)
Wynn, Henry (London School of Economics & Political Science)
Xu, Xiaojian (Brock University)
Yang, Min (University of Illinois at Chicago)
Zhang, Zizhao (UCLA)
Zhigljavsky, Anatoly (Cardiff University)
Zhou, Julie (University of Victoria)

WIN4: Women in Numbers 4

August 13 - 18, 2017

Organizers:

Chantal David (Concordia University)
Michelle Manes (University of Hawaii at Manoa)

Jennifer Balakrishnan (Boston University)
Bianca Viray (University of Washington)



The first Women in Numbers workshop was held at BIRS in 2008, with the explicit goals of highlighting the research of female number theorists and increasing the participation of women in number theory research. Since that first proposal, 84 different women have participated in three WIN conferences at BIRS, with an additional 40 participants at the Women in Numbers -- Europe conference held at CIRM in Luminy. The number of female number theorists is steadily growing. The visibility of the WIN conferences --- due both to the community that has developed and the high quality of research output from these workshops --- has helped to raise awareness in the broader community of the important contributions made by these researchers.

The workshop aimed to continue this important work, promoting research and leadership among female number theorists within a supportive environment.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5083>

Participants:

Balakrishnan, Jennifer (Boston University)
Bank, Efrat (University of Michigan)
Bianchi, Francesca (University of Oxford)
Bourdon, Abbey (University of Georgia)
Camacho Navarro, Ana Catalina (Colorado State University)
Cantoral Farfán, Victoria (ICTP)
Ciperiani, Mirela (The University of Texas at Austin)
Costache, Anamaria (University of Bristol)
David, Chantal (Concordia University)
Eisentraeger, Kirsten (The Pennsylvania State University)
Ejder, Ozlem (University of Southern California)
Etropolski, Anastassia (Rice University)
Feigon, Brooke (The City College of New York (CUNY))
Folsom, Amanda (Amherst College)
Friedlander, Holley (Dickinson College)
Fuchs, Elena (University of California, Davis)
Gafni, Ayla (University of Rochester)
Harron, Piper (University of Hawaii at Manoa)
Hsu, Catherine (University of Oregon)
Jang, Min-Joo (Cologne University)
Juul, Jamie (Amherst College)

Kimport, Susie (Stanford University)
Krieger, Holly (University of Cambridge)
Lauter, Kristin (Microsoft Research)
Li, Wanlin (University of Wisconsin-Madison)
Liu, Yuan (University of Wisconsin - Madison)
Looper, Nicole (Northwestern University)
Malik, Amita (University of Illinois at Urbana-Champaign)
Manes, Michelle (University of Hawaii at Manoa)
Mantovan, Elena (California Institute of Technology)
Massierer, Maike (University of New South Wales)
Odumodu, Frances (Universite Bordeaux)
Park, Jennifer (University of Michigan)
Prabhu, Neha (Indian Institute of Science Education and Research-Pune)
Pries, Rachel (Colorado State University)
Puskás, Anna (University of Alberta)
Schindler, Damaris (Utrecht University)
Tang, Yunqing (IAS/Princeton University)
Thompson, Bianca (Harvey Mudd College)
Turnage-Butterbaugh, Caroline (Duke University)
Viray, Bianca (University of Washington)
Walton, Laura (Brown University)

Geometric and Structural Graph Theory

August 20 - 25, 2017

Organizers:

Bojan Mohar (Simon Fraser University)
Janos Pach (Ecole Polytechnique Federale de

Lausanne)
Paul Seymour (Princeton University)



This workshop followed a similar model as used in a highly successful BIRS workshop that some of us have organized in 2006. At that time we have focused of bringing together researchers working in Topological Graph Theory with those working in Geometric Graph Theory and crossing numbers. This time the goal was to include some of the main protagonists in the newly emerging area of Computational Topology (H. Edelsbrunner, J. Erickson, E. Colin de Verdiere, S. Cabello) and work on related questions from structural graph theory. The workshop on Geometric and Structural Graph Theory brought together world experts working on geometric, topological and structural aspects of graph theory. This area of pure mathematics has distinctive applications in theoretical computer science, in information visualization, discrete optimization and the theory of algorithms.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5154>

Participants:

Arroyo, Alan (University of Waterloo)
Bonamy, Marthe (CNRS, LaBRI, Université de Bordeaux)
Cabello, Sergio (University of Ljubljana)
Chudnovsky, Maria (Princeton University)
Dujmović, Vida (University of Ottawa)
Dvorak, Zdenek (Charles University)
Erickson, Jeff (University of Illinois, Urbana-Champaign)
Fox, Jacob (Stanford University)
Fulek, Radoslav (IST Austria)
Gonzalez Hermosillo de la Maza, Sebastian (Simon Fraser University)
Hlineny, Petr (Masaryk University)
Knox, Fiachra (Simon Fraser University)
Kral, Dan (University of Warwick)
Kuhn, Daniela (Birmingham University)
Kyncl, Jan (Charles University)
Le, Tien Nam (Ecole Normale Supérieure Lyon)
Le, Ngoc Khang (Ecole Normale Supérieure Lyon)
Li, Zhentao (Ecole Normale Supérieure Paris)
Liu, Chun-Hung (Princeton University)
Maffray, Frederic (Laboratoire G-SCOP)
Mohar, Bojan (Simon Fraser University)
Norin, Sergey (McGill University)

Osthus, Deryk (Birmingham University)
Oum, Sang-il (KAIST)
Pach, Janos (Ecole Polytechnique Federale de Lausanne)
Postle, Luke (University of Waterloo)
Richter, Bruce (University of Waterloo)
Salazar, Gelasio (Universidad Autónoma de San Luis Potosí)
Scott, Alex (University of Oxford)
Seymour, Paul (Princeton University)
Shantanam, Abhinav (Simon Fraser University)
Sivaraman, Vaidy (Binghamton)
Song, Zixia (University of Central Florida)
Spirkl, Sophie (Princeton University)
Tancer, Martin (Charles University in Prague)
Thomasse, Stephan (École Normale Supérieure de Lyon)
Trotignon, Nicolas (CNRS - École Normale Supérieure de Lyon)
Valtr, Pavel (Charles University)
Vuskovic, Kristina (University of Leeds)
Wood, David (Monash University)
Wu, Hehui (Shanghai Center For Mathematical Sciences)
Yu, Xingxing (Georgia Institute of Technology)

The Analysis of Gauge-Theoretic Moduli Spaces

August 27 - September 1, 2017

Organizers:

Rafe Mazzeo (Stanford University)
Michael Singer (University College London)

Sergey Cherkis (University of Arizona)



The introduction of gauge theories in theoretical physics goes back to the 1950's, while the mathematical analysis of these theories traces back to the 1970's. These mathematical developments turned out to have numerous far-reaching consequences in low-dimensional topology, and this area of mathematical study provides a beautiful set of interactions between geometric analysis, topology and mathematical physics. This workshop addressed an intricate web of questions about these gauge-theoretic moduli spaces, including their metric structure, L^2 cohomology and the analysis of the natural differential operators on them. Participants explored the conjectured equivalences of different constructions of these moduli spaces. For the more recently introduced gauge theory equations, the fundamental questions about the basic properties of the associated moduli spaces was discussed. The subject presents an extraordinarily fertile ground where mathematicians and physicists are able to exchange ideas. This workshop was aimed at fostering serious interactions between the two groups and producing important new results of interest to a large community of geometers, analysts and mathematical physicists.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5149>

Participants:

Bielawski, Roger (University of Hannover)
Biswas, Indranil (Tata Institute of Fundamental Research)
Bradlow, Steve (University of Illinois Champaign-Urbana)
Charbonneau, Benoit (University of Waterloo)
Cherkis, Sergey (University of Arizona)
Dai, Xianzhe (University of California Santa Barbara)
Dancer, Andrew (University of Oxford)
Degeratu, Anda (University of Stuttgart)
Foscolo, Lorenzo (SUNY Stony Brook)
Fredrickson, Laura (Stanford University)
Fritzsche, Karsten (University College London)
Graham, Robin (University of Washington)
Hanany, Amihay (Imperial College)
Harland, Derek (University of Leeds)
Haydys, Andriy (Universität Bielefeld)
He, Siqi (Caltech)
Hurtubise, Jacques (McGill University)

Kydonakis, Georgios (University of Illinois at Urbana-Champaign)
Manton, Nick (Cambridge University)
Mazzeo, Rafe (Stanford University)
Nakajima, Hiraku (Kyoto University)
Rayan, Steven (University of Saskatchewan)
Rochon, Frédéric (Université du Québec à Montréal)
Romao, Nuno (Universität Augsburg)
Royston, Andy (Texas A&M)
Schaposnik, Laura (University of Illinois Chicago)
Schroers, Bernd (Heriot-Watt University)
Singer, Michael (University College London)
Stern, Mark (Duke University)
Swoboda, Jan (Ludwig-Maximilians Universität)
Weiss, Hartmut (University of Kiel)
Wendland, Katrin (Albert-Ludwigs-Universität Freiburg)
Zhu, Xuwen (Stanford University)

Future Targets in the Classification Program for Amenable C^* -Algebras

September 3 - 8, 2017

Organizers:

Aaron Tikuisis (University of Aberdeen)
Zhuang Niu (University of Wyoming)

George Elliott (University of Toronto)



C^* -algebras are mathematical objects that originally arose in quantum physics. Beyond these origins, C^* -algebra theory gained stature as it was quickly realized that C^* -algebras can encode key information about other mathematical objects, such as symmetries, networks, large data sets, and time-evolving systems. These constructions follow a common pattern: a mathematical object (such as a group of symmetries) is input and a C^* -algebra is output. They suggest an important problem: what do properties of the output C^* -algebra tell us about the input mathematical object? This workshop focused on a program that systematically answers this question: the classification of C^* -algebras. The overarching objective of this program was to identify computable data about C^* -algebras, that is sufficiently rich to tell when two differently-constructed C^* -algebras are, in fact, the same. This has been a sustained, intensive research project over the last twenty years, and the workshop has taken particular advantage of exceptional breakthroughs made in the past years.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5127>

Participants:

an Huef, Astrid (Victoria University of Wellington)
Blackadar, Bruce (University of Nevada at Reno)
Brenken, Berndt (University of Calgary)
Carrión, José (Texas Christian University)
Dadarlat, Marius (Purdue University)
Deeley, Robin (University of Hawaii)
Eckhardt, Caleb (Miami University)
Eilers, Soren (University of Copenhagen)
Elliott, George (University of Toronto)
Evington, Samuel (University of Glasgow)
Farah, Ilijas (York University)
Gabe, Jamie (University of Southampton)
Gardella, Eusebio (Muenster)
Geffen, Shirly (Ben Gurion University)
Giordano, Thierry (University of Ottawa)
Gong, Guihua (University of Puerto Rico)
Hirshberg, Ilan (Ben Gurion University of the Negev)
Ivanescu, Cristian (MacEwan University)
Jacelon, Bhishan (University of Toronto)
Katsura, Takeshi (Keio University)
Kennedy, Matthew (University of Waterloo)
Lee, Hyun Ho (University of Ulsan)
Li, Xin (Queen Mary University of London)
Li, Kang (Westfälische Wilhelms-Universität Münster)

Lin, Huaxin (University of Oregon)
Lutley, James (University of Toronto)
Musat, Magdalena (University of Copenhagen)
Ng, Ping Wong (University of Louisiana at Lafayette)
Niu, Zhuang (University of Wyoming)
Perera, Francesc (Universitat Autònoma de Barcelona)
Phillips, N. Christopher (University of Oregon)
Putnam, Ian (University of Victoria)
Robert, Leonel (University of Louisiana at Lafayette)
Rordam, Mikael (University of Copenhagen)
Sato, Yasuhiko (Kyoto University)
Schafhauser, Chris (University of Waterloo)
Skau, Christian (NTNU - Trondheim - Norway)
Strung, Karen (Polish Academy of Sciences)
Szabó, Gábor (University of Aberdeen)
Thiel, Hannes (University of Münster)
Tikuisis, Aaron (University of Ottawa)
Toms, Andrew (Purdue University)
Viola, Maria Grazia (Lakehead University)
Wang, Qingyun (University of Oregon)
White, Stuart (University of Glasgow)
Winter, Wilhelm (Munster)
Wu, Jianchao (Penn State University)
Zacharias, Joachim (University of Glasgow)

Photonic Topological Insulators

September 10 -15, 2017

Organizers:

Mikael Rechtsman (Pennsylvania State University)
Michael Weinstein (Columbia University)

Marin Soljacic (Massachusetts Institute of Technology)



The goal of the workshop was to bring together the leading researchers in the fields of photonic topological insulators and mathematical research in topology, analysis, and partial differential equations, in order to stimulate new insights and advances in the field of topological photonics, a field which spans questions of deep interest to the mathematics community, as well as to the applied and fundamental physics. We also brought together graduate students from these usually disparate fields in a highly interdisciplinary setting. This enabled mathematics students to learn about the possibilities and limitations of available experimental techniques, and spurred conversations about known theory that could lead to new experiments. There was a large tutorial component to the workshop to better facilitate understanding and discussion between fields.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5144>

Participants:

Ablowitz, Mark (University of Colorado, Boulder)
Alu, Andrea (The University of Texas at Austin)
Anlage, Steven (University of Maryland)
Bahl, Gaurav (University of Illinois at Urbana-Champaign)
Bandres, Miguel (Technion)
Benalcazar, Wladimir (University of Illinois at Urbana-Champaign)
Buljan, Hrvoje (Faculty of Science, University of Zagreb)
Carusotto, Iacopo (INO-CNR BEC Center)
Cerjan, Alexander (Penn State Univ)
Chong, Yidong (NTU-Singapore)
Cole, Justin (University of Colorado, Boulder)
Fefferman, Charles (Princeton University)
Guglielmon, Jonathan (PSU)
Hafezi, Mohammad (Joint Quantum Institute)
Hu, Xiao (National Institute for Materials Science)
Huber, Sebastian (ETH)
Irvine, William (University of Chicago)
Keller, Rachael Tara (Columbia University)
Khanikaev, Alexander (City College of New York)
Lein, Max (Tohoku University)

Levy, Eli (Rafael, Technion)
Lindner, Nate (Technion)
Loring, Terry (University of New Mexico)
Lu, Ling (Chinese Academy of Sciences)
Marquardt, Florian (FAU Erlangen-Nuremberg)
Mechelen, Todd F Van (Purdue)
Mortessagne, Fabrice (Université Côte d'Azur)
Noh, Jiho (PSU)
Ohberg, Patrick (Heriot-Watt University)
Ozawa, Tomoki (INO-CNR BEC Center)
Price, Hannah (INO-CNR BEC Center and University of Trento)
Prodan, Emil (Yeshiva University)
Rechtsman, Mikael (Pennsylvania State University)
Refael, Gil (California Institute of Technology)
St-Jean, Philippe (CNRS - Université Paris-Sud)
Vitelli, Vincenzo (Leiden University)
Wang, Zheng (the University of Texas at Austin)
Watson, Alexander (Duke)
Weinstein, Michael (Columbia University)
Zhen, Bo (MIT)
Zhu, Yi (Tsinghua University)
Zilberberg, Oded (ETH)

Lattice walks at the Interface of Algebra, Analysis and Combinatorics

September 17 - 22, 2017

Organizers:

Marni Mishna (Simon Fraser University)
Mireille Bousquet-Mélou (Université de Bordeaux/
Centre national de la recherche scientifique)

Michael Singer (North Carolina State University)
Stephen Melczer (University of Waterloo & ENS
Lyon)



Many physical phenomena are accurately modelled by walks on lattices, particularly those restricted between boundaries. Recent examples include polymers and queueing models. A deep understanding of the factors which influence the large scale behaviour of these models is essential to guide how to best design them. The functions which track the number of walks of a fixed length in a given model are key to this understanding, and turn out to be fascinating in their own right. Indeed, the study of lattice path models has intrigued researchers from combinatorics, probability, computer algebra, and differential/difference algebra. Lattice path models are an excellent testing ground for mathematical ideas, and techniques. This workshop brought together representatives from these different communities to answer longstanding conjectures, learn each other's techniques and to plan the directions for the future.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5090>

Participants:

Adamczewski, Boris (Institu Camille Jordan & CNRS)
Arreche, Carlos (The University of Texas at Dallas)
Bagherzadeh, Fatemeh (University of Saskatchewan)
Banderier, Cyril (Paris 13 University)
Bell, Jason (University of Waterloo)
Bona, Miklos (University of Florida)
Bostan, Alin (INRIA)
Budd, Timothy (Université Paris-Saclay)
Chen, Shaoshi (Chinese Academy of Sciences)
Chyzak, Frederic (INRIA)
Corteel, Sylvie (CNRS)
Courtial, Julien (Université de Caenn)
Di Vizio, Lucia (Université de Versailles-St Quentin)
Dreyfus, Thomas (Université Lyon 1)
Drmot, Michael (Technische Universitaet Wien)
Gessel, Ira (Brandeis University)
Greenwood, Torin (Georgia Institute of Technology)
Guo, John (Simon Fraser University)
Guttmann, Tony (University of Melbourne)
Hardouin, Charlotte (Institut de mathématiques de Toulouse)

Huang, Hui (Johannes Kepler University Linz)
Kauers, Manuel (Johannes Kepler University)
Koutschan, Christoph (Austrian Academy of Sciences)
Krattenthaler, Christian (University of Vienna)
Labahn, George (University of Waterloo)
Lipshitz, Leonard (Purdue University)
Melczer, Stephen (University of Waterloo & ENS Lyon)
Mishna, Marni (Simon Fraser University)
Owczarek, Aleks (The University of Melbourne)
Pak, Igor (University of California Los Angeles)
Prelberg, Thomas (Queen Mary University of London)
Raschel, Kilian (CNRS / Université de Tours)
Rechnitzer, Andrew (University of British Columbia)
Salvy, Bruno (INRIA)
Simon, Samuel (Simon Fraser University)
Singer, Michael (North Carolina State University)
Tevlin, Lenny (New York University)
Trotignon, Amelie (Université de Tours)
Wallner, Michael (TU Wien)
Wilson, Mark (University of Auckland)

Symmetries of Surfaces, Maps and Dessins

September 24 - 29, 2017

Organizers:

Marston Conder (University of Auckland)
Thomas Tucker (Colgate University)
Gabino González-Diez (Universidad Autónoma de Madrid)

Nigel Boston (University of Wisconsin at Madison)
Gareth Jones (University of Southampton)



Symmetry pervades nature and science, and mathematics provides means for its study. This workshop concerned the symmetry of discrete objects, especially those resulting from embedding a combinatorial graph/network on a surface. The study of such objects dates back to the ancient Greeks (and the so-called Platonic solids), and recent advances in mathematics have made it possible to progress their study in various directions. The main objective of this workshop was to bring together leading and emerging researchers in the area of study of actions of discrete groups on Riemann and Klein surfaces and algebraic curves, and related topics such as symmetric embeddings of graphs and dessins d'enfants on surfaces. It followed up on a meeting held at the CIEM in Spain in 2010.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5162>

Participants:

Anderson, James (University of Southampton)
Breda d'Azevedo, Antonio (University of Aveiro)
Broughton, Allen (Rose Hulman Institute of Technology)
Bujalance Garcia, Emilio (The National Distance Education University)
Camacho, Charles (Oregon State University)
Carvacho, Mariela (UTFSM Valparaiso)
Cirre Torres, Francisco Javier (Universidad Nacional de Educación a Distancia)
Conder, Marston (University of Auckland)
Du, Shaofei (Capital Normal University)
Gilman, Jane (Rutgers University-Newark)
Girondo, Ernesto (Universidad Autónoma de Madrid)
González-Diez, Gabino (Universidad Autónoma de Madrid)
Gromadzki, Grzegorz (University of Gdansk)
Ivic Weiss, Asia (York University)
Izquierdo, Milagros (University of Linköping)
Jajcay, Robert (Comenius University Bratislava)
Kwon, Young Soo (Yeungnam University)

Leemans, Dimitri (Université Libre de Bruxelles)
Lo, Stephen (University of Auckland)
Magaard, Kay (University Birmingham)
Marion, Claude (Università degli Studi di Padova)
Monien, Hartmut (Universität Bonn)
Morris, Joy (University of Lethbridge)
Nedela, Roman (University of West Bohemia)
Paulhus, Jen (Grinnell College)
Siran, Jozef (Open University)
Skoviera, Martin (Comenius University Bratislava)
Stokes, Klara (University of Skovde)
Torres, David (University of Saarbrücken)
Tucker, Thomas (Colgate University)
Vdovina, Alina (Newcastle University)
Voight, John (Dartmouth College)
Weaver, Anthony (Bronx Community College CUNY)
Wilson, Steve (Northern Arizona University)
Winarski, Becca (University of Wisconsin-Milwaukee)
Wootton, Aaron (University of Portland, USA)
Zvonkin, Alexander (Université de Bordeaux)

***p*-adic Cohomology and Arithmetic Applications**

October 1 - 6, 2017

Organizers:

Ambrus Pal (Imperial College London)
Kiran Kedlaya (University of California, San Diego)
Christopher Lazda (Universita di Padova)

Tomoyuki Abe (Kavli Institute for the Physics and Mathematics of the Universe)



The subject of the conference, p -adic cohomology, is a perfect example of the sort of synthesis in pure mathematics which has been dominating the subject in its most modern period. It is the study of rather discrete objects, systems of polynomial congruences, using methods of analysis, the theory of continuous change, while the language of the subject is topology, a modern area of mathematics developed to study properties of geometric objects which do not change under deformations or distortions. In its goals the area has been brilliantly successful: for example it was used as a key ingredient in the proof of Fermat's last theorem, and it is continued to be used in the subject which provided the proof for this famous old conjecture, namely the Langlands program.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5118>

Participants:

Abe, Tomoyuki (Kavli Institute for the Physics and Mathematics of the Universe)

Balakrishnan, Jennifer (Boston University)

Baldassarri, Francesco (Universita Degli Studi di Padova)

Bellovin, Rebecca (Imperial College London)

Boeckle, Gebhard (Universität Heidelberg)

Costa, Edgar (Dartmouth College)

Crew, Richard (University of Florida)

Dan-Cohen, Ishai (Ben Gurion University of the Negev)

Di Proietto, Valentina (University of Exeter)

Ertl, Veronika (University Regensburg)

Esnault, H el ene (Freie Universit at Berlin)

Gregory, Oliver (Technische Universit at M unchen)

Hansen, David (Columbia University)

Hesselholt, Lars (Nagoya University)

Huyghe, Christine (IRMA Universite de Strasbourg)

Kedlaya, Kiran (University of California, San Diego)

Kobayashi, Shinichi (Kyushu University)

Kramer-Miller, Joe (University College London)

Langer, Andreas (University of Exeter)

Lazda, Christopher (Universita di Padova)

Le Stum, Bernard (IRMAR Universite de Rennes I)

Liu, Ruochuan (Peking University)

Marmora, Adriano (IRMA Universite de Strasbourg)

Moon, Yong Suk (Purdue University)

Niziol, Wieslawa (ENS Lyon)

Orlik, Sascha (Universitat Wuppertal)

Pal, Ambrus (Imperial College London)

Pulita, Andrea (Institut Fourier)

Shankar, Ananth (MIT)

Shiho, Atsushi (University of Tokyo)

Strauch, Matthias (Indiana University)

Taelman, Lenny (Universiteit van Amsterdam)

Vlasenko, Masha (Institute of Mathematics of the Polish Academy of Sciences)

Zhu, Xinwen (Caltech)

Ziegler, Paul (University of Oxford)

Zureick-Brown, David (Emory University)

Computational Uncertainty Quantification

October 8 - 13, 2017

Organizers:

Serge Prudhomme (École Polytechnique de Montréal)
Mohammad Motamed (University of New Mexico)

Roger Ghanem (University of Southern California)
Raúl Tempone (King Abdullah University of Sciences and Technology)



The overall objective of the workshop will be to address the theoretical and computational foundations of UQ methods for complex systems arising in science and engineering. Specific objectives were concerned with the following issues:

1. How to characterize uncertainty, particularly when available measurements and data are scarce and lack accuracy?
2. How to propagate uncertainty in problems where quantities of interest lack regularity with respect to the input parameters?
3. How to treat inverse problems in settings that feature high-dimensional parameter spaces and computationally expensive forward models?

These questions describe challenging computational and analytical problems.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5072>

Participants:

Appelo, Daniel (University of New Mexico)
Bal, Guillaume (University of Chicago)
Beck, Joakim (King Abdullah University of Science and Technology)
Chen, Jianbing (Tongji University)
Constantine, Paul (Colorado School of Mines)
Cottreau, Régis (CNRS - CentraleSupélec)
Das, Sonjoy (SUNY - Buffalo)
Doostan, Alireza (University of Colorado)
Eldred, Michael (Sandia National Laboratories)
Gabriela, Malenova (Royal Institute of Technology)
Ghattas, Omar (The University of Texas at Austin)
Haji-Ali, Abdul-Lateef (Oxford University)
Hoel, Håkon (EPFL)
Jin, Shi (University of Wisconsin-Madison)
Kergrene, Kenan (Ecole Polytechnique de Montréal)
Knio, Omar (King Abdullah University of Science and Technology)
Law, Kody (Oak Ridge National Laboratory)
Le Bris, Claude (Ecole Nationale des Ponts et Chaussées)
Le Maître, Olivier (Centre National de la Recherche Scientifique)
Liu, Liu (University of Texas-Austin)

Marzouk, Youssef (Massachusetts Institute of Technology)
Meidani, Hadi (University of Illinois at Urbana-Champaign)
Morrison, Rebecca (MIT)
Motamed, Mohammad (University of New Mexico)
Nair, Prasanth (University of Toronto)
Najm, Habib (Sandia National Laboratories)
Nobile, Fabio (Ecole Polytechnique Fédéral de Lausanne)
Nouy, Anthony (Ecole Centrale de Nantes)
Patra, Abani (University at Buffalo)
Prudhomme, Serge (École Polytechnique de Montréal)
Rieger, Christian (Bonn University)
Runborg, Olof (KTH)
Tamellini, Lorenzo (CNR-IMATI Pavia)
Tempone, Raúl (King Abdullah University of Sciences and Technology)
Terejanu, Gabriel (University of South Carolina)
Wildef, Tim (Sandia National Laboratories)
Wolfers, Sören (King Abdullah University of Science and Technology)
Zahm, Olivier (MIT)

New Perspectives in Representation Theory of Finite Groups

October 15 - 20, 2017

Organizers:

Pham Tiep (University of Arizona)

Gunter Malle (Technische Universität Kaiserslautern)

Gabriel Navarro (Universidad de Valencia)

Britta Späth (Bergische Universität Wuppertal)



In this meeting discussed recent breakthrough results on deep global-local conjectures as well as new research directions in representation theory of finite groups that opened up in the past few years. The meeting brought together the leading experts on the representation theory of abstract finite groups as well as of finite reductive groups to exploit the substantial advances on these fundamental old and new conjectures. The recent progress in our field has attracted a number of young researchers to this area. The conference provided them with a unique opportunity to learn more about the current exciting developments and become directly involved in this fast moving area of research.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5003>

Participants:

Boltje, Robert (University of California, Santa Cruz)

Bonnafé, Cédric (Université Montpellier)

Broué, Michel (Université Paris Diderot)

Brough, Julian (Bergische Universität)

Brunat, Olivier (Université Paris Diderot)

Cabanes, Marc (Université Paris Diderot)

Chaneb, Reda (Université Paris Diderot)

Craven, David (University of Birmingham)

Danz, Susanne (Catholic University of Eichstaett-Ingolstadt)

Eaton, Charles (University of Manchester)

Farrell, Niamh (City University London)

Fong, Paul (University of Illinois at Chicago)

Giannelli, Eugenio (TU Kaiserslautern)

Gramain, Jean-Baptiste (University of Aberdeen)

Grodal, Jesper (University of Copenhagen)

Halasi, Zoltan (Eötvös Loránd University)

Hiss, Gerhard (RWTH Aachen University)

Hollenbach, Ruwen (TU Kaiserslautern)

Klupsch, Matthias (RWTH Aachen)

Koshitani, Shigeo (Chiba University)

Külshammer, Burkhard (University of Jena)

Lassueur, Caroline (TU Kaiserslautern)

Lübeck, Frank (RWTH Aachen)

Malle, Gunter (Technische Universität Kaiserslautern)

Maróti, Attila (Alfréd Rényi Institute of Mathematics)

Navarro, Gabriel (Universidad de Valencia)

Nguyen, Hung (University of Akron)

Paolini, Alessandro (TU Kaiserslautern)

Rizo Carrión, Noelia (Universitat de València)

Rossi, Dan (University of Arizona)

Rouquier, Raphael (University of California at Los Angeles)

Ruhstorfer, Lucas (Bergische Universität Wuppertal)

Sambale, Benjamin (TU Kaiserslautern)

Schaeffer Fry, Amanda (Metropolitan State University of Denver)

Späth, Britta (Bergische Universität Wuppertal)

Taylor, Jay (University of Arizona)

Tent, Joan (Universitat de València)

Tiep, Pham (University of Arizona)

Trefethen, Stephen (College of William and Mary)

Turull, Alexandre (University of Florida)

Vallejo, Carolina (ICMAT)

Zhang, Jiping (Peking University)

Stochastic Analysis and its Applications

October 22 - 27, 2017

Organizers:

Zhen-Qing Chen (University of Washington)
Ed Perkins (University of British Columbia)

Jeremy Quastel (University of Toronto)



Stochastic analysis, at one end, has branched into a number of specific fields, often inspired by scientific applications. At the other end, it consists of a collection of methods underpinning all other uses and developments in the field. Some of the best known and most active specific areas of stochastic analysis include stochastic partial differential equations (SPDE), Gaussian free fields and Schramm-Lowner Evolution (SLE), random matrices, rough path theory and Black-Scholes theory in mathematical finance. The scientific goal of the workshop was to bring together top experts in stochastic analysis representing its various branches, with the common theme of developing new foundational methods and their applications to specific areas of probability. We stressed geographic diversity and also invited some of the most promising junior mathematicians.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5119>

Participants:

Atar, Rami (Technion)
Athreya, Siva (Indian Statistical Institute Bangalore Centre)
Banuelos, Rodrigo (Purdue University)
Barlow, Martin (University of British Columbia)
Bass, Richard (University of Connecticut)
Berestycki, Nathanael (University of Cambridge)
Bogdan, Krzysztof (Wroclaw University of Science and Technology)
Burdzy, Krzysztof (University of Washington)
Cerrai, Sandra (University of Maryland)
Chen, Zhen-Qing (University of Washington)
Chen, Yu-Ting (University of Tennessee)
Cranston, Michael (UC Irvine)
Deuschel, Jean-Dominique (Technische Universitat Berlin)
Evans, Steve (University of California, Berkeley)
Fan, Wai-Tong (Louis) (University of Wisconsin-Madison)
Funaki, Tadahisa (University of Tokyo)
Greenwood, Priscilla (University of British Columbia)
Hairer, Martin (Imperial College)
Kaspi, Haya (Technion)
Kim, Panki (Seoul National University)

Kulczycki, Tadeusz (Wroclaw University of Science and Technology)
Kumagai, Takashi (RIMS Kyoto)
Lawler, Greg (University of Chicago)
Le Gall, Jean-Francois (Université Paris-Sud, Orsay)
Li, Xue-Mei (Imperial College)
Ma, Zhi-Ming (Chinese Academy of Science)
Mueller, Carl (University of Rochester)
Mytnik, Inna (Technion)
Nualart, David (University of Kansas)
Pal, Soumik (University of Washington)
Peres, Yuval (Microsoft Research)
Perkins, Ed (University of British Columbia)
Ramanan, Kavita (Brown University)
Salisbury, Tom (York University)
Sanz-Solé, Marta (Universitat de Barcelona)
Sturm, Karl-Theodor (University of Bonn)
Swanson, Jason (University of Central Florida)
Toth, Balint (University of Bristol)
Wang, Jian (Fujian Normal University)
Williams, Ruth (University of California-San Diego)
Zeitouni, Ofer (Weizmann)
Zheng, Tianyi (UCSD)

Automorphic Forms, Mock Modular Forms and String Theory

October 29 - November 3, 2017

Organizers:

Daniel Persson (Chalmers University of Technology)

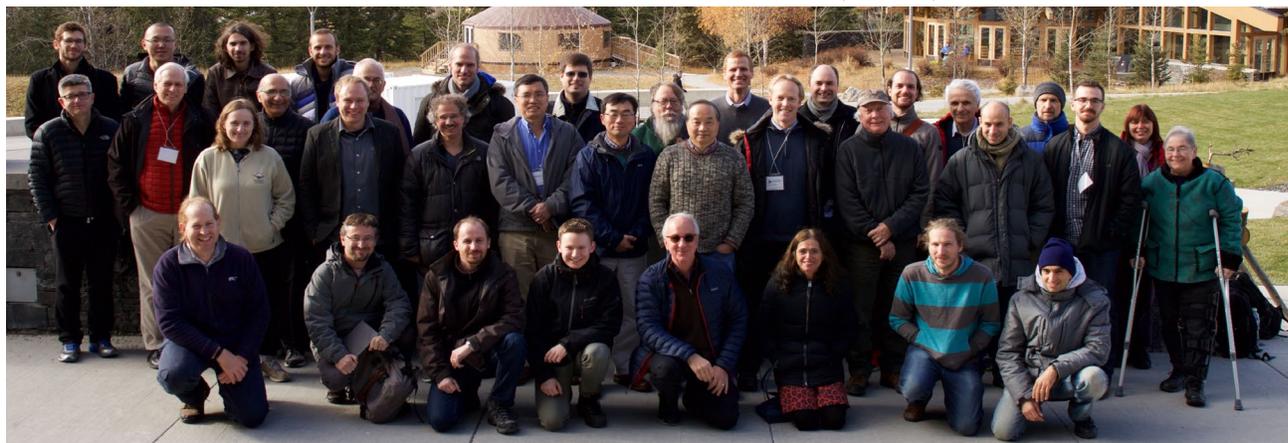
Terry Gannon (University of Alberta)

David Ginzburg (Tel Aviv University)

Axel Kleinschmidt (Max Planck Institute for Gravitational Physics)

Stephen Miller (Rutgers University)

Boris Pioline (LPTHE)



This workshop aimed to investigate various occurrences of huge and beautiful symmetries that appear in different parts of physics and mathematics. The intriguing fact is that the same type of symmetries show up in seemingly unrelated areas and understanding why this is so is a matter of intense research which involves a very fruitful exchange of ideas and perspectives at the borderland between physics and mathematics. The main objective of this workshop was to gather physicists and mathematicians working on automorphic forms, mock modular forms, black holes and moonshine in an effort to foster cross-fertilisations between these different fields. This meeting was dedicated to stimulating the exchange of ideas and perspectives coming from these seemingly disparate fields.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5097>

Participants:

Berg, Marcus (Karlstad University)

Bossard, Guillaume (Polytechnique, CNRS)

Braverman, Alexander (University of Toronto)

Brubaker, Benjamin (University of Minnesota)

Bump, Daniel (Stanford University)

Cosnier-Horeau, Charles (Jussieu Paris 6)

Creutzig, Thomas (University of Alberta)

D'Hoker, Eric (UCLA)

Friedberg, Solomon (Boston College)

Fuchs, Jürgen (Karlstad University)

Gannon, Terry (University of Alberta)

Garland, Howard (Yale University)

Gerken, Jan (Max-Planck Institute for Gravitational Physics, Potsdam)

Gourevitch, Dmitry (Weizmann Institute of Science)

Green, Michael (Cambridge University)

Gurevich, Nadya (Ben Gurion University)

Gustafsson, Henrik (Chalmers University of Technology)

Harvey, Jeff (University of Chicago)

Hohenegger, Stefan (Université Claude Bernard Lyon 1)

Jiang, Dihua (University of Minnesota)

Keller, Christoph (ETH Zürich)

Kim, Henry (Toronto)

Kleinschmidt, Axel (Max Planck Institute for Gravitational Physics)

Kudla, Stephen (University of Toronto)

Lee, Kyu-Hwan (University of Connecticut)

Leslie, Spencer (Boston College)

Nicolai, Hermann (AEI Potsdam)

Patnaik, Manish (University of Alberta)

Persson, Daniel (Chalmers University of Technology)

Pioline, Boris (LPTHE)

Raum, Martin (Chalmers University of Technology)

Sahi, Siddhartha (Rutgers University)

Savin, Gordan (Utah University)

Sayag, Eitan (Ben Gurion U)

Segal, Avner (UBC)

Speh, Birgit (Cornell university)

Tourkine, Piotr (University of Cambridge)

Vigneras, Marie-France (Jussieu Paris 6)

Volpato, Roberto (Padua University)

Wendland, Katrin (Albert-Ludwigs-Universität Freiburg)

Zhang, Zhuohui (Rutgers)

Forest and Wildland Fire Management: a Risk Management Perspective

November 5 - 10, 2017

Organizers:

Douglas Woolford (University of Western Ontario)
David Martell (University of Toronto)
Frederic Schoenberg (University of California, Los Angeles)

David Brillinger (University of California-Berkeley)
Mike Wotton (Canadian Forest Service)



Fire management agencies have the difficult task of addressing two competing concerns: the importance of fire from an ecological perspective and the danger of fire from a human perspective. Faced with the need to deliver “the right amount of right fire at the right place at the right time at the right cost”, forest fire managers must make difficult decisions on a regular basis. This workshop addressed fire management decision making from an operations research perspective. It provided a forum for decision makers in fire management agencies to form tangible working relationships with ecologists, fire scientists, industrial engineers, mathematical modellers and statisticians. The objective of the workshop was to bring together researchers and end-users from a variety of disciplines (e.g., operations research, statistics, actuarial science, mathematics, computer science, forestry and the environmental and health sciences) to provide a forum to discuss fire management needs and to initiate interdisciplinary team-based collaborations aimed at addressing important problems in forest fire management.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5145>

Participants:

Albert-Green, Alisha (University of Toronto)
Becker, Devan (University of Western Ontario)
Beverly, Jennifer (University of Alberta)
Born, Wally (Alberta Agriculture and Forestry)
Braun, John (University of British Columbia)
Cary, Geoff (The Australian National University)
Cole, Bill (Ontario Ministry of Natural Resources & Forestry)
Crowley, Mark (University of Waterloo)
Cumming, Steve (Universite Laval)
Daniels, Lori (University of British Columbia)
Davison, Matt (University of Western Ontario)
Evans, Jordan (Ontario Ministry of Natural Resources & Forestry)
Falcao, Tony (BC Wildfire Service)
Flannigan, Mike (University of Alberta)
Fried, Jeremy (Pacific Northwest Research Station)
James, Patrick (Université de Montréal)
Kruus, Rob (Saskatchewan MNR)
Larson, Kate (University of Waterloo)
Martell, David (University of Toronto)
McAlpine, Rob (Ontario Ministry of Natural Resources)

McFayden, Colin (Ontario Ministry of Natural Resources & Forestry)
McLoughlin, Neal (Government of Alberta)
Moore, Brett (Alberta Agriculture & Forestry)
Park, Jane (Parks Canada)
Podur, Justin (York University)
Rönnqvist, Mikael (Laval University)
Schoenberg, Frederic (University of California, Los Angeles)
Taylor, Steve (Simon Fraser University)
Thompson, Matthew (United States Forest Service)
Thompson, John (University of Western Ontario)
Thomson, Trevor (Simon Fraser University)
Tithecott, Al (Tithecott Management Services)
Tymstra, Cordy (Sustainable Resource Development)
Vega-Garcia, Cristina (University of Lleida)
Wang, Xianli (Canadian Forest Service)
Wei, Yu (Colorado State University)
Whitman, Ellen (University of Alberta)
Wotton, Mike (Canadian Forest Service)
Xi, Dexen (Western University)
Xiong, Yi (Simon Fraser University)

Approximation Algorithms and the Hardness of Approximation

November 12 - 17, 2017

Organizers:

Mohammad R. Salavatipour (University of Alberta)
Julia Chuzhoy (Toyota Technological Institute at Chicago)
Jochen Koenemann (University of Waterloo)

David Williamson (Cornell University)
Nisheeth Vishnoi (École Polytechnique Fédérale de Lausanne)



Over the last few years, there has been remarkable progress on several special cases of the TSP and on some closely related problems. Many of these advances are introducing new and very interesting connections between different areas such as probability, structural graph theory, coupled with technically difficult yet powerful new methods such as interlacing families of polynomials. The goal of the workshop was to focus on a few key topics that could lead to deep new results in the areas of approximation algorithms, combinatorial optimization, hardness of approximation, and proof complexity.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5133>

Participants:

An, Hyung-Chan (Yonsei University)
Blumenstock, Markus (Johannes Gutenberg University Mainz)
Chalermsook, Parinya (Aalto University)
Chawla, Shuchi (University of Wisconsin-Madison)
Cheriyán, Joseph (University of Waterloo)
Dinitz, Michael (Johns Hopkins University)
Ene, Alina (Boston University)
Feige, Uriel (Weizmann Institute)
Friggstad, Zachary (University of Alberta)
Goemans, Michel (Massachusetts Institute of Technology)
Grandoni, Fabrizio (IDSIA, University of Lugano)
Gupta, Anupam (Carnegie Mellon University)
Gutekunst, Sam (Cornell University)
Hopkins, Samuel (Cornell University)
Khodamoradi, Kamyar (University of Alberta)
Koenemann, Jochen (University of Waterloo)
Koh, Cedric (University of Waterloo)
Laekhanukit, Bundit (Simons Institute for the Theory of Computing & Shanghai University of Finance and Economics)
Lau, Lap Chi (University of Waterloo)
Lee, James (University of Washington)
Lee, Euiwoong (Simons Institute)

Mahboub, Maryam (U. of Alberta)
Makarychev, Konstantin (Northwestern University)
Makarychev, Yury (Toyota Technological Institute at Chicago)
Megow, Nicole (University of Bremen)
Nagarajan, Viswanath (University of Michigan)
Naor, Seffi (Technion)
Nimavat, Rachit (Toyota Technological Institute at Chicago)
Oveis Gharan, Shayan (University of Washington)
Paul, Alice (Brown University)
Rahgoshay, Mirmahdi (University of Alberta)
Saberi, Amin (Stanford University, USA)
Salavatipour, Mohammad R. (University of Alberta)
Sanita, Laura (University of Waterloo)
Schramm, Tselil (Simons Institute/UC Berkeley)
Shmoys, David B. (Cornell University)
Swamy, Chaitanya (University of Waterloo)
Trevisan, Luca (U.C. Berkeley)
Tulsiani, Madhur (Toyota Technological Institute at Chicago)
Vijayaraghavan, Aravindan (Northwestern University)
Wiese, Andreas (U. of Chile)
Zenklusen, Rico (ETH Zurich)

Nonlinear and Stochastic Problems in Atmospheric and Oceanic Prediction

November 19 - 24, 2017

Organizers:

Youmin Tang (University of Northern British Columbia)

Adam Monahan (University of Victoria)

Shouhong Wang (Indiana University)

Wansuo Duan (Chinese Academy of Sciences)



The nonlinear and stochastic methods have been widely applied in the atmospheric and oceanic sciences, and play a fundamental role in improving the atmospheric and oceanic prediction skill. However, some important issues, which are highly related to nonlinear and stochastic methods, still remain and are challenging to the prediction community. This broadly interdisciplinary workshop brought together researchers from mathematics / Statistics, and environmental scientists from Atmospheric Science, Oceanography, and Climate Science. The synergistic workshop explored prediction problems, which will benefit from the application of nonlinear and stochastic methods, and the development of new nonlinear and stochastic methods to address the unique needs of various challenges in atmospheric and oceanic predictions.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5061>

Participants:

Chen, Nan (New York University)

Delsole, Timothy (George Mason U.)

Demirov, Entcho (Memorial University)

Ding, Ruiqiang (Institute of Atmospheric Physics, Chinese Academy of Sciences)

Duan, Wansuo (Chinese Academy of Sciences)

Frediani, Maria E. B. (University of British Columbia)

Herbert, Corentin (Ecole Normale Supérieure de Lyon)

Hsia, Chun-Hsiung (National Taiwan University)

Islam, Siraj ul (University of Northern British Columbia)

Kieu, Chanh (Indiana University)

Kwasniok, Frank (University of Exeter)

Li, Jianping (Beijing normal university)

Lin, Hai (Environment and Climate Change Canada)

Liu, Ting (Second Institute of Oceanography)

Lu, Fei (Johns Hopkins University)

Mao, Yiwen (University of Victoria)

Monahan, Adam (University of Victoria)

Pimentel, Sam (Trinity Western University)

Shen, Zheqi (Second Institute of Oceanography)

Straub, David (McGill University)

Subramanian, Aneesh (University of California, San Diego)

Sun, Guodong (Chinese Academy of Sciences)

Tang, Youmin (University of Northern British Columbia)

Wang, Shouhong (Indiana University)

Wang, Xiaoming (Florida State Uni. & Fudan Uni.)

Zhang, Shaoqing (Ocean University of China)

Zheng, Fei (Chinese Academy of Sciences)

Partial Order in Materials: at the Triple Point of Mathematics, Physics and Applications

November 26 - December 1, 2017

Organizers:

Apala Majumdar (University of Bath)
Jeff Z. Y. Chen (University of Waterloo)

Changyou Wang (Purdue University)
Pingwen Zhang (Peking University)



The theory, analysis, simulations and applications of partially ordered materials constitute novel, thriving and somewhat disconnected research fields in their own right. The lack of effective connections stems from the fact that different research communities in mathematics, physics and computational chemistry have different approaches to similar problems and the approach strongly relies on the scale and scope of the problem. The workshop aims resonated with the aims of Banff as an excellent venue to host groups of researchers who do not ordinarily meet at workshops and meetings. The organizers asked the experimentalists to give an overview of some modern experiments on liquid crystals, colloidal suspensions and new materials, including details on the design and fabrication, the experimental predictions and experimental limitations and the big future challenges.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5059>

Participants:

Aarts, Dirk (University of Oxford)
Ball, John (University of Oxford)
Barchiesi, Marco (Università di Napoli Federico II)
Braun, Julian (University of Warwick)
Brown, Cora (University of Minnesota)
Calderer, Carme (University of Minnesota)
Canevari, Giacomo (University of Oxford)
Cawte, Joel (University of Bath)
Chen, Jeff Z. Y. (University of Waterloo)
De Anna, Francesco (The Penn State University)
Earls, Ashley (University of Minnesota)
Fang, Lidong (Shanghai Jiao Tong University)
Fei, Mingwen (Anhui Normal University)
Giorgi, Tiziana (New Mexico State University)
Harris, Joseph (University of Bath)
Lavrentovich, Oleg (Kent State University)
Majumdar, Apala (University of Bath)

Park, Jinhae (Chungnam National University)
Phan, Tuoc (University of Tennessee)
Phillips, Daniel (Purdue University)
Rolls, Edward (University of Oxford)
Stroffolini, Bianca (Università degli Studi di Napoli Federico II)
Wang, Changyou (Purdue University)
Wang, Yiwei (Peking University)
Wang, Dehua (University of Pittsburgh)
Xu, Jie (Purdue University)
Xu, Xianmin (Chinese Academy of Sciences)
Yu, Yong (The Chinese University of Hong Kong)
Zhang, Pingwen (Peking University)
Zhang, Hui (Beijing Normal University)
Zhang, Zhifei (Peking University)
Zhang, Rongfang (University of Pittsburgh)

Inferential Challenges for Large Spatio-Temporal Data Structures

December 3 - 8, 2017

Organizers:

John Braun (University of British Columbia)
Patrick Brown (University of Toronto)

Charmaine Dean (Western University)
Jamie Stafford (University of Toronto)



A range of inference methodologies are in use for spatio-temporal data, and the complexity and nature of each problem dictates the nature of the methodology used. The high dimensionality of spatio-temporal data often means inference methodologies exhibit a combination of model simplifications, approximations of estimators and likelihood functions, and/or computational and algorithmic efficiencies. Unlike many other 'big data' problems, however, an understanding of the physical properties of the spatio-temporal process in question often enables many simplifying assumptions to be made which lead to convenient and enabling mathematical properties (i.e. Markov property, stationarity, various forms of conditional independence). The workshop was comprised of talks in the following four broad areas, with talks having a common emphasis on computational tractability and an accommodation of large, high resolution spatio-temporal datasets. Interactions with subject-area specialists in some of the application areas also featured prominently in the workshop, through presentations, but also through panel discussions and roundtables.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5153>

Participants:

Albert-Green, Alisha (University of Toronto)
Becker, Devan (University of Western Ontario)
Braun, John (University of British Columbia)
Brown, Patrick (University of Toronto)
Coeurjolly, Jean-François (University of Quebec at Montreal)
Craigmile, Peter (The Ohio State University)
de Fondeville, Raphael (École Polytechnique Fédérale de Lausanne)
Dowd, Mike (Dalhousie University)
Duchesne, Thierry (Laval)
Guhaniyogi, Rajarshi (UC Santa Cruz)
Haran, Murali (Pennsylvania State University)
Hu, Joan (Simon Fraser University)
Illian, Janine (University of St Andrews)
Jun, Mikyoung (Texas A&M University)
Leahy, Thomas (Imperial College)
Li, Dongdong (Simon Fraser University)

Lindgren, Finn (University of Edinburgh)
Menezes, Raquel (Minho University / Center of Statistics and Applications (CEAUL))
Nguyen, Paul (Queen's University)
Rue, Havard (King Abdullah University of Science and Technology)
Shaddick, Gavin (University of Exeter)
Simpson, Daniel (University of Bath)
Smith, Theresa (University of Bath)
Stafford, Jamie (University of Toronto)
Sun, Lei (University of Toronto)
Taylor, Ben (Lancaster University)
Thiessen, Michelle (Simon Fraser University)
Waagepetersens, Rasmus (Aalborg University)
Wakefield, Jon (University of Washington)
Waller, Lance (Emory University)
Wang, Joey (University of Toronto)
Wilson, Katie (University of Washington)

Mathematics for Developmental Biology

December 10 - 15, 2017

Organizers:

Przemyslaw Prusinkiewicz (University of Calgary)

Eric Mjolsness (University of California, Irvine)



The workshop brought together developmental biologists, computer scientists, mathematicians and physicists, whose research incorporates mathematical description, modeling and analysis of development. In addition, several mathematicians specializing in areas with emerging applications to developmental biology were invited to share their expertise and exchange ideas and inspirations. The list of participants also included young researchers, with the potential to further transform developmental biology from a descriptive to a mathematical science. Mathematical descriptions of the development and form of organisms can be traced to the book “On Growth and Form” by d’Arcy Thomson [1], and the paper “The chemical basis of morphogenesis” by Turing [2]. Over time, these works have led to a substantial body of computational modeling techniques and mathematical analyses.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5164>

Participants:

Allard, Jun (University of California, Irvine)

Audoly, Basile (CNRS and California Institute of Technology)

Boudaoud, Arezki (École Normale Supérieure de Lyon)

Cieslak, Mik (University of Calgary)

Coen, Enrico (John Innes Center)

Cornelissen, Johanna Maria (Annemiek) (UMR 7057 CNRS & Université Paris Diderot)

Douady, Stephane (CNRS / University Paris 7 Denis Diderot)

Durand, Pauline (California Institute of Technology)

Epstein, Marcelo (University of Calgary)

Godin, Christophe (INRIA)

Gole, Christophe (Smith College)

Gou, Jia (University of Minnesota)

Grieneisen, Veronica (John Innes Centre)

Holloway, David (British Columbia Institute of Technology)

Honda, Hisao (Kobe University)

Iber, Dagamar (ETH Zurich)

Jonoska, Natasa (University of South Florida)

Jönsson, Henrik (University of Cambridge)

Kaandorp, Jaap (University of Amsterdam)

Knote, Andreas (University of Wuerzburg)

Kondo, Shigeru (University of Osaka)

Lane, Brendan (Max Planck Institute for Plant Breeding Research)

Lubkin, Sharon (North Carolina State University)

Maree, Stan (John Innes Centre)

McQuillan, Ian (University of Saskatchewan)

Merks, Roeland (CWI and Leiden University)

Mjolsness, Eric (University of California, Irvine)

Nedelec, Francois (EMBL Heidelberg)

Othmer, Hans (University of Minnesota)

Owens, Andrew (University of Calgary)

Peyrieras, Nadine (CNRS)

Prusinkiewicz, Przemyslaw (University of Calgary)

Ringham, Lee (University of Calgary)

Roeder, Adrienne (Cornell University)

Runions, Adam (Max Planck Institute for Plant Breeding Research)

Sharon, Eran (The Hebrew University of Jerusalem)

Smith, Richard (Max Planck Institute for Plant Breeding Research)

Spicher, Antoine (University of Paris-Est Creteil)

Stavness, Ian (University of Saskatchewan)

von Mammen, Sebastian (University of Wuerzburg)

Banff International Research Station

2017

2-Day Workshops

Alberta Number Theory Days (ANTD IX)

March 17 - 19, 2017

Organizers:

Alia Hamieh (University of Lethbridge)
Amy Feaver (The King's University)

Shashank Kanade (University of Denver)



Number theory is a broad and central area of research with many connections and applications to other areas of mathematics and science. It is also an extremely active and diverse area of research. The subject may be divided into several subdisciplines that range from pure mathematics, to more applied areas such as computational number theory and mathematical physics. Some of the pure mathematics subdisciplines are algebraic number theory, arithmetic geometry, analytic number theory, automorphic forms and representation theory. All of these fields are represented among the Albertan number theorists from Calgary, Edmonton and Lethbridge. This conference was a unique opportunity for the number theorists in Alberta to get together and discuss the latest research progress in the field as well hear about the advances of Alberta's own researchers. The smaller, intimate nature of the conference provided an ideal environment for young researchers to introduce their work and connect with other well-established researchers in the province, but outside of their own universities.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2672>

Participants:

Ali, Abid (University of Alberta)
Bauer, Mark (University of Calgary)
Chalker, Kirsty (University of Lethbridge)
Chen, Imin (Simon Fraser University)
Feaver, Amy (The King's University)
Fiori, Andrew (University of Calgary)
Francis, Forrest (University of Lethbridge)
Gannon, Terry (University of Alberta)
Greenberg, Matthew (University of Calgary)
Guy, Richard (The University of Calgary)
Hamieh, Alia (University of Lethbridge)
Hennig, Johanna (University of Alberta)
Jacobson, Mike (University of Calgary)
Kadiri, Habiba (University of Lethbridge)
Kanade, Shashank (University of Denver)

Lindner, Sebastian (University of Calgary)
Morrill, Ryan (University of Alberta)
Muthiah, Dinakar (University of Alberta)
Ng, Nathan (University of Lethbridge)
Patnaik, Manish (University of Alberta)
Puskás, Anna (University of Alberta)
Riedler, Wolfgang (University of Alberta)
Roettger, Eric (Mount Royal University)
Scheidler, Renate (University of Calgary)
Shahabi, Majid (University of Calgary)
Siavashi, Sahar (University of Lethbridge)
Stange, Katherine (University of Colorado Boulder)
Tran, Ha (University of Calgary)
Troupe, Lee (University of British Columbia)
Whitcher, Ursula (American Mathematical Society)

Ted Lewis SNAP Math Fair Workshop 2017

April 21 - 23, 2017

Organizers:

Sean Graves (University of Alberta)
Ted Lewis (SNAP Mathematics Foundation)

Tiina Hohn (MacEwan University)



During this pivotal time of K-9 curriculum reform in our province it is important to find the correct balance between inquiry-based problem solving and practicing basic facts in the mathematics classroom. The purpose of a SNAP math fair is to provide a meaningful problem-solving experience for all students. This was the fifteenth annual Ted Lewis Math Fair Workshop at BIRS. The workshop explained to teachers how to organize a SNAP math fair, how some schools have adapted the concept to their particular academic objectives, and provide resources and contacts to help the teachers get started. A second focus of the workshop was to brainstorm ways to communicate the concept and benefits of SNAP math fairs to teachers all over the province. A major goal was to have SNAP math fairs incorporated into the writing of the new versions of the LearnAlberta K-9 Program of Studies. There was time scheduled to discuss this at the BIRS workshop.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2682>

Participants:

Batynski, Simon (Edmonton Public Schools)
Biglands, Adrian (MacEwan University)
Brickwood, Melinda (Pre-service Teacher)
Crowle, Kendall (Edmonton Public Schools)
Der, Mark (Pre-Service Teacher)
Forster, Amanda (Edmonton Public Schools)
Graves, Sean (University of Alberta)
Greco, Silvia (Edmonton Public Schools)
Harychan, Carissa (Edmonton Public Schools)
Hildebrandt, Maxine (Mother Earth's Children's Charter School)
Hoffman, Janice (Edmonton Public Schools)

Hohn, Tiina (MacEwan University)
Jones, Carolyn (Centre for Education)
Lewis, Ted (SNAP Mathematics Foundation)
Lorway, Geri (Thinking 101/University of Alberta)
Morin, Matthew (Keyano College)
Pasanen, Trevor (University of Alberta)
Pettipas, Erin (Edmonton Public Schools)
Rioux-Wilson, Judith (St.Catherine School)
Somera, Carlito (North Peace Tribal Council)
Taylor, Heather (Edmonton Public Schools)
Winterford, Thomas (Pre-service Teacher)

Future Research Directions in Digital Simulation Methodology for the Next 10 Years April 28 - 30, 2017

Organizers:

Seong-Hee Kim (Georgia Institute of Technology)

Jeff Hong (City University of Hong Kong)



The purpose of this workshop was to come up with a list of tactical topics in simulation methodology that will definitely have significant impacts and be likely to lead the simulation research next 10 years. Top researchers in the field of analysis methodology in simulation got together and exchanged ideas and opinions. Then participants brainstormed desirable research directions and their importance; and how to successfully approach the research problems. Most research fields are driven by problems considered to be important for the era. The problems that have been considered important in the simulation fields in the past are as follows: Random number/variante generation; Simulation language; Output analysis with variance reduction; Simulation optimization; Generating multivariate vectors with cross- or auto-correlation; and Quantifying input uncertainty. When simulation is considered as a research field, most efforts were on random number and random variate generation.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2670>

Participants:

Andradottir, Sigrun (Georgia Institute of Technology)
Barton, Russell (Penn State University)
Boesel, Justin (MITRE)
Chen, Xi (Virginia Tech)
Fowler, John (Arizona State University)
Fu, Michael (University of Maryland)
Glynn, Peter (Stanford University)
Goldsman, David (Georgia Institute of Technology)
Haas, Peter (IBM Research)
Henderson, Shane (Cornell University)
Hong, Jeff (City University of Hong Kong)
Hunter, Susan (Purdue University)
Kim, Seong-Hee (Georgia Institute of Technology)
Leemis, Larry (College of William & Mary)

Liu, Guangwu (City University of Hong Kong)
Nelson, Barry (Northwestern University)
Ouyang, Huiyin (Northwestern University)
Park, Chuljin (Hanyang University)
Pasupathy, Raghu (Purdue University)
Sanchez, Paul (Naval Postgraduate School)
Sanchez, Susan (Naval Postgraduate School)
Schmeiser, Bruce (Purdue University)
Schruben, Lee (University of California at Berkeley)
Song, Eunhye (Northwestern University)
Sun, Zhankun (Kevin) (City University of Hong Kong)
Tsai, Shing Chih (Harvey) (National Cheng Kung University)
Xu, Jie (George Mason University)

Special Western Canada Linear Algebra meeting

July 7 - 9, 2017

Organizers:

Hadi Kharaghan (University of Lethbridge)
Pauline Van den Driessche (University of Victoria)

Shaun Fallat (University of Regina)



The Western Canada Linear Algebra meeting, or W-CLAM, is a regular series of meetings held roughly once every 2 years since 1993. Professor Peter Lancaster from the University of Calgary initiated the conference series and has been involved as a mentor, an organizer, a speaker and participant in all of the ten or more W-CLAM meetings. Two broad goals of the W-CLAM series are a) to keep the community abreast of current in this discipline in our field, and b) to bring together well-established and early-career researchers to talk about their work in a relaxed academic setting. W-CLAM typically features three invited speakers (usually from outside Western Canada) and, despite being a regional meeting, generally attracts participants across Canada, the U.S.A., Asia and Europe. Participation by early-career researchers and students (especially graduate students and postdoctoral fellows, but also some mathematically keen undergraduates on a research trajectory) is prioritized; a relatively nonthreatening forum for presenting their work among an audience of experts is provided.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2668>

Participants:

Adm, Mohammad (University of Regina)
Breen, Jane (University of Manitoba)
Craigen, Robert (University of Manitoba)
Fallat, Shaun (University of Regina)
Guy, Richard (The University of Calgary)
Hassani Monfared, Keivan (University of Calgary)
Holzmann, Wolfgang (University of Lethbridge)
Kaashoek, Rien (Vrije Universiteit)
Kharaghani, Hadi (University of Lethbridge)
Kim, In-Jae (Minnesota State University)
Kirkland, Stephen (University of Manitoba)
Lancaster, Peter (University of Calgary)
Li, Chi-Kwong (College of William and Mary)
Martinez-Rivera, Xavier (Iowa State University)
Masgreggi, Javad (Laval University)
McDonald, Judith (Washington State University)

Nasserasr, Shahla (Nova Southeastern University)
Pereira, Rajesh (University of Guelph)
Plosker, Sarah (Brandon University)
Raouafi, Samir (University of Regina)
Sasani, Sara (University of Lethbridge)
Suda, Sho (Aichi University of Education)
Tayfeh-Rezaie, Behruz (Institute for Research in Fundamental Sciences (IPM))
Tsatsomeros, Michael (Washington State University)
Van den Driessche, Pauline (University of Victoria)
Vander Meulen, Kevin (Redeemer University College)
Watkins, David (Washington State University)
Zaballa, Ion (Euskal Herriko Unibertsitatea)

Modelling and Simulation: Practical Engineering Applications

September 1 - 3, 2017

Organizers:

Zhangxing John Chen (University of Calgary)
Jesse Zhu (Western University)

Zhenghe Xu (University of Alberta)



This BIRS workshop focussed on several important topics that have fundamental scientific merits and significant engineering application values. Energy, environment, chemical processing, nanotechnology and information modelling and simulation require the collaborative efforts of a diverse group to maximize the outcomes, including basic science from scientists, technical expertise from engineers, modelling and numerical skills of mathematicians and the modern techniques of computer scientists. The simulation and modelling work is challenged by numerical solutions to coupled systems of nonlinear, multiscale and time-dependent partial differential equations (PDEs). There are multiple temporal and spatial scales and nonlinear effects presented and large scale and long time simulation required. The workshop promoted, enhanced and stimulated cross-continental research interactions and collaborations in mathematics, science, and engineering impacting the modeling and simulation field by bringing many minds together for unique and meaning solutions.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2689>

Participants:

Chen, Zhangxing John (University of Calgary)
Chen, Guohua (Hong Kong Polytechnic University)
Chen, Jingming (University of Toronto)
Chen, Zhongwei (University of Waterloo)
Chen, Nancy Shengnan (University of Calgary)
Cheng, Frank (University of Calgary)
Huang, Huaxiong (York University, Canada)
Le, X. Chris (University of Alberta)
Li, Xianguo (University of Waterloo)
Liang, Dong (York University)
Liao, Wenyuan (University of Calgary)
Liu, Zheng (Tsinghua University)
Lu, Gemma (University of Calgary)

Niu, Haibo (Dalhousie University)
Sheng, Jinyu (Dalhousie University)
Sun, Qiao (University of Calgary)
Wong, Yaushu (University of Alberta)
Xu, Charles (Western University)
Yang, Laurence T. (St Francis Xavier University)
Zeng, Fanhua (University of Regina)
Zeng, Hongbo (University of Alberta)
Zhao, Boxin (University of Waterloo)
Zheng, Ying (University of Edinburgh)
Zhu, Jesse (Western University)
Zu, Jean (Stevens Institute of Technology (US))

Open Source Computation and Algebraic Surfaces

September 29 - October 1, 2017

Organizers:

Ursula Whitcher (American Mathematical Society)
Anthony Várilly-Alvarado (Rice University)

Simon Brandhorst (Gottfried Wilhelm Leibniz Universität Hannover)



The late twentieth century saw developments in the geometry of surfaces that laid the groundwork for the study of their number-theoretic properties in the past two decades. The past few years alone have witnessed exciting new approaches that combine theoretical insight with computer aided calculations, leading to new results on point-counting, dynamics, identifying lines, and the study of transformations, to name a few. The workshop aimed to make openly available to the mathematical community implementations of the algorithms used in the above developments, and to do so in a user-friendly way. One goal was to open the field to new participants and give both experts and non-experts a reliable toolbox ready for use. To do this, we emphasized the development of practical skills for computer experimentation, using the open-source SageMath framework. By forming small teams and discussing the general design and interface we hoped to spark new cooperations and contacts among the participants.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2677>

Participants:

Balakrishnan, Jennifer (Boston University)
Berg, Jennifer (Rice University)
Beshaj, Lubjana (University of Texas-Austin)
Brandhorst, Simon (Gottfried Wilhelm Leibniz Universität Hannover)
Costa, Edgar (Dartmouth College)
Feaver, Amy (The King's University)
Goodson, Heidi (Haverford College)
Kedlaya, Kiran (University of California, San Diego)

Roe, David (University of Pittsburgh)
Scheidler, Renate (University of Calgary)
Shimada, Ichiro (Hiroshima University)
Taelman, Lenny (Universiteit van Amsterdam)
Várilly-Alvarado, Anthony (Rice University)
West, McKenzie (Kalamazoo College)
Whitcher, Ursula (American Mathematical Society)
Zureick-Brown, David (Emory University)

Transdisciplinary Approaches to Integrating Policy and Science for Sustainability

October 6 - 8, 2017

Organizers:

Gabriela Alonso Yanez (University of Calgary)
Kathleen Halvorsen (Michigan Technological University)

Marcella Ohira (Inter American Institute for Global Change Research)

We are all familiar with the latest reports on climate change that document the evidence on the scale and character of the challenges arising from climate change. Successfully confronting these challenges require—among many other actions—the effective translation of science into policy design and into implementation and integration of scientific researchers and policy-makers in functional teams. However, interaction among different types of scientists, society, and decision-makers is not easy. This workshop trained 27 participants from 15 countries on practical skills to improve teamwork, develop joint research proposals and facilitate cross-sector interactions. Our seminar approach involved three key ingredients for capacity building. First, the program's participants were exposed to innovative research methodologies, analytical tools, and concepts. This exposure complemented their disciplinary training and expertise, and encouraged them towards more interdisciplinary framings. Second, the participants received guidance in the development of professional teams and networks to provide them with the skills to work collaboratively across disciplinary and sectorial divides. Finally, the teams were coached in established approaches that fostered a solutions orientation and the convergence of science, policy and practice.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2688>

Participants:

Alfaro, Gabriela (Universidad del Valle de Guatemala)
Alonso Yanez, Gabriela (University of Calgary)
Bazely, Dawn (York University)
Big Head, Ramona (Kainai Board of Education)
Birthwright, Anne-Teresa (The University of the West Indies)
Carrizo, Erica (Ministry of Science Technology and Productive Innovation)
del Callejo, Ivan (Universidad Mayor de San Simón)
Donald, Dwayne (University of Alberta)
Duchicela, Jessica (Universidad de Las Fuerzas Armadas - ESPE)
Fernández Velazquez, Alexander (Province Delegation Ministry of Science Technology and Environment)
Forsberg, Kerstin (Planeta Océano)
Halvorsen, Kathleen (Michigan Technological University)
Hanna Collado, Jeniffer (National Council for Climate Change and Clean Development Mechanism of the Dominican Republic)
House-Peters, Sarah (California State University, Long Beach)

Krogman, Naomi (University of Alberta)
Liebman, Alexander Max
Lui, Gabriel (Ministry of the Environment)
Modernel, Pablo (Universidad de la República)
Ohira, Marcella (Inter American Institute for Global Change Research)
Oñate, Bastián (Corporación para la Conservación y Uso Sustentable de los bosques de Alerce)
Padgurschi, Maíra (Brazilian Platform on Biodiversity and Ecosystem Services/State University of Campinas)
Quarrington, Caitlin (MindFuel (Science Alberta Foundation))
Rincón, Alexander (National University of Colombia)
Souza, Tatiana (Conservation International -Brazil)
Toledo, Mariana (Inter-American Institute for Global Change Research)
Velasco, Alejandro (Quality Energy Solutions)
Vergara, Jorge (Comunidad Indígena Quechua de Quipisca)
Vilariño, Maria Virginia (Argentinean Business Council for Sustainable Development)
Zaldúa, Natalia (Vida Silvestre Uruguay)

Retreat for Young Researchers in Stochastics

October 20 - 22, 2017

Organizers:

Martin Barlow (University of British Columbia)
Michael Kouritzin (University of Alberta)

Chris Hoffman (University of Washington)



The workshop brought together postdoctoral fellows at Simon Fraser U., U. Alberta, U. Calgary, U. British Columbia and U. Washington and some of their supervising faculty. These included fellows sponsored by the PIMS Training Centre in Stochastics. It was an opportunity for them to meet each other, describe their interests and discuss open problems. The workshop allowed some outstanding young postdoctoral fellows to describe their recent research results and the open problems on which they were currently working. The range of topics from pure to the very applied was a distinctive feature of the workshop. This gave those whose interests were on the fundamental side an opportunity to see what was going on in applications in areas such as filtering and compressed sensing and gave those on the more applied side an opportunity to learn some of the more recent fundamental advances in theory. In the past the occasion has been useful in setting up visits once faculty and postdocs learn of common interests.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2695>

Participants:

Barlow, Martin (University of British Columbia)
Barrera Vargas, Gerado (University of Alberta)
Brugiapaglia, Simone (Simon Fraser University)
Burdzy, Krzysztof (University of Washington)
Chen, Zhen-Qing (University of Washington)
Forman, Noah (University of Washington)
Foxall, Eric (U. Alberta)
Gauthier, Carl-Erik (U. Washington)
Hoffman, Chris (University of Washington)
Hu, Yaozhong (University of Alberta at Edmonton)
Kouritzin, Michael (University of Alberta)
Lohmann, Martin (University of BC)

Murugan, Mathav (University of British Columbia)
Perkins, Ed (University of British Columbia)
Qiu, Jinniao (Department of Mathematics & Statistics, University of Calgary)
Ray, Gourab (University of Victoria)
Sezer, Deniz (University of Calgary)
Shen, Zhongwei (University of Alberta)
Swishchuk, Anatoliy (University of Calgary)
Wang, Shirou (U. Alberta)
Wang, Jiun-Chau (University of Saskatchewan)
Ware, Tony (The University of Calgary)
Wei, Wenning (U. Calgary)

Contemporary Topics in Mathematical Physics

October 27 - 29, 2017

Organizers:

Thomas Creutzig (University of Alberta)
Richard Sydora (University of Alberta)

Terry Gannon (University of Alberta)



The objectives of this workshop were firstly to honor Jurgen Fuchs who is turning 60 this year. The development of the mathematics of a full bulk conformal field theory are largely due to the insights of Jurgen Fuchs and his collaborators. Secondly, we would like to strengthen the ties between the mathematicians and physicists of the Theoretical Physics Institute at the University of Alberta and thirdly we would like to learn more about the research of different research groups in Western Canada. We intended to have introductory lectures on the topics of interest.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/2-day-workshops/17w2694>

Participants:

Berg, Marcus (Karlstad University)
Bernstein, Tobias (University of Alberta)
Boyack, Rufus (University of Chicago/Alberta)
Chen, Chun (University of Alberta)
Chidambaram, Nitin (University of Alberta)
Creutzig, Thomas (University of Alberta)
Fernandez, Rodrigo (University of Alberta)
Fuchs, Jürgen (Karlstad University)
Gannon, Terry (University of Alberta)
Ivanova, Natalia (University of Alberta)

Maciejko, Joseph (University of Alberta)
Marsiglio, Frank (University of Alberta)
Osuga, Kento (University of Alberta)
Page, Don (University of Alberta)
Riedler, Wolfgang (University of Alberta)
Sydora, Richard (University of Alberta)
Walton, Mark (University of Lethbridge)
Yazdi, Yasaman (Perimeter Institute/University of Alberta)
You, Fenglong (University of Alberta)

Banff International Research Station

2017

**Research in Teams
Focussed Research Groups**

Research in Teams

Derivative Free and Black Box Optimization

June 4 - 11, 2017

Organizers:

Warren Hare (University of British Columbia, Okanagan Campus)

Charles Audet (Poly. Montreal)

The workshop focussed on two areas of research. First, Dr. Audet and Dr. Hare are currently completing a book titled "Derivative-Free and Blackbox Optimization". The book has been accepted for publication by Springer, and we had a week of focused activity to finalize the book. Second, the book has prompted several new research questions in the field of derivative free optimization. These questions are encapsulated into the broad question: how can direct-search and model-based DFO methods best be integrated together to create powerful new DFO algorithms? We had a week of focused activity to make progress in this area.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/research-in-teams/17rit681>

Participants:

Audet, Charles (Polytechnique, Montreal)

Hare, Warren (University of British Columbia)

Gravity as an Effective Medium

July 23 - 30, 2017

Organizers:

Cliff Burgess (McMaster University and Perimeter Institute)

Peter Adshead (University of Illinois at Urbana-Champaign)

Richard Holman (Minerva Schools at KGI)

Vincent Vennin (University of Portsmouth)

The objectives of this workshop were to better understand the tools involved in making predictions for open systems (such as particles moving through a medium) and to apply these tools to gravitational situations. We were reasonably sure this line of inquiry would prove fruitful because some of us (Burgess and Holman) took first steps along these lines in an earlier BIRS research in teams effort several years ago, finding them to be very effective when applied to some predictions in cosmic inflation. In this workshop we intended to exploit the insights of this early success in two ways: first by verifying their value by seeing whether they can usefully resum late-time predictions in situations for which detailed perturbative calculations have been done and in realistic inflationary scenarios; and second by applying them to the problem of information loss in black holes (which has not been hitherto done).

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/research-in-teams/17rit680>

Participants:

Adshead, Peter (University of Illinois at Urbana-Champaign)

Holman, Richard (Minerva Schools at KGI)

Burgess, Cliff (McMaster University and Perimeter Institute)

Shandera, Sarah (Pennsylvania State University)

The Structure of Finite Algebras and the Constraint Satisfaction Problem

August 6 - 13, 2017

Organizers:

Andrei Bulatov (Simon Fraser University)

Marcin Kozik (Jagiellonian University)

In a constraint satisfaction problem (CSP for short) the goal is to decide whether or not there is a homomorphism between two given relational structures. This framework turns out so versatile and flexible that the CSP found applications in numerous areas from artificial intelligence, to theoretical computer science, to graph theory, to logic, to algebra. On the practical side CSP solvers has been designed that allow for descriptive languages more efficient and expressive than, say, Prolog. On the theoretical side the main research directions have been concerned with algorithms for solving CSPs and the complexity of various restricted versions of the problem. Our goal was to study the structure of finite algebras related to the CSP by unifying the three existing approaches to this problem. We also hope to use the new results to advance the study of the CSP and other combinatorial problems.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/research-in-teams/17rit685>

Participants:

Barto, Libor (Charles University)

Bulatov, Andrei (Simon Fraser University)

Kozik, Marcin (Jagiellonian University)

Zhuk, Dimitriy (Moscow State University)

Some Intermittency Problems for Parabolic SPDE

August 20 - 27, 2017

Organizers:

Carl Mueller (University of Rochester)

Kunwoo Kim (Pohang University of Science and Technology, Korea)

Davar Khoshnevisan (University of Utah)

Intermittency and related phenomenon play a central role in the study of many physical phenomena. Typically, the energy or action of an intermittent system is concentrated in a small region. For example, on the surface of the sun, most of its energy is concentrated in sunspots, which cover only a small portion of the sun's surface. Furthermore, within each sunspot, most of the energy is further concentrated in a small region. In spite of intensive study, there are many mysterious features of intermittency which remain to be explained. The investigators studied some specific mathematical models which feature intermittency, and which are possible to study mathematically.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/research-in-teams/17rit683>

Participants:

Khoshnevisan, Davar (University of Utah)

Kim, Kunwoo (Pohang University of Science and Technology, Korea)

Mueller, Carl (University of Rochester)

Bounds for Restrictions of Laplace Eigenfunctions

October 15 - 22, 2017

Organizers:

Jeffrey Galkowski (Stanford University)
John Toth (McGill University)

Yaiza Canzani (University of North Carolina at Chapel Hill)

In this workshop we studied the behavior of the L^2 -mass of restricted Laplace eigenfunctions. We worked on compact surfaces without boundary, and we restricted the eigenfunctions to curves that are not a segment of a geodesic. We conjectured that the L^2 -mass of the restrictions of quantum ergodic eigenfunctions to the curve H are uniformly bounded above and below by a constant as the eigenvalue grows to infinity. Furthermore, the L^2 -mass of any eigenfunctions to the curve H have an exponential lower bound. Understanding these questions will have profound implications for the study of the nodal sets of eigenfunctions.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/research-in-teams/17rit687>

Participants:

Canzani, Yaiza (University of North Carolina at Chapel Hill)

Galkowski, Jeffrey (Stanford University)
Toth, John (McGill University)

Nikol'skii Inequalities and their Applications

December 3 - 10, 2017

Organizers:

Sergey Tikhonov (Catalan Institution for Research and Advanced Studies)
Feng Dai (University of Alberta)

Vladimir Temlyakov (University of South Carolina)

Nikol'skii's inequalities have been playing crucial roles in polynomial approximation and embedding of function spaces. The purpose of this project was to solve three specific problems concerning sharp Nikol'skii inequalities for spherical polynomials and their interaction with sparse spherical harmonic approximation. The aim was to improve our understanding of the high-dimensional Nikol'skii constant and to develop new techniques to attack greedy approximation with regard to spherical harmonics.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/research-in-teams/17rit679>

Participants:

Dai, Feng (University of Alberta)
Prymak, Andriy (University of Manitoba)
Temlyakov, Vladimir (University of South Carolina)

Tikhonov, Sergey (Catalan Institution for Research and Advanced Studies)

Focussed Research Groups

Material Evolution from Plasticity to Morphogenesis

June 11 - 18, 2017

Organizers:

Cristina Sardón (Instituto de Ciencias Matematicas) **Reuven Segev** (Ben-Gurion University of the Negev)
Manuel de León (Consejo Superior de Investigaciones Científicas)
Marcelo Epstein (University of Calgary)

The primary objective of our stay in Banff was bringing together researchers from five different institutions, that come from different branches of science, engineering and mathematics, but with a same objective: to put their knowledge in common for a research project entitled "Material evolution: from plasticity to morphogenesis". This gathering was part of an ongoing effort to overlap purely mathematical grounds and applications of engineering to material evolution. People in the proposed team are good representatives of these fields of research. The spanish team is an expert in differential geometry and geometrical mechanics, whilst members from Canada, Israel and US have a solid background of applications of differential geometry in biomechanics and materials. From this meeting we expect some publications in reputable journals concerning the applications of geometric mechanics to the understanding of evolution and composition of organic and inorganic materials: from muscle tissue to crystals. We also plan to write a state of the art indicating potential ways to explore in the next future.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/focussed-research-groups/17frg674>

Participants:

Elzanowski, Marek (Portland State University) **Segev, Reuven** (Ben-Gurion University of the Negev)
Epstein, Marcelo (University of Calgary) **Sniatycki, Jędrzej** (University of Calgary)
Jimenez Morales, Victor Manuel (ICMAT) **Vilariño, Silvia** (Centro Universitario de la Defensa de Zaragoza)
Sardón, Cristina (Instituto de Ciencias Matematicas)

Extensions of index theory inspired by scattering theory

June 18 - 25, 2017

Organizers:

Alan Carey (Australian National University) **Fritz Gesztesy** (Baylor University)

The main aim of this focussed research group proposal was to investigate extensions of index theory to situations where one starts a priori with non-Fredholm operators. This entails generalisations of earlier work of Gesztesy et al. on this problem for particular non-Fredholm operators. We are inspired by the trace formula of Carey et al. and recent progress in scattering theory through investigations of the spectral shift function. A key question is whether the spectral shift function can be really thought of as defining a generalisation of spectral flow to non-Fredholm situations. As an adjunct to this, we investigated the Witten index as a method of calculating this generalised spectral flow via a far-reaching generalisation of both Pushnitski's ideas on spectral shift functions and all of the previous research on this topic by the proposed participants. We also studied applications to spectral geometry and problems in condensed matter physics involving magnetic Dirac operators and their perturbations as arise for example in the study of graphene and topological phases of matter. We aimed to resolve questions raised by theorists in these areas relating to the use of index theory and spectral flow.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/focussed-research-groups/17frg668>

Participants:

Carey, Alan (Australian National University) **Levitina, Galina** (UNSW Sydney)
Gesztesy, Fritz (Baylor University) **Nichols, Roger** (Univ. of Tennessee at Chattanooga)
Kaad, Jens (University of Southern Denmark) **Sukochev, Fedor** (University of NSW)

Stochastic Lattice Differential Equations and Applications

September 10 - 17, 2017

Organizers:

Xiaoying Han (Auburn University)

Hakima Bessaih (University of Wyoming)

Maria J. Garrido-Atienza (University of Sevilla)

Bjorn Schmalfuss (Friedrich-Schiller-Universität
Jena)

Stochastic lattice differential equations have a wide range of applications where the spatial structure has a discrete character and uncertainty is taken into account. The applications include image processing, pattern recognition, chemical reaction theory, neuron networks, fluid dynamics, molecular biology, etc. However, the study on stochastic lattice systems is still in early stage. In fact, most existing works up to date are limited to the study of stochastic lattice systems with additive or linear multiplicative white noise. The goal of this project was to analyze dynamics of stochastic lattice systems with more general type of noise, by using new techniques from Stochastic Analysis.

For details, please refer to the workshop webpage

<http://www.birs.ca/events/2017/focussed-research-groups/17frg671>

Participants:

Bessaih, Hakima (Department of Mathematics,
University of Wyoming)

Caraballo, Tomas (Universidad de Sevilla)

Garrido-Atienza, Maria J. (University of Sevilla)

Han, Xiaoying (Auburn University)

Schmalfuss, Bjorn (Institut for Mathematics)

CMO 2017 Program

5-Day Workshops 2017

Apr 30	May 5	Optimal Transport meets Probability, Statistics and Machine Learning
May 7	May 12	Beyond Toric Geometry
May 14	May 19	Ordinary and Symbolic Powers of Ideals
May 21	May 26	Geometric Properties of Local and non-Local PDEs
May 28	Jun 2	High Dimensional Probability
Jun 4	Jun 9	Field Theories and Higher Structures in Mathematics and Physics
Jun 11	Jun 16	Structure and Geometry of Polish groups
Jun 18	Jun 23	Geometrical Methods, non Self-Adjoint Spectral Problems, and Stability of Periodic Structures
Jun 25	Jun 30	Analysis of Dislocation Models for Crystal Defects
Jul 30	Aug 4	Thirty Years of Floer Theory for 3-Manifolds
Aug 6	Aug 11	Low Dimensional Topology and Gauge Theory
Aug 13	Aug 18	Mathematical and Numerical Methods for Time-Dependent Quantum Mechanics - from Dynamics to Quantum Information
Aug 20	Aug 25	Symmetries of Discrete Structures in Geometry
Aug 27	Sep 1	New perspectives on State Space Models
Sep 3	Sep 8	Distributed Data for Dynamics and Manifolds
Sep 10	Sep 15	Set Theory and its Applications in Topology
Sep 17	Sep 22	Splitting Algorithms, Modern Operator Theory, and Applications
Sep 24	Sep 29	Geometry & Computation for Interactive Simulation
Oct 1	Oct 6	Complex Creeping Fluids: Numerical Methods and Theory
Oct 15	Oct 20	Mathematical Advances in Electron Microscopy
Oct 22	Oct 27	Beyond Convexity: Emerging Challenges in Data Science
Oct 29	Nov 3	Synthesis of Statistics, Data Mining and Environmental Sciences in Pursuit of Knowledge Discovery
Nov 5	Nov 10	The Geometry and Topology of Knotting and Entanglement in Proteins
Nov 12	Nov 17	Workshop on Arithmetic and Complex Dynamics
Nov 26	Dec 1	Challenges and Synergies in the Analysis of Large-Scale Population-Based Biomedical Data
Dec 3	Dec 8	Bayesian Nonparametric Inference: Dependence Structures and their Applications

Summer Schools

Jul 2	Jul 16	2017 IMO Summer Training Camp
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Optimal Transport meets Probability, Statistics and Machine Learning

April 30 - May 5, 2017

Organizers:

Guillaume Carlier (Université Paris Dauphine)
Marco Cuturi (ENSAE)
Brendan Pass (University of Alberta)

Carola-Bibiane Schönlieb (University of Cambridge)



What is the most efficient way to transport coal from mines to factories? How can one put color in the style of Andy Warhol on a black and white portrait of Humphrey Bogart? These are seemingly unrelated questions. However, they can be addressed by the same mathematical theory: Optimal Transport. Optimal transport can be traced to the work of Monge before the French Revolution, and has been an extremely successful theory with applications in many different areas of Mathematics in the last 25 years. Cédric Villani, who was awarded the Fields medal in 2010, wrote a thousand pages book on the topic! This workshop aimed at understanding how optimal transport can be used to efficiently extract relevant information from huge and complex datasets (such as vast collections of HD images, politician speeches, postings on social networks...).

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5093>

Participants:

Barton, Alistair (Mcgill)
Bernton, Espen (Harvard)
Boistard, Hélène (Université de Toulouse TSE)
Bowles, Malcolm (University of British Columbia)
Brune, Christoph (University of Twente)
Carlier, Guillaume (Université Paris Dauphine)
Cazelles, Elsa (Institut de Mathématiques de Bordeaux)
Chizat, Lénaïc (Université Paris Dauphine)
Claici, Sebastian (MIT)
Cotar, Codina (University College London)
Craig, Katy (University of California Santa Barbara)
Cuturi, Marco (ENSAE)
Del Barrio, Eustasio (Universidad de Valladolid)
Düring, Bertram (University of Sussex)
Flamary, Rémi (Université de Nice Sophia Antipolis)
Georgiou, Tryphon (University of California, Irvine)
Guerra Polania, Wincy Alejandro (Cinvestav del IPN)
Guo, Gaoyue (Oxford University)
Kim, Young-Heon (University of British Columbia)
Kitagawa, Jun (Michigan State University)
Léonard, Christian (Universite Paris Nanterre)
Levy, Bruno (Inria Lorraine)

Loubes, Jean-Michel (Université de Toulouse)
Marzouk, Youssef (Massachusetts Institute of Technology)
McCann, Robert (University of Toronto)
Mohajerin Esfahani, Peyman (Delft University of Technology)
Oberman, Adam (McGill University)
Obloj, Jan (University of Oxford)
Palmer, Aaron (University of British Columbia)
Pass, Brendan (Univ. Alberta)
Peyré, Gabriel (CNRS and Ecole Normale Supérieure)
Poon, Clarice (University of Cambridge)
Reich, Sebastian (Universität Potsdam)
Schönlieb, Carola-Bibiane (University of Cambridge)
Schrieber, Jörn (University of Göttingen)
Seguy, Vivien (Kyoto University)
Slepčev, Dejan (Carnegie Mellon University)
Srivastava, Sanvesh (The University of Iowa)
Tabak, Esteban (Courant Institute)
von Renesse, Max (Leipzig University)
Ye, Jianbo (Penn State University)

Beyond Toric Geometry

May 7 - 12, 2017

Organizers:

Nathan Ilten (Simon Fraser University)
Kalle Karu (University of British Columbia)

Milena Hering (Edinburgh University)



Toric geometry is an exciting area of mathematics developed during the past half-century. Its objects of study are special varieties (solution sets of systems of polynomial equations) that possess additional structure stemming from the action of an algebraic torus. This additional structure makes toric geometry highly accessible via tools in combinatorics and discrete geometry. On the other hand, toric geometry plays an important role in many other areas of mathematics, for example, mirror symmetry and coding theory. This workshop focussed on using tools and techniques from toric geometry to a larger class of varieties with a number of applications. It brought together experts to share and discuss recent results using toric techniques, and to tackle new problems by pushing these techniques further.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5130>

Participants:

Achinger, Piotr (IHES)
Bernal Guillén, Martha María (Universidad de Zacatecas)
Braden, Tom (University of Massachusetts)
Carrell, James (University of British Columbia)
Casagrande, Cinzia (Università di Torino)
Castravet, Ana-Maria (Northeastern University)
Chen, Linda (Swarthmore College)
Dey, Arijit (IIT-Madras)
Di Rocco, Sandra (KTH Stockholm)
Duarte, Daniel (Catedrático CONACYT-UAZ)
Duncan, Alexander (University of South Carolina)
Elizondo, E. Javier (Universidad Nacional Autónoma de México, Ciudad Universitaria)
Escobar, Laura (University of Illinois at Urbana-Champaign)
Frías-Medina, Juan Bosco (Universidad Autónoma de Zacatecas)
Gómez-Morales, Mirna Lisette (Universidad Nacional Autónoma de México)
Gonzalez, Jose (University of California Riverside)
Hausen, Jürgen (University of Tübingen)
He, Zhuang (Northeastern University)
Hochenegger, Andreas (Università degli Studi di

Milano)
Ilten, Nathan (Simon Fraser University)
Jabbusch, Kelly (University of Michigan - Dearborn)
Karu, Kalle (University of British Columbia)
Kaveh, Kiumars (University of Pittsburgh)
Kiritchenko, Valentina (National Research University Higher School of Economics)
Lam, Kee Yuen (University of British Columbia)
Lanini, Martina (Università degli Studi di Roma Tor Vergata)
Liendo, Alvaro (Universidad de Talca)
Maclagan, Diane (University of Warwick)
Manon, Chris (George Mason University)
Martin del Campo, Abraham (CIMAT at Guanajuato)
Nødland, Bernt Ivar Utstøl (University of Oslo)
Payne, Sam (Yale University)
Rajchgot, Jenna (University of Saskatchewan)
Satriano, Matthew (University of Waterloo)
Smith, Gregory G. (Queen's University)
Talpo, Mattia (University of British Columbia)
Tymoczko, Julianna (Smith College)
Wisniewski, Jaroslaw (University of Warsaw)
Zainoulline, Kirill (University of Ottawa)

Ordinary and Symbolic Powers of Ideals

May 14 - 19, 2017

Organizers:

Christopher Francisco (Oklahoma State University) **Tai Ha** (Tulane University)
Adam Van Tuyl (McMaster University)



Commutative algebra, combinatorics, and algebraic geometry are three areas of mathematics that often study similar problems with different techniques. Commutative algebraists are often interested in studying relationships among polynomials. Combinatorial mathematicians study discrete structures, like graphs, which model networks. Algebraic geometers study solutions to polynomial equations from both an algebraic and geometric perspective. Researchers in all three fields have been interested in powers of algebraic structures called ideals in recent years, and the questions that have arisen have significant implications in mathematics, including applied areas like combinatorial optimization. Because there are questions common to the different areas, there is great opportunity for useful collaboration. For example, researchers in graph theory, a branch of combinatorics, recently helped disprove a widely-believed conjecture in algebra after algebraists translated the question into problems about graphs. The goal of this workshop was to facilitate communication among mathematicians in the three areas in order to combine the different approaches in the best way possible.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5027>

Participants:

Biermann, Jennifer (Hobart and William Smith Colleges)
Bocci, Cristiano (Universita di Siena)
Caviglia, Giulio (Purdue University)
Cooper, Susan (North Dakota State University)
Cutkosky, Steven Dale (University of Missouri - Columbia)
Dao, Hailong (University of Kansas)
de Alba Casillas, Hernán (Universidad Autónoma de Zacatecas)
DiPasquale, Michael (Oklahoma State University)
Faridi, Sara (Dalhousie University)
Francisco, Christopher (Oklahoma State University)
Galetto, Federico (McMaster University)
Grifo, Eloísa (University of Virginia)
Guardo, Elena (Universita di Catania)
Ha, Tai (Tulane University)
Ha, Minh Lam (Vietnam Academy of Science and Technology)
Harbourne, Brian (University of Nebraska-Lincoln)
Huneke, Craig (University of Virginia)
Lin, Kuei-Nuan (Penn State Greater Allegheny)
Mermin, Jeffrey (Oklahoma State University)
Migliore, Juan (University of Notre Dame)
Montaño, Jonathan (University of Kansas)
Morey, Susan (Texas State University)

Murai, Satoshi (Osaka University)
Nagel, Uwe (University of Kentucky)
Nguyen, Hop (University of Genoa)
Núñez-Betancourt, Luis (Centro de Investigación en Matemáticas)
O'Keefe, Augustine (Connecticut College)
Polini, Claudia (University of Notre Dame)
Reyes, Enrique (CINVESTAV-IPN)
Römer, Tim (University of Osnabrück)
Schenck, Hal (Iowa State University)
Schweig, Jay (Oklahoma State University)
Secleanu, Alexandra (University of Nebraska Lincoln)
Srinivasan, Hema (University of Missouri)
Szemberg, Tomasz (Pedagogical University of Cracow)
Szpond, Justyna (Pedagogical University of Cracow)
Terai, Naoki (Saga University)
Toledo, Jonathan (CINVESTAV-IPN)
Trok, William (University of Kentucky)
Ulrich, Bernd (Purdue University)
Van Tuyl, Adam (McMaster University)
Villarreal, Rafael (Center of Investigations and Advanced Studies)
Walker, Robert (University of Michigan)

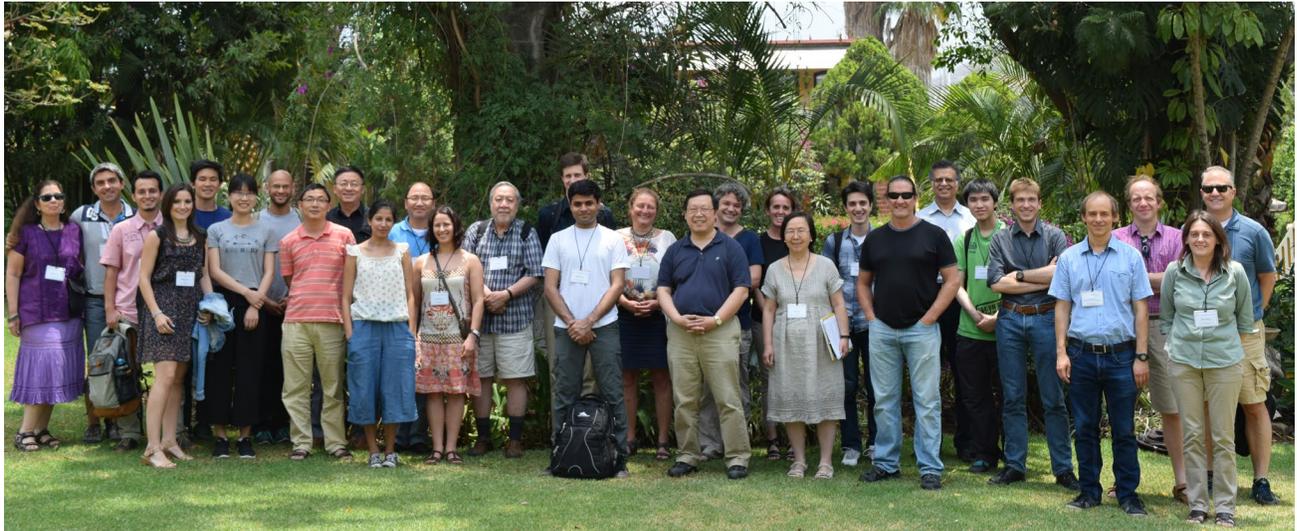
Geometric Properties of Local and non-Local PDEs

May 21 - 26, 2017

Organizers:

Maria del Mar Gonzalez (Universidad Autonoma de Madrid)
Jeffrey Case (The Pennsylvania State University)

Juncheng Wei (University of British Columbia)
Manuel del Pino (University of Chile)



The focus of this workshop was the study of non-local operators. These appear many applications such as physics, economy, probability, fluid mechanics, geometry, etc... Their significance comes from the fact that they model processes in which long range interactions (and not only the ones with the closest neighbours) play a role. This fact leads to immediate applications in population dynamics or economic models, for instance. Here we concentrate in their geometric interpretation. For instance, there are many ways to understand how a surface is curved, depending on the magnitude we wish to measure and in particular, on the weight we give to the far away points. As a consequence, one expects a rich interaction between the geometry of a surface and non-local operators on such surface.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5047>

Participants:

Ao, Weiwei (Wuhan University)
Case, Jeffrey (The Pennsylvania State University)
Chan, Hardy (University of British Columbia)
Chang, Alice (Princeton University)
Chanillo, Sagun (Rutgers University)
Chen, Eric (Princeton University)
Clapp, Monica (Universidad Nacional Autonoma de Mexico)
Cowan, Craig (University of Manitoba)
Davila, Juan (Universidad de Chile, Departamento de Ingenieria Matematica and Centro de Modelamiento Matematico)
DelaTorre, Azahara (University of Basel)
Esposito, Pierpaolo (Università di Roma Tre)
Fernández, Juan Carlos (Universidad Nacional Autonoma de Mexico)
Gover, Rod (University of Auckland)
Gursky, Matt (University of Notre-Dame)
Kamburov, Nikola (Pontificia Universidad Catolica de Chile)

Lee, Ki-ahm (Seoul National University)
Liu, Yong (North China Electric Power University)
Lopez Rios, Luis (Universidad Nacional Autónoma de México)
Mazumdar, Saikat (UBC)
Musso, Monica (Pontificia Universidad Católica de Chile)
Perales, Raquel (UNAM)
Pistoia, Angela (Sapienza Università di Roma)
Ren, Xiaofeng (George Washington University)
Robert, Frédéric (Universite de Lorraine)
Saez, Mariel (Pontificia Universidad Católica de Chile)
Sire, Yannick (Johns Hopkins University)
Terracini, Susanna (Università di Torino)
Vétois, Jérôme (McGill University)
Wang, Yi (Johns Hopkins University)
Wei, Juncheng (University of British Columbia)
Yang, Paul (Princeton University)

High Dimensional Probability

May 28 - June 2, 2017

Organizers:

Rafal Latala (University of Warsaw)
Mokshay Madiman (University of Delaware)
Patricia Reynaud-Bouret (University of Nice Sophia Antipolis)

Nathael Gozlan (Université Paris 5 - René Descartes)
Jose Figueroa-Lopez (Washington University in St. Louis)



The aim of this workshop was to bring together leading experts in high dimensional probability and a number of related areas to discuss the recent progress in the subject as well as present the major open problems and questions. We wanted to deepen contacts between several different communities with common research interests focusing on probability inequalities, empirical processes, strong approximations, Gaussian and related chaos processes of higher order, Markov processes, concentration of measure techniques and applications of these methods to a wide range of problems in other areas of mathematics, statistics and computer science. We fostered and developed interest in this area of research by new researchers and recent Ph.D.'s. There are many exciting open problems in the area that may be formulated in a way that can be understood by graduate students. We hoped that they would attract attention of young people taking part in this workshop.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5080>

Participants:

Adamczak, Radoslaw (University of Warsaw)
ALBERT, Melisande (INSA Toulouse)
Bednorz, Witold (University of Warsaw)
Chafaï, Djilil (University Paris Dauphine)
Chatterjee, Sourav (Stanford University)
Delgado-Vences, Francisco (UNAM)
Döbler, Christian (University of Luxembourg)
Eichelsbacher, Peter (Ruhr-Universität Bochum)
El Karoui, Noureddine (University of California Berkeley)
Figueroa-Lopez, Jose (Washington University in St. Louis)
Fradelizi, Matthieu (Université Paris-Est Marne-la-Vallée)
Goetze, Friedrich (University of Bielefeld)
Gozlan, Nathael (Université Paris 5 - René Descartes)
Hitczenko, Pawel (Drexel University)
Houdré, Christian (Georgia Institute of Technology)
Koltchinskii, Vladimir (Georgia Institute of Technology)
Latala, Rafal (University of Warsaw)
Lounici, Karim (Université de Nice - Sophia

Antipolis)
Madiman, Mokshay (University of Delaware)
Maïda, Mylène (University of Lille 1)
Melbourne, James (University of Delaware)
Meller, Rafal (University of Warsaw)
Merlevède, Florence (University Paris Est Marne-la-Vallée)
Minsker, Stanislav (University of South California)
Nourdin, Ivan (University of Luxembourg)
Oleszkiewicz, Krzysztof (University of Warsaw)
Olivier, Adelaide (University of Paris-Sud Orsay)
Peligrad, Magda (University of Cincinnati)
Perez Abreu, Victor (CIMAT)
Pollard, Emma (University of Delaware)
Rosinski, Jan (University of Tennessee)
Samson, Paul Marie (Paris Est Marne-la-Vallée)
Tanguy, Kevin (University of Toulouse)
Tkocz, Tomasz (Princeton University)
Veraar, Mark (Delft University of Technology)
Werner, Elisabeth (Case Western Reserve University)
Yaroslavtsev, Ivan (Delft University of Technology)

Field Theories and Higher Structures in Mathematics and Physics

June 4 - 9, 2017

Organizers:

Thomas Strobl (Universite de Lyon)
Yael Fregier (Artois University, Lens)

Nicolai Reshethikin (Berkeley)



The workshop, which took place in Oaxaca, a UNESCO designated World Heritage site, brought together leading experts in mathematics and theoretical physics on the subject of Higher Structures and Classical and Quantum Field Theories. One of the goals was to compare and outline recent approaches to quantum field theory such as factorization algebras, extended TQFTs, and perturbative quantization of gauge field theories on space-times with boundary. Another objective was to clarify the relation between the “BV formalism” in quantum and classical gauge theories with the “Derived mathematics” program. Finally, we aim at a better understanding of higher gauge theories, the general new framework of the gauging of singular foliations, and higher homotopy moment maps.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5167>

Participants:

Benini, Marco (Universität Potsdam)
Berdichevsky, Leon (Instituto Tecnológico Autónomo de México)
Blohmann, Christian (Max Planck Institute for Mathematics)
Canepa, Giovanni (Universität Zürich)
Cattaneo, Alberto (Zurich University)
Colosi, Daniele (UNAM)
Contreras, Ivan (University of Illinois)
Dotsenko, Vladimir (CINVESTAV and Trinity College Dublin)
Fregier, Yael (Artois University, Lens)
Getzler, Ezra (Northwestern University)
Grataloup, Albin (ENS de Lyon)
Hull, Chris (Imperial College London)
Ikeda, Noriaki (Ritsumeikan University)
Johnson-Freyd, Theo (Perimeter Institute)
Jordan, David (University of Edinburgh)
Juárez Ojeda, Rigel Apolonio (University of Artois/Institute of Mathematics of Jussieu)
Kandel, Santosh (Universität Zürich)
Lupercio, Ernesto (Centro de Investigacion del IPN)
Meneses-Torres, Claudio (Centro de Investigación

en Matemáticas)
Mnev, Pavel (University of Notre Dame)
Moshayedi, Nima (University of Zurich)
Naef, Florian (University of Geneva)
Oeckl, Robert (Universidad Nacional Autónoma de México)
Rogers, Chris (University of Nevada)
Safronov, Pavel (Université de Genève)
Salnikov, Vladimir (University of Luxembourg)
Schenkel, Alexander (University of Nottingham)
Schiavina, Michele (Berkeley University)
Schlegel, Vincent (University of Zurich)
Stolz, Stephan (University of Notre Dame)
Strobl, Thomas (Universite de Lyon)
Tamarkin, Dmitry (Northwestern University)
Tanaka, Hiro Lee (Harvard University)
Valach, Fridrich (University of Geneva)
Vishnyakova, Elizaveta (UFMG)
Weitsman, Jonathan (Northeastern University)
Wernli, Konstantin (University of Zurich)
Wulkenhaar, Raimar (Universität Münster)
Youmans, Donald (University of Geneva)
Zabzine, Maxim (Uppsala Universitet)

Structure and Geometry of Polish groups

June 11 - 16, 2017

Organizers:

Christian Rosendal (University of Illinois at Chicago)
Julien Melleray (Université Lyon 1)

Pierre-Emmanuel Caprace (Université catholique de Louvain)
Stevó Todorčević (University of Toronto and Institut de Mathématiques de Jussieu)



The workshop focused on the structure of Polish groups and more specifically topological transformation groups. These occur naturally as groups of transformations of particular mathematical objects such as infinite-dimensional spaces or manifolds. The workshop brought together researchers in various domains of mathematics in which Polish groups appear to develop common tools to study their structure and geometry.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5094>

Participants:

Caprace, Pierre-Emmanuel (Université catholique de Louvain)
Cohen, Michael (North Dakota State University)
Dowerk, Philip (Katholieke Universiteit Leuven)
Duchesne, Bruno (Université de Lorraine)
Ferenczi, Valentin (Universidade de São Paulo)
Gaboriau, Damien (University of Chili / CNRS / ENS Lyon)
Glasner, Eli (Tel Aviv University)
Glasner, Yair (Ben Gurion University of the Negev)
Herndon, Jake (University of Illinois at Chicago)
Hrusak, Michael (Universidad Nacional Autónoma de México)
Ibarlucía, Tomás (Université Paris Diderot)
Juschenko, Kate (Northwestern University)
Kwiatkowska, Aleksandra (University of Münster/ University of Wrocław)
Le Maitre, Francois (Université Paris Diderot)
Lopez Abad, Jordi (Université Paris 7)
Malicki, Maciej (Warsaw School of Economics)
Melleray, Julien (Université Lyon 1)
Meza-Alcantara, David (UNAM)
Moore, Justin Tatch (Cornell University)

Nguyen Van Thé, Lionel (University of Aix-Marseille)
Nuñez-Rosales, Fernando (National Autonomous University of Mexico)
Pestov, Vladimir (University of Ottawa)
Reid, Colin (University of Newcastle)
Rosendal, Christian (University of Illinois at Chicago)
Sabok, Marcin (McGill University)
Schneider, Friedrich Martin (Technische Universität Dresden)
Solecki, Slawomir (University of Illinois)
Thomas, Simon (Rutgers University)
Tkachenko, Michael (Universidad Autónoma Metropolitana, Iztapalapa campus)
Tsankov, Todor (Université Paris 7)
Tucker-Drob, Robin (Texas A&M University)
Wesolek, Phillip (Binghamton University)
Willis, George (University of Newcastle)
Xiao, Zhiqiang (Nanjing Normal University)
Zava, Nicolo (University of Udine)
Zielinski, Joseph (Carnegie Mellon University)
Zucker, Andrew (Carnegie Mellon University)

Geometrical Methods, non Self-Adjoint Spectral Problems, and Stability of Periodic Structures

June 18 - 23, 2017

Organizers:

Peter Miller (University of Michigan)
Jared Bronski (University of Illinois at Urbana-Champaign)

Ramon Plaza (Universidad Nacional Autónoma de México)



In this workshop we brought together researchers working on questions of stability in many different contexts and using many different methodologies, including geometrical, analytical and numerical approaches. This provided a fertile ground for interaction between researchers in many different subfields, and led to new approaches and new understanding for many different physical systems. Moreover, the workshop also aimed to foster global collaborative efforts to address these scientific challenges, and to develop initiatives involving graduate students and scientists at all levels of experience. The workshop enhanced the research environment in the host country of the meeting and abroad.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5044>

Participants:

Akers, Benjamin (Air Force Inst. Tech.)
Álvarez del Castillo de Pina, Enrique (Universidad Nacional Autónoma de México)
Angeles García, Felipe (Instituto de Investigaciones en Matemáticas Aplicadas y Sistemas)
Angulo Pava, Jaime (Universidade de São Paulo)
Barreiro, Andrea (Southern Methodist University)
Benzoni-Gavage, Sylvie (University of Lyon)
Bilman, Deniz (University of Michigan)
Bronski, Jared (University of Illinois at Urbana-Champaign)
Capella Kort, Antonio (Universidad Nacional Autónoma de México)
Cox, Graham (Memorial University of Newfoundland)
Cruz-García, Salvador (IIMAS)
Deconinck, Bernard (University of Washington)
Demirkaya-Ozkaya, Aslihan (University of Hartford)
Derks, Gianne (University of Surrey)
Espínola-Rocha, Jesús Adrián (Universidad Autónoma de Metropolitana -Azcapotzalco)
Ghazaryan, Anna (Miami University)
Gonzalez, Rocío (Unidad Profesional Interdisciplinaria de Ingeniería Campus Hidalgo)
Hernandez Melo, Cesar Adolfo (Universidade estadual de Maringá)
Hur, Vera Mikyoung (University of Illinois at Urbana-Champaign)
Jenkinson, Michael (Rensselaer Polytechnic Institute)
Johnson, Mathew (University of Kansas)
Kapitula, Todd (Calvin College)
Kollar, Richard (Comenius University)
Lafortune, Stephane (College of Charleston)
Latushkin, Yuri (University of Missouri)
Lyng, Gregory (University of Wyoming)
Marangell, Robert (Sydney University)
Mascia, Corrado (Università di Roma 'La Sapienza')
Miller, Peter (University of Michigan)
Molina Fructuoso, Martin (University of Maryland at College Park)
Natali, Fabio (Universidade Estadual de Maringá)
Noble, Pascal (INSA Toulouse)
Oliveras, Katie (Seattle University)
Plaza, Ramon (Universidad Nacional Autónoma de México)
Promislow, Keith (Michigan State University)
Rodrigues, Miguel (Université de Rennes 1)
Simeoni, Chiara (University of Nice Sophia Antipolis)
Stanislavova, Milena (University of Kansas)
Stefanov, Atanas (University of Kansas)
Trichtchenko, Olga (University of Washington)
Wright, J. Douglas (Drexel University)

Analysis of Dislocation Models for Crystal Defects

June 25 - 30, 2017

Organizers:

Enrico Valdinoci (University of Melbourne)

Adriana Garroni (Universita' di Roma Sapienza)



The workshop brought together experts from diverse communities that are working on models for dislocations in crystals and on related topics, in order to share their understanding of the problem from their respective perspectives, with particular attention to the rise of young scientists and to the active role played by women of outstanding scientific level in this field. The workshop also had additional benefits. Indeed, as far as we know, this workshop is one of the firsts that brought together a large variety of different mathematical communities which developed research on this topic under different perspectives and with different techniques at a top international level. In this sense, we were confident that the workshop could favor new interactions and stimulate a large number of scientific discussions. The topic also has very strong mathematical foundations and it is rich in potential concrete applications. In addition, this workshop provided an excellent opportunity for young and talented researchers to present their work to the international scientific community, to consolidate their presence in the field and to establish new connections with established world experts. Moreover, there was a very high representation of women involved in this project.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5024>

Participants:

Alicandro, Roberto (Universita' di Cassino e del Lazio Meridionale)
Bonetti, Elena (Universita di Milano)
Bonilla, Luis (Universidad Carlos III de Madrid)
Cagnetti, Filippo (University of Sussex)
Campos Cordero, Judith (Universidad Autónoma Metropolitana - Iztapalapa)
Carpio, Ana (Universidad Complutense de Madrid)
De Luca, Lucia (Technische Universitaet Muenchen)
Dipierro, Serena (University of Melbourne)
Fonseca, Irene (Carnegie Mellon University)
Garroni, Adriana (Universita' di Roma Sapienza)
Gladbach, Peter (Carnegie Mellon University)
Hudson, Tom (University of Warwick)

Jerrard, Robert (University of Toronto)
Luckhaus, Stephan (University of Leipzig)
Mora, Maria Giovanna (Università di Pavia)
Morandotti, Marco (Technical University of Munich)
Patrizi, Stefania (University of Texas at Austin)
Peletier, Mark (Technische Universiteit Eindhoven)
Ponsiglione, Marcello (Universita di Roma Sapienza)
Rizzi, Matteo (University of Chile)
Scardia, Lucia (University of Bath)
Theil, Florian (University of Warwick)
Valdinoci, Enrico (University of Melbourne)
Van Meurs, Patrick (Kanazawa University)
Williams, Luke (University of Warwick)

Thirty Years of Floer Theory for 3-Manifolds

July 30 - August 4, 2017

Organizers:

Robert Lipshitz (University of Oregon)
Daniel Ruberman (Brandeis University)

Jennifer Hom (Georgia Institute of Technology)



The workshop brought together experts on two sides of three-dimensional topology, Floer homology and combinatorial topology, with a focus on three areas of contact between these fields: surgery problems, the fundamental group, and quantum invariants. The workshop's goal was to map out open problems and avenues of attack for the next five years. We accomplished this goal by, in addition to the research talks, asking one participant to give a survey of Floer theory's applications to one of the three areas of contact each of the first three days, and then including hour-and-a-half long problem sessions each of the last two days. Two participants were designated for each problem session to take notes on the problems, which were then compiled and made available online. The goal was a list of thirty motivating problems, for this thirtieth anniversary of the subject.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5011>

Participants:

Allen, Samantha (Indiana University)
Auckly, David (Kansas State University)
Baker, Kenneth (Miami University)
Boileau, Michel (Aix Marseille Université)
Boyer, Steven (Université du Québec à Montréal)
Chan Palomo, Luis Celso (Universidad Autónoma de Yucatán)
Cornish, James (Columbia University)
Eudave-Muñoz, Mario (UNAM)
Frias Garcia, Jose Angel (UNAM)
Golla, Marco (Uppsala University)
Gordon, Cameron (University of Texas at Austin)
Greene, Joshua (Boston College)
Guzmán Tristan, Araceli (UNAM)
Hanselman, Jonathan (University of Texas - Austin)
Hendricks, Kristen (Michigan State University)
Hom, Jennifer (Georgia Institute of Technology)
Kazez, Will (University of Georgia)
Kuzbary, Miriam (Rice University)
Lee, Yi-Jen (City University of Hong Kong)

Lipshitz, Robert (University of Oregon)
Manolescu, Ciprian (UCLA)
McCoy, Duncan (University of Texas at Austin)
Miller, Allison (University of Texas Austin)
Miller, Mike (UCLA)
Piccirillo, Lisa (University of Texas at Austin)
Raoux, Katherine (Brandeis)
Rasmussen, Jake (Cambridge)
Rasmussen, Sarah (Cambridge University)
Roberts, Rachel (Washington University)
Sarkar, Sucharit (UCLA)
Scaduto, Christopher (Stonybrook University)
Starkston, Laura (Stanford)
Truong, Linh (Massachusetts Institute of Technology)
Wang, Shida (University of Oregon)
Watson, Liam (Université de Sherbrooke)
Wong, Biji (Brandeis University)
Wu, Zhongtao (Chinese University of Hong Kong)
Zemke, Ian (UCLA)

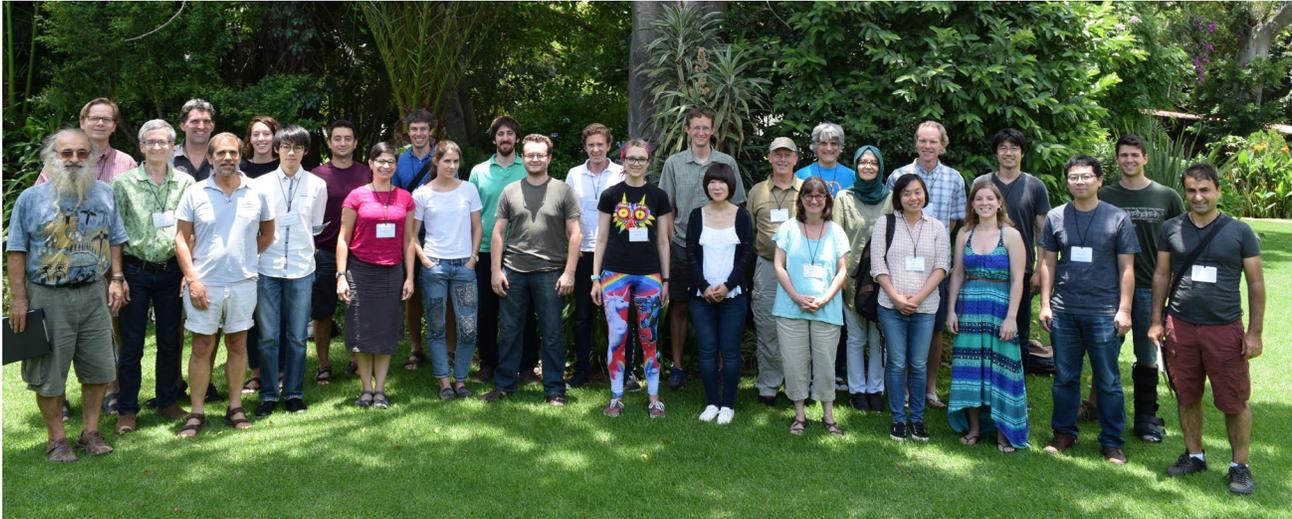
Low Dimensional Topology and Gauge Theory

August 6 - 11, 2017

Organizers:

David Auckly (Kansas State University)
Daniel Ruberman (Brandeis University)
Yi-Jen Lee (Chinese University of Hong Kong)

Adam Levine (Princeton University)
Anar Akhmedov (University of Minnesota)



There are many fundamental open problems in the theory of smooth 4-manifolds. At the same time there has been steady progress in the field. The most effective tool has been gauge theory. The first gauge theoretic information about 4-manifolds came from the Yang-Mills equations. Later, the Seiberg-Witten equations transformed the field, to be followed by the development of Heegaard Floer theory. It is a reasonable conjecture that the invariants arising from all three packages agree, and there are a number of partial results to support this. It is more difficult to compare the associated invariants of 3-manifolds or knots. There are many interesting variants and gauge-theoretic tools in 3-dimensions, and the interplay between these various tools is an interesting area of current research. At the same time progress continues on various construction techniques. New examples continue to be discovered and existing examples are becoming better understood. This conference brought together researchers who study smooth topology in dimension four with researchers who study the various forms of gauge theory.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5040>

Participants:

Akbulut, Selman (Michigan State University)
Auckly, David (Kansas State University)
Baldwin, John (Boston College)
Baykur, Inanc (University of Massachusetts)
Boden, Hans (McMaster University)
Curtis, Cynthia (College of New Jersey)
Feehan, Paul (Rutgers University)
Gabai, David (Princeton University)
Gompf, Bob (University of Texas Austin)
Holguín Cardona, Sergio Andrés (UNAM)
Karakurt, Cagri (Bogazici University)
Kim, Hee Jung (Seoul National University)
Knapp, Adam (American University)
Konno, Hokuto (University of Tokyo)
Lee, Yi-Jen (Chinese University of Hong Kong)
Li, Tian-Jun (University of Minnesota)
Longo, Vincent (University of Nebraska)
Mark, Thomas (University of Virginia)

Melvin, Paul (Bryn Mawr College)
Miller, Maggie (Princeton University)
Monden, Naoyuki (Osaka Electro - Communication University)
Piccirillo, Lisa (University of Texas at Austin)
Pinzon-Caicedo, Juanita (University of Georgia)
Raoux, Katherine (Brandeis)
Sakalli, Sumeyra (University of Minnesota)
Schwartz, Hannah (Bryn Mawr College)
Simone, Jonathan (University of Virginia)
Sivek, Steven (Imperial College London)
Strle, Saso (University of Ljubljana)
Takahashi, Ryosuke (The Chinese University of Hong Kong)
Wong, Biji (Brandeis University)
Yasui, Kouichi (Osaka University)
Zupan, Alex (University of Nebraska-Lincoln)

Mathematical and Numerical Methods for Time-Dependent Quantum Mechanics - from Dynamics to Quantum Information

August 13 - 18, 2017

Organizers:

Emmanuel Lorin (Carleton University)
Andre Bandrauk (Universite de Sherbrooke)

Barry Sanders (University of Calgary)



Modern laser technology is today the unique source of ultrafast (few cycle) intense laser pulses, with intensities exceeding the internal electric field in atoms and molecules. The interaction of such pulses with atoms and molecules leads to a new regime of laser-matter interaction, a highly nonlinear nonperturbative regime where new nonlinear physical phenomena occur such as High Harmonic Generation, HHG, from which the shortest pulse has been created, the attosecond ($\text{asec}=10^{-18}$ second) pulse, the natural time scale of the electron. Such pulses are new tools for imaging electron motion and their interaction with these new intense pulses. This workshop focussed on mathematical and numerical methods for time-dependent relativistic & nonrelativistic quantum mechanics, which is the mathematical foundation for quantum dynamics and for quantum information processing. Regimes for which highly nonlinear interactions occur at both microscopic and macroscopic levels, were specifically addressed. As an example of the importance of applied mathematics in these areas of modern science, we mention the recent article in SIAM NEWS-vol 48(4), May 2015, "Mathematical Challenges and Opportunities in Optics and Photonics", which emphasizes the importance of research in light-matter interaction as becoming one of the most active research fields in applied mathematics.

Participants:

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5010>

Argáez García, Carlos (University of Iceland)
Arrighi, Pablo (Aix-Marseille University)
Bandrauk, Andre (Universite de Sherbrooke)
Brabec, Thomas (University of Ottawa)
Cai, Yongyong (Beijing Computational Science Research Center)
Cances, Eric (Ecole des Ponts and INRIA)
Carrington, Tucker (Queen's University)
Chelkowski, Szczepan (Université de Sherbrooke)
Chin, Siu (Texas A&M University)
Fillion-Gourdeau, Francois (INRS-EMT)
Kato, Tsuyoshi (The University of Tokyo)
Koch, Christiane (University of Kassel)
Lefebvre, Catherine (INRS-EMT)
León-Montiel, Roberto (UNAM)

Lopata, Kenneth (Louisiana State University)
Lorin, Emmanuel (Carleton University)
Maitra, Neepa (Hunter College and Graduate Center of the City University of New York)
Moya Cessa, Hector (Instituto Nacional de Astrofísica, Óptica y Electrónica)
Neville, Simon (University of Ottawa)
Palittapongarnpim, Pantita (U. of Calgary)
Pisanty, Emilio (ICFO)
Sanders, Barry (University of Calgary)
Schild, Axel (ETH Zurich)
Schirmer, Sophie (Swansea University)
Starace, Anthony (University of Nebraska)
Turinici, Gabriel (Université Paris Dauphine)
Uzer, Turgay (Georgia Tech.)

Symmetries of Discrete Structures in Geometry

August 20 - 25, 2017

Organizers:

Eugenia O'Reilly-Regueiro (Universidad Nacional Autonoma de Mexico)

Egon Schulte (Northeastern University)
Dimitri Leemans (Université Libre de Bruxelles)



Our main goal was to nourish new and unexpected connections established recently between the theories of polytopes, polyhedra, maps, Coxeter groups and incidence geometries, focussing on symmetry as a unifying theme. In each case an important class of groups acts on a natural geometrical and combinatorial object in a rich enough way to ensure a fruitful interplay between geometric intuition and algebraic structure. Naturally their study requires a broad and long-range view, merging approaches from a wide range of different fields such as geometry, combinatorics, incidence geometry, group theory and low-dimensional topology. These connections are further enriched by bringing in new ideas and methods from computational algebra, where powerful new algorithms provide an abundance of inspiring examples and challenging conjectures.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5015>

Participants:

Araujo-Pardo, Gabriela (UNAM)
Berman, Leah (University of Alaska Fairbanks)
Bracho, Javier (UNAM)
Brooksbank, Peter (Bucknell University)
Carrancho Fernandes, Maria Elisa (University of Aveiro)
Castillo-Ramirez, Alonso (Universidad de Guadalajara)
Collins, Jose (UNAM)
Conder, Marston (University of Auckland)
Cunningham, Gabriel (University of Massachusetts Boston)
De Schepper, Anneleen (Ghent University)
Del Rio Francos, Maria (Anahuac)
Ens, Eric (York University)
Garcia-Colin, Natalia (CONACYT-INFOTEC)
Garcia-Vazquez, Patricio Ricardo (UNAM)
Hansberg, Adriana (Instituto de Matemáticas, Universidad Nacional Autónoma de México)
Hubard, Isabel (UNAM)
Ivic Weiss, Asia (York University)
Jones, Gareth (University of Southampton)

Koike-Quintanar, Sergio Hiroki (UNAM)
Leemans, Dimitri (Université Libre de Bruxelles)
Mochan-Quesnel, Jaime Elias (UNAM)
Moerenhout, Jeremie (University of Auckland)
Monson, Barry (University of New Brunswick)
Montero, Antonio (UNAM)
Mulpas, Jessica (Oxford University)
O'Reilly-Regueiro, Eugenia (Universidad Nacional Autonoma de Mexico)
Pellicer, Daniel (Universidad Nacional Autonoma de Mexico)
Ramos, Alejandra (University of Primorska)
Ramos-Tort, Andrea (UNAM)
Schulte, Egon (Northeastern University)
Silva-Ruiz, Claudia (UNAM)
Soberón, Pablo (Northeastern University)
Stokes, Klara (University of Skovde)
Trejo-Escamilla, Briseida (UNAM)
van Maldeghem, Hendrik (Ghent University)
Williams, Gordon (University of Alaska Fairbanks)
Wilson, Steve (Northern Arizona University)

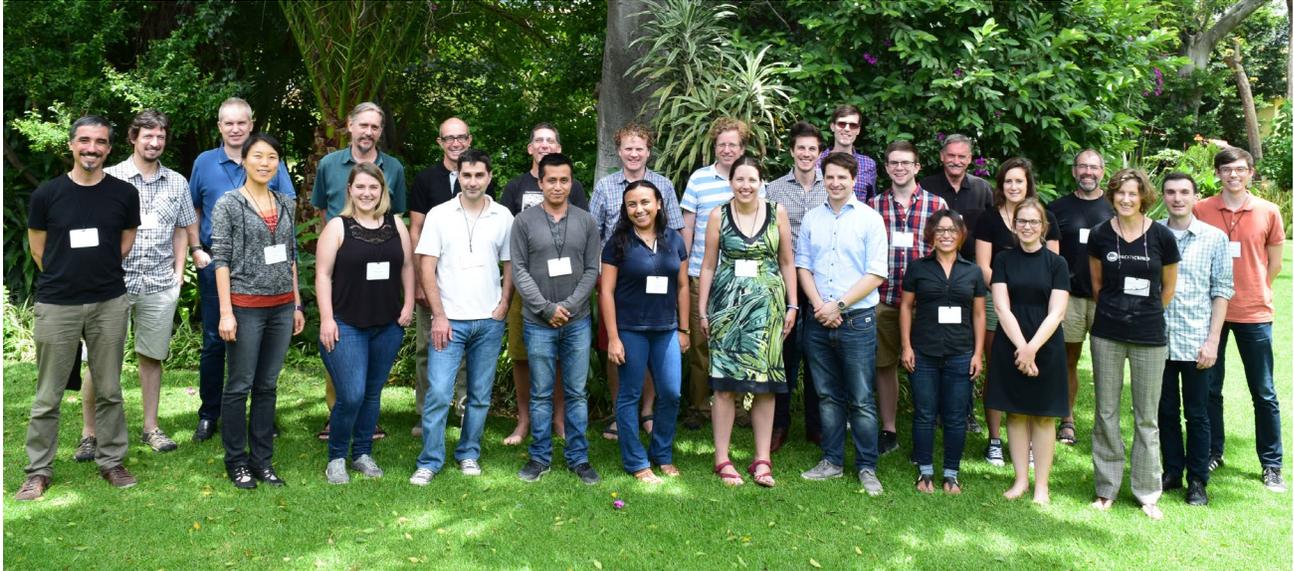
New perspectives on State Space Models

August 27 - September 1, 2017

Organizers:

David Campbell (Simon Fraser University)
Marie Auger-Methe (Dalhousie University)

Len Thomas (University of St. Andrews)



This workshop focussed on new and potential methodological advances for State Space Models (SSMs). A wide spectrum of researchers were assembled to bring advances from diverse fields to explore these tools and the modifications needed to accommodate the process noise and observation noise combination in SSMs. The goal was to develop new collaborations between distant fields and accelerate research and collaboration in SSMs for resource management purposes. As the flexibility of SSMs continues to add to their popularity, it is important to bring together the communities at this crucial stage in their development. Furthermore, in bringing together experts in a variety of sub-fields of Mathematics and Statistics permitted the workshop participants to produce a 'call to arms' paper outlining recent advances in their respective fields with potential for high impact in SSMs and highlight the collaborative potential.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5120>

Participants:

Aeberhard, William (Dalhousie University)
Albertsen, Christoffer (Technical University of Denmark)
Auger-Methe, Marie (Dalhousie University)
Campbell, David (Simon Fraser University)
Cole, Diana (University of Kent)
Dinsdale, Daniel (University of British Columbia)
Dowd, Michael (Dalhousie University)
Edwards, Andrew (Fisheries and Oceans Canada)
Empacher, Fanny (University of St Andrews)
Euan, Carolina (King Abdullah University of Science and Technology)
Ferraz, Gonçalo (Universidade Federal do Rio Grande do Sul)
Genton, Marc (King Abdullah University of Science and Technology)
Ionides, Edward (University of Michigan)
Joy, Ruth (Simon Fraser University)

King, Aaron (University of Michigan)
Lawler, Ethan (Dalhousie University)
Leos-Barajas, Vianey (Iowa State University)
Martinez Hernandez, Israel (Centro de Investigación en Matemáticas, CIMAT)
Michaud, Nicholas (University of California, Berkeley)
Morales, Juan (Universidad Nacional del Comahue)
Newman, Ken (U.S. Fish and Wildlife Service)
Petris, Giovanni (University of Arkansas)
Ruiz Suárez, Sofia (Universidad Nacional del Comahue)
Salibian-Barrera, Matias (The University of British Columbia)
Sun, Ying (King Abdullah University of Science and Technology)
Thomas, Len (University of St. Andrews)
Whoriskey, Kim (Dalhousie University)

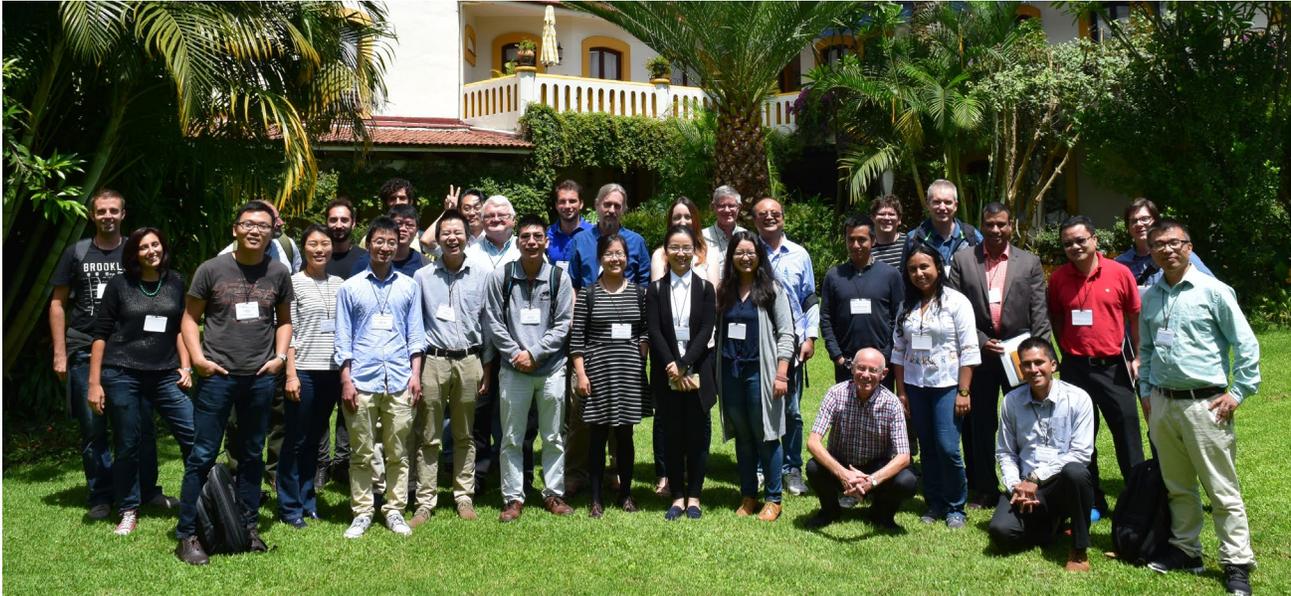
Distributed Data for Dynamics and Manifolds

September 3 - 8, 2017

Organizers:

Jiguo Cao (Simon Fraser University)
Giles Hooker (Cornell University)
Fang Yao (University of Toronto)

James Ramsay (McGill University)
Laura Sangalli (Politecnico di Milano, Italy)



The ever-increasing rise of automated measurement has allowed us an unprecedented view of the world around us; from chemical processes on cell surfaces to global climate models, new sensors are capable of recording complex processes over a huge variety of spatial scales. The challenge is now not to collect data, but to analyze it. This workshop will focus on pairing complex models of physical processes with large data sets recorded on complex objects to learn about these processes, refine our models and come new understanding. This workshop brought together statisticians, mathematical biologists, geometers and applied mathematicians to develop new methods to understand how this new wealth of data can inform and improve mathematical models in these fields and how these models, in turn, can affect how the data is collected and measured.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5070>

Participants:

Arnone, Eleonora (Politecnico di Milano)
Cao, Jiguo (Simon Fraser University)
Carey, Michelle (University College Dublin)
Chung, Moo (University of Wisconsin-Madison)
Euan, Carolina (King Abdullah University of Science and Technology)
Ferraccioli, Federico (Università degli Studi di Padova)
Fricks, John (Arizona State University)
Genton, Marc (King Abdullah University of Science and Technology)
King, Aaron (University of Michigan)
Lai, Ming-jun (University of Georgia)
Li, Juan (McGill University)
Lila, Eardi (University of Cambridge)
Lin, Zhenhua (University of Toronto)
Martinez Hernandez, Israel (Centro de Investigación en Matemáticas, CIMAT)
Mendoza, Francisco (UNAM)

Nie, Yunlong (Simon Fraser University)
Ramsay, James (McGill University)
Ramsay, Tim (University of Ottawa)
Sang, Peijun (Simon Fraser University)
Secchi, Piercesare (Politecnico di Milano)
Shang, Han Lin (Australian National University)
Srivastava, Anuj (Florida State University)
Stefanucci, Marco (Università di Roma - La Sapienza)
Sun, Ying (King Abdullah University of Science and Technology)
Tupper, Paul (Simon Fraser University)
Vantini, Simone (Politecnico di Milano)
Voit, Eberhard (Georgia Institute Technology)
Wang, Liangliang (Simon Fraser University)
Wang, Yuan (University of Wisconsin-Madison)
Yang, Yuping (Simon Fraser University)
Zhu, Hongtu (University of North Carolina at Chapel Hill)

Principles of Gene Circuit Design

September 10 - 15, 2017

Organizers:

Pablo Meyer (IBM)
Aleksandra Walczak (CNRS - LPTENS)
Diego Ferreiro (Universidad de Buenos Aires)

Thierry Mora (CNRS)
Michael Elowitz (California Institute of Technology)



The increasing sophistication and power of synthetic biology to analyze and reconstruct genetic circuits has developed in parallel to the more computational approach of gene regulatory networks' inference from large genomic datasets. Revolutionary techniques using single-cell approaches such as single-cell imaging, single-cell metabolomics and single-cell genomics are helping merge these previously separated fields. Through its many applications single cell studies, genomics and synthetic biology are beginning to be used in medical contexts, but there is a growing recognition that circuit level problems are limiting our ability to predictively design therapeutic strategies. The conference brought together many of the pioneers and leading experts in these diverse fields for a few days of extensive, interdisciplinary and informal discussion. Our goal was to create a forum where knowledge is shared, hoping that this diverse community will discuss how the lack of understanding of design principles is limiting the advancement of genetic circuit engineering and help define together the agenda for understanding genetic circuit design.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5143>

Participants:

Alcala-Corona, Sergio Antonio (National Institute of Genomic Medicine, Mexico)
Altan-Bonnet, Grégoire (National Cancer Institute)
Antebi, Yaron (Caltech)
Arzate, Rodrigo (UNAM)
Avelar-Rivas, J Abraham (Cinvestav)
Borrayo-Carbajal, Ernesto (Universidad de Guadalajara)
Briscoe, James (The Francis Crick Institute)
Bromberg, Yana (Rutgers)
Cruz Maldonado, Carlos Roberto (UNAM)
De Luna, Alexander (CINVESTAV Mexico)
Dostatni, Nathalie (Institut Curie)
Elowitz, Michael (California Institute of Technology)
Escorcía Rodríguez, Juan Miguel (UNAM)
Federici, Fernan (Universidad Católica de Chile)
Ferreiro, Diego (Universidad de Buenos Aires)
Francois, Paul (McGill University)
Freyre-Gonzalez, Julio Augusto (Centro de Ciencias Genómicas)
Furlan, Mayra (Fisiología Celular UNAM)
Hernández-Lemus, Enrique (INMEGEN)
Herrera-Valdez, Marco Arieli (UNAM)

Howard, Martin (John Innes Centre)
Karin, Omer (Weizmann)
Karr, Jonathan (Icahn School of Medicine at Mount Sinai)
Khammash, Mustafa (ETH Zurich)
Lacramioara, Bintu (Stanford University)
Larkin, Joe (UC-San Diego)
López Castillo, Alfredo Antonio (UNAM)
Martinez-Sanchez, Mariana (UNAM)
Meyer, Pablo (IBM)
Miller-Jensen, Kathryn (Yale)
Mora, Thierry (CNRS)
Nemenman, Ilya (Emory University)
Resendis, Osbaldo (UNAM-INMEGEN)
Reyes, Rodrigo (Mc Gill U.)
Rodríguez Martínez, María (IBM, Zurich Research Lab)
Rudge, Tim (Universidad Católica de Chile)
Sánchez, Ignacio Enrique (Universidad de Buenos Aires)
Skotheim, Jan (Stanford)
Sprinzak, David (Tel Aviv University)
Walczak, Aleksandra (CNRS - LPTENS)

Splitting Algorithms, Modern Operator Theory, and Applications

September 17 - 22, 2017

Organizers:

Heinz Bauschke (University of British Columbia)
Regina Burachik (University of South Australia)

D. Russell Luke (University of Goettingen)



The most urgent problems we face today - global warming or economic crises may come to mind - are too large and too complex to solve through one monolithic action. Like a Sudoku puzzle, we start with something that we can do, something that is manageable - turn down the thermostat, lower interest rates - and hope that the accumulation of positive moves will lead, eventually, to a solution. In some cases there is solid mathematical theory to guarantee when and how decompositions of problems into simpler parts result in procedures, or courses of action, that are guaranteed to lead to a solution. Understanding the behaviour of these procedures, otherwise known as splitting methods, in increasingly complex environments - when they work, how fast they work, and how close to the solution you need already to be before they will work - is the subject of monotone operator theory, and the reason for this workshop in Banff.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5030>

Participants:

Adly, Samir (University of Limoges)
Aragon Artacho, Francisco Javier (Alicante)
Attouch, Hedy (Université Montpellier)
Bauschke, Heinz (University of British Columbia)
Bot, Radu Ioan (University of Vienna)
Burachik, Regina (University of South Australia)
Burke, James (University of Washington)
Cegielski, Andrzej (University of Zielona Góra)
Combettes, Patrick (North Carolina State University)
Csetnek, Robert (Vienna)
Daniilidis, Aris (Chile)
Dao, Minh (University of Newcastle)
Diaz Millan, Reinier (Federal Institute of Goias)
Dontchev, Asen (AMS and the University of Michigan)
Eckstein, Jonathan (Rutgers University)
Elser, Veit (Cornell University)
Giselsson, Pontus (Lund University (Sweden))
Goebel, Rafal (Loyola University Chicago)
Gonçalves, Max L.N. (Federal University of Goias)
Grad, Sorin-Mihai (Chemnitz University of Technology)
Kaya, Yalcin (University of South Australia)

Lewis, Adrian (Cornell University)
Lindstrom, Scott (University of Newcastle)
Lopez, Genaro (Sevilla)
Luke, D. Russell (University of Goettingen)
Malitsky, Yura (Institute for Numerical and Applied Mathematics, University of Goettingen)
Martinez Legaz, Juan Enrique (Universitat Autònoma de Barcelona)
Melo, Jefferson (Federal University of Goias)
Moursi, Walaa (UBC)
Noll, Dominik (University of Toulouse)
Nurminski, Evgeni (Far Eastern Federal University)
Patrinos, Panos (KU Leuven)
Resmerita, Elena (Alpen-Adria Universitaet)
Simons, Stephen (UCSB)
So, Anthony Man-Cho (The Chinese University of Hong Kong)
Sotirov, Renata (Tilburg Univeristy)
Vanderwerff, Jon (La Sierra University)
Wang, Shawn (University of British Columbia)
Yamada, Isao (Tokyo Institute of Technology)
Yu, Yaoliang (University of Waterloo)
Yuan, Xiaoming (Hong Kong Baptist University)

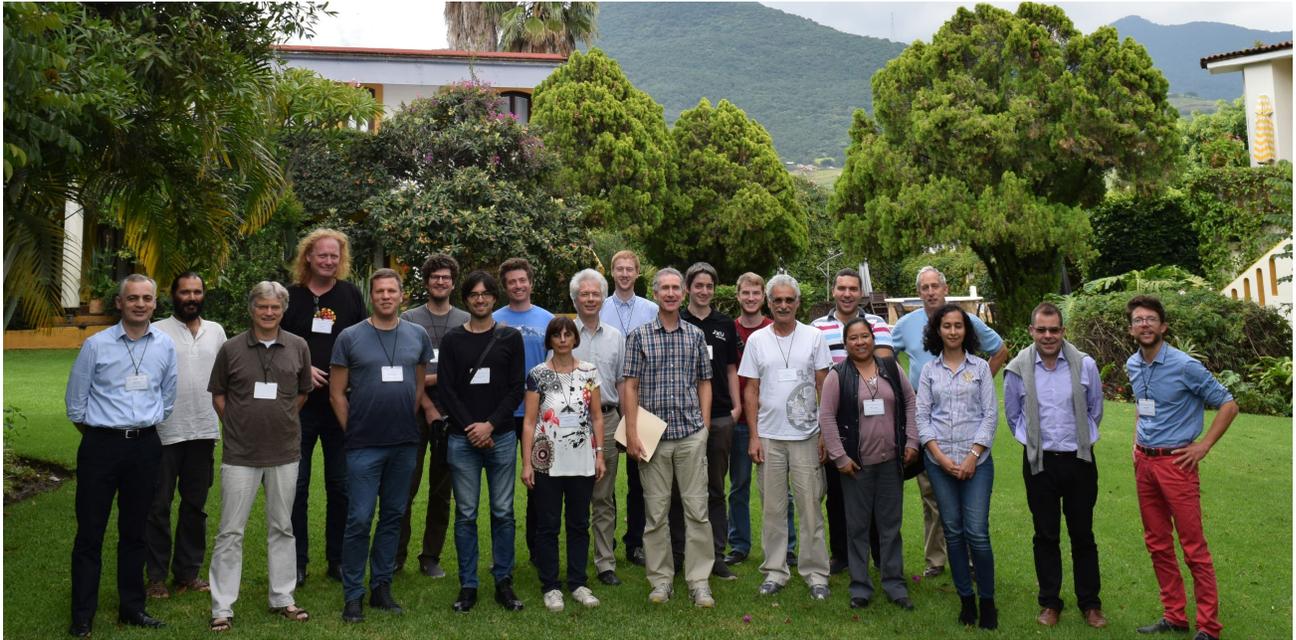
Geometry & Computation for Interactive Simulation

September 24 - 29, 2017

Organizers:

Jorg Peters (University of Florida)
Ulrich Reif (Technische Universitaet Darmstadt)

Dinesh Pai (University of British Columbia)



The workshop brought together a unique set of top researchers from geometry processing, computational geometry, geometric design, formulation of simulation models, real-time computation for interactive simulation, isogeometric and higher-order isoparametric design, and non-meshed approaches. The focus was on presenting the state-of-the-art in a tutorial fashion to develop a more holistic approach to reverse the tendency towards specialization that risks neglecting feedback to the overarching set of challenges. Pointers and introductions to available tools, code or theory were part of the presentations, e.g. opensource software packages such as sofa, blender, bullet, CGAL, etc.. and select proprietary tools from Autodesk and Nvidia. To shorten and improve the outcomes of the design-analysis cycle, the workshop highlighted integrating novel techniques that range from isogeometric design including irregularities, to new hierarchical spline spaces, to low-degree high-quality spline surfaces, co-rotational PDE models, collocation with extended B-splines, and convolution improvement of discontinuous Galerkin computations.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5008>

Participants:

Alliez, Pierre (INRIA Sophia Antipolis)
Ascher, Uri (University of British Columbia)
Bonilla, Beatriz (Benemérita Universidad Autónoma de Puebla)
Cirak, Fehmi (University of Cambridge)
Grandine, Thomas (The Boeing Company)
Hildebrandt, Klaus (Delft University of Technology)
Jacobson, Alec (University of Toronto)
Levin, David (University of Toronto)
Licon Salaiz, Jose Luis (University of Cologne)
Mantzaflaris, Angelos (RICAM)

Martin, Florian (University of Stuttgart)
Mirzargar, Mahsa (University of Miami)
Peters, Jorg (University of Florida)
Pitolli, Francesca (University of Roma)
Reif, Ulrich (Technische Universitaet Darmstadt)
Singh, Karan (University of Toronto)
Stam, Jos (Autodesk Research)
Takacs, Thomas (JKU Linz)
Talbot, Hugo (INRIA)
Youngquist, Jeremy (University of Florida)
Zorin, Denis (New York University)

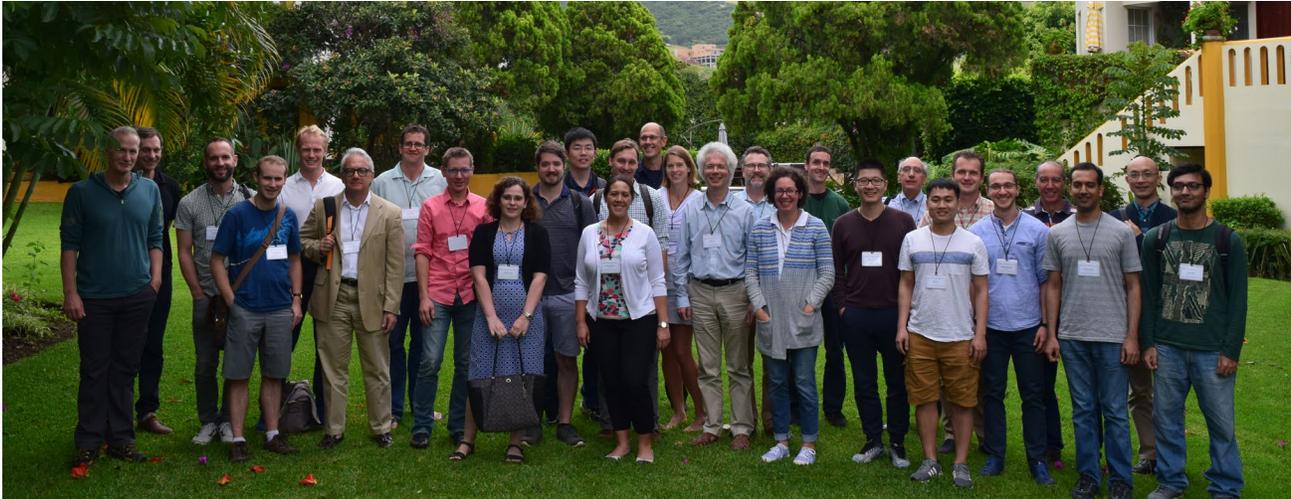
Complex Creeping Fluids: Numerical Methods and Theory

October 1 - 6, 2017

Organizers:

Bryan Quaife (Florida State University)

George Biros (University of Texas)



Many applications in biology, physics, and science require solving problems in complex fluids. A few examples of complex fluids include colloidal suspensions, blood flows, fumble and rigid particle suspensions, vesicle flows, Mizar solutions, bacterial solutions, and polymer solutions. They can be viewed as fluids that possess some kind of elastic microstructure, characterized by the presence of a microscopic length scale. Because of the scales of many of these complex fluids, the Reynolds number is small, and the flow is assumed to be creeping (i.e., governed by the incompressible Stokes equations). Simulations of complex fluids are particularly challenging because of fluid-structure interactions, large deformations, strong nonlinearities, non-local interactions, evolving interfaces, and multiple length and time scales with, typically, no clear scale separation. They are non-equilibrium, non-Hamiltonian systems and typically lack a variational characterization of their dynamics. As a result, complex fluids display an incredible range of structural and rheological properties. The goal of this workshop was to bring together world-renowned experts that develop theory, numerical and stochastic methods, statistical methods, and software for simulating complex creeping fluids.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5155>

Participants:

af Klinteberg, Ludvig (Simon Fraser University)
Aidun, Cyrus (Georgia Tech)
Askham, Travis (University of Washington)
Bao, Yuanxun Bill (New York University)
Biros, George (University of Texas)
Bystricky, Lukas (Florida State University)
Eastham, Patrick (FSU)
Gekle, Stephan (University of Bayreuth)
Gillman, Adrianna (Rice University)
Graham, Michael (University of Wisconsin-Madison)
Kabacaoglu, Gokberk (University of Texas)
Lushi, Enkeleida (Simons Foundation & New York University)
Malhotra, Dhairya (University of Texas at Austin)
Miksis, Michael J. (Northwestern University)
Misbah, Chaouqi (CNRS)
Moore, Nick (Florida State University)
Moza, Romir (University of Texas at Austin)

Pivkin, Igor (University of Lugano)
Quaife, Bryan (Florida State University)
Saintillan, David (UC San Diego)
Salac, David (University at Buffalo)
Sandoval Torres, Sadoth (Instituto Politécnico Nacional - CIIDIR Oaxaca)
Shaqfeh, Eric (Stanford)
Shelley, Michael (Simons Foundation & New York University)
Siegel, Michael (New Jersey Institute of Technology)
Tornberg, Anna-Karin (KTH Royal Institute of Technology)
Veerapaneni, Shraavan (University of Michigan)
Vlahovska, Petia (Northwestern University)
Wu, Bobbie (University of Michigan)
Yan, Wen (Flatiron Institute, Simons Foundation)
Young, Yuan-Nan (NJIT)
Zorin, Denis (New York University)

Mathematical Advances in Electron Microscopy

October 15 - 20, 2017

Organizers:

Peter Binev (University of South Carolina)
Paul Voyles (University of Wisconsin - Madison)
Thomas Vogt (University of South Carolina - NanoCenter)

Nigel Browning (Pacific Northwest National Laboratory)
Wolfgang Dahmen (University of South Carolina)



The aim of the workshop was to connect mathematicians together with specialists in imaging, material science, and electron microscopy to advance modeling, simulation and analysis by incorporating state-of-the-art mathematical and computational tools and methods in electron microscopy. It was instrumental to build foundations for interdisciplinary research by engaging all these subject areas. This workshop provided the opportunity to present and exchange ideas, share data, and introduce new tools and develop new imaging and sensing paradigms needed in a variety of fields.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5055>

Participants:

Anden, Joakim (Flatiron Institute)
Ben Dory, Tamir (Princeton University)
Berkels, Benjamin (RWTH Aachen University)
Binev, Peter (University of South Carolina)
Browning, Nigel (Pacific Northwest National Laboratory)
Dahmen, Wolfgang (University of South Carolina)
Dwyer, Christian (Arizona State University)
Gursoy, Doga (Argonne National Lab)
Haigh, Sarah (University of Manchester)
Johnstone, Duncan (University of Cambridge)
Jones, Lewys (University of Oxford)
Kelly, Kevin (Rice University)
LeBeau, James (North Carolina State University)
März, Maximilian (Technische Universität Berlin)
Mayer, Joachim (RWTH-Aachen)
Nellist, Peter (Oxford University)

Ophus, Colin (Lawrence Berkeley National Lab)
Ramasse, Quentin (SuperSTEM Laboratory)
Rauhut, Holger (RWTH Aachen University)
Reed, Bryan (Integrated Dynamic Electron Solutions, Inc.)
Ringe, Emilie (Rice University)
Rooney, Aidan (University of Manchester)
Sanders, Toby (Arizona State University)
Shkolnisky, Yoel (Tel-Aviv University)
Stevens, Andrew (Pacific NW Natl Lab / Duke Univ)
Vogt, Thomas (University of South Carolina - NanoCenter)
Voyles, Paul (University of Wisconsin - Madison)
Webster, Clayton (Oak Ridge National Laboratory)
Xin, Huolin (Brookhaven National Laboratory)
Yankovich, Andrew (Chalmers University of Technology)

Beyond Convexity: Emerging Challenges in Data Science

October 22 - 27, 2017

Organizers:

Stephen Wright (University of Wisconsin-Madison)
Robert Nowak (University of Wisconsin-Madison)

Tamara Kolda (Sandia National Laboratories)
Rebecca Willett (University of Wisconsin-Madison)



Modern methods in machine learning have led to a renaissance in large-scale analytics that has sped scientific exploration, revolutionized advertising strategies, improved health care services, and contributed strongly to national security. Many of these methods are based on convex optimization, a class of problems that is easy to solve in a mathematical sense, and also feasible in a practical sense, even for enormous data sets. Increasingly, data scientists are encountering problems that are not convex, and these are posing significant challenges for the current solver methodology. The primary objectives of this workshop were to explore nonconvex problems that arise in data science and to develop algorithms for solving these problems that are practical, that draw on the full range of technology from optimization, statistics, and computational hardware and systems, and that come with performance guarantees. We brought together researchers from the machine learning, optimization, statistics, and applied mathematics communities to explore these key challenges and opportunities at the intersection of nonconvex optimization and machine learning.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5159>

Participants:

Anderson-Bergman, Cliff (Sandia National Lab)
Bhojanapalli, Srinadh (TTI-Chicago)
Burer, Sam (University of Iowa)
Chi, Eric (NC State)
Curtis, Frank E. (Lehigh University)
Dalmau Cedeño, Oscar (Center for Research in Mathematics, CIMAT)
Eufrazio Vazquez, Odin Fernando (CIMAT)
Fazel, Maryam (University of Washington)
Hong, David (University of Michigan)
Kolda, Tamara (Sandia National Laboratories)
Lessard, Laurent (University of Wisconsin-Madison)
Linderth, Jeff (Wisconsin University)
Loh, Po-Ling (University of Wisconsin - Madison)
Marcia, Roummel (University of California, Merced)
Nowak, Robert (University of Wisconsin-Madison)
Ongie, Greg (U. Michigan)

Raskutti, Garvesh (University of Wisconsin-Madison)
Robeva, Elina (MIT)
Royer, Clement (University of Wisconsin-Madison)
Sabach, Shoham (Technion - Israel Institute of Technology)
Schiebinger, Geoff (MIT)
Shah, Devavrat (Massachusetts Institute of Technology)
Soltanolkotabi, Mahdi (University of Southern California)
Teboulle, Marc (Tel Aviv University)
Tropp, Joel (California Institute of Technology)
Uhler, Caroline (MIT)
Wibisono, Andre (University of Wisconsin-Madison)
Willett, Rebecca (University of Wisconsin-Madison)
Wright, Stephen (University of Wisconsin-Madison)

Synthesis of Statistics, Data Mining and Environmental Sciences in Pursuit of Knowledge Discovery

October 29 - November 3, 2017

Organizers:

Leticia Ramirez Ramirez (Centro de Investigacion en Matematicas)

Vyacheslav Lyubchich (University of Maryland)

Yulia Gel (University of Texas at Dallas)



In the era of massive multi-platform, multiscale and multi-source data, there appear increasingly more examples that are beyond the scope of any single discipline or field of research practice and that connect across domains with new fascinating capabilities. Such problems must be addressed simultaneously from multiple different perspectives, ranging from statistical sciences, computational and applied mathematics to machine learning to pure and applied studies of Earth systems and their exposure to physical and human influences. The primary goal of this 5-days workshop was to discuss innovative multi-disciplinary approaches to analysis, modeling and prediction of environmental processes and their societal impact, with a particular focus, on modern statistical and data mining methods for information fusion, uncertainty quantification and propagation. The workshop highlighted a number of such tightly interwoven themes as uncertainty quantification in climate modeling and its impact on end users; climate-induced risk management, adaption and sustainability; climate-sensitive epidemiology, and climate modeling, urban analytics and data mining.

*For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5076>*

Participants:

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Alvarez Rodríguez, Eduardo (Centro de Investigación en Matemáticas)

Barahona, Igor (Instituto de Matemáticas. Universidad Nacional Autónoma de México)

Barrios Vargas, Juan Martin (CONABIO)

Beach, Robert (RTI International)

Bobashev, Georgiy (RTI - USA)

Brenning, Alexander (Friedrich Schiller University Jena)

Chatterjee, Singdhansu B (University of Minnesota)

Coats, Sloan (NCAR)

Dixon, Matthew (Illinois Institute of Technology)

Ensor, Katherine (Rice University)

Fairchild, Geoffrey (Los Alamos National Laboratory)

Gel, Yulia (University of Texas at Dallas)

Gelfand, Alan (Duke University)

Gómez Méndez, Irving (CIMAT)

Guzmán Zavaleta, Zobeida Jezabel (Universidad Iberoamericana Puebla)

Haran, Murali (Pennsylvania State University)

Haug, Ola (Norwegian Computing Center)

Lee, Kyo (JPL/NASA)

Lund, Robert (Clemson University)

Lyubchich, Vyacheslav (University of Maryland Center for Environmental Science)

Mastretta-Yanes, Alicia (CONABIO)

Ortega Morgado, Victoria Andrea (Universidad Nacional Autónoma de México)

Ramirez Ramirez, Leticia (Centro de Investigacion en Matematicas)

Sandoval Torres, Sadoth (Instituto Politecnico Nacional - CIIDIR Oaxaca)

Sokolov, Vadim (George Mason University)

Sykulski, Adam (University of Lancaster)

Warner, Lizzy (Northeastern University)

The Geometry and Topology of Knotting and Entanglement in Proteins

November 5 - 10, 2017

Organizers:

Kenneth Millett (University of California, Santa Barbara)

Dorothy Buck (University of Bath)

Eric Rawdon (University of Saint Thomas)

Joanna Sulkowska (University of Warsaw)

Mario Eudave-Muñoz (Universidad Nacional Autónoma de México)



Researchers from theoretical and experimental biology and biophysics and from mathematical geometry and topology will focus their efforts on understanding the consequences of the spatial structure of proteins and nucleic acids, such as DNA, on how living organisms work. For example, we know that some proteins contain knots while most others don't. How and why did this happen? Was it an accidental mutation that persists (when it shouldn't) or is there a reason why this knotting is needed. How do enzymes that change the spatial structure of nucleic acids work? How does one devise new enzymes to slow and stop various forms of cancer or alter their toxicity? These grand questions benefit from cross-disciplinary perspectives, theories, methods, and experience assembled in this workshop.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5032>

Participants:

Armas-Sanabria, Lorena (UNAM)

Arsuaga, Javier (University of California, Davis)

Barbensi, Agnese (University of Oxford)

Benitez-Cardoza, Claudia (Escuela Nacional de Medicina y Homeopatía del IPN)

Buck, Dorothy (University of Bath)

Cabrera-Ibarra, Hugo (Instituto Potosino de Investigacion Cientifica y Tecnologica)

Chapman, Kyle (University of Georgia)

Chapman, Harrison (University of Georgia)

Cieplak, Marek (Polish Academy of Science)

Dabrowski-Tumanski, Pawel (University of Warsaw)

Deguchi, Tetsuo (Ochanomizu University)

Diao, Yuanan (University of North Carolina)

Ernst, Claus (Western Kentucky University)

Eudave-Muñoz, Mario (Universidad Nacional Autónoma de México)

Guevara Hernandez, Maria de los Angeles (Instituto Potosino de Investigacion Cientifica y Tecnologica Division de Matematicas Aplicadas)

Haglund, Ellinor (Rice University)

Hake, Kate (University of California Santa Barbara)

Hermosillo-Reyes, Oyuki Hayde (Universidad Autónoma de Nayarit)

Hernandez Granados, David Ivan (IPICYT)

Hernández Rosales, Maribel (UNAM)

Jackson, Sophie (University of Cambridge)

Liu, Pengyu (UNC-Charlotte)

Medina Graciano, Carolina (Universidad Autónoma de San Luis Potosí)

Millett, Kenneth (University of California, Santa Barbara)

Needham, Tom (Ohio State University)

Niemyska, Wanda (University of Warsaw)

Onuchic, Jose (Rice University)

Panagiotou, Eleni (University of California Santa Barbara)

Plunkett, Laura (Holy Names University)

Ramos-Velazquez, Cinthia Sarai (Escuela Nacional de Medicina y Homeopatía del IPN)

Rawdon, Eric (University of Saint Thomas)

Salazar, Gelasio (Universidad Autónoma de San Luis Potosí)

Santiago, Elizabeth (UNAM)

Santiago-González, Grissel (UNAM)

Schreyer, Erik (University of Georgia)

Shonkwiler, Clayton (Colorado State University)

Sulkowska, Joanna (University of Warsaw)

Summers, De Witt (Florida State University)

Szymczak, Piotr (University of Warsaw)

Virnau, Peter (Johannes Gutenberg-Universität Mainz)

Zechiedrich, Lynn (Baylor College of Medicine)

Workshop on Arithmetic and Complex Dynamics

November 12 - 17, 2017

Organizers:

Holly Krieger (University of Cambridge)
Mattias Jonsson (University of Michigan)

Laura DeMarco (Northwestern University)



Complex dynamics is the study of repeated application of a self-map of a complex variety; a complex variety can be thought of as the solution set over the complex numbers of a system of polynomial equations in a (possibly large) number of variables. This workshop brought together leading researchers from complex dynamics, non-Archimedean analysis and geometry, and algebraic and arithmetic geometry, with the goal of making progress on current problems in arithmetic dynamics. Recent breakthroughs have come from groups of mathematicians whose backgrounds span these varied disciplines. We focussed on sharing ideas and tools among researchers from diverse specialties in hopes of inspiring new questions and collaborations in arithmetic dynamics.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5081>

Participants:

Arfeux, Matthieu (Pontificia Universidad Católica de Chile)
Baker, Matthew (Georgia Institute of Technology)
Barroero, Fabrizio (University of Basel)
Bedford, Eric (Stony Brook University)
Burgos, Juan Manuel (Cinvestav)
Canci, Jung-Kyu (Universität Basel)
Cantat, Serge (CNRS -- Université de Rennes)
Capuano, Laura (University of Oxford)
Dang, Nguyen-Bac (Ecole Polytechnique)
DeMarco, Laura (Northwestern University)
Diaz, Juan Pablo (Instituto Matemáticas Unidad Cuernavaca)
Diller, Jeffrey (University of Notre Dame)
Gauthier, Thomas (Université de Picardie Jules Verne)
Ingram, Patrick (York University)
Jacobs, Kenneth (Northwestern University)
Jonsson, Mattias (University of Michigan)
Kawaguchi, Shu (Doshisha University)
Kim, Kyounghee (Florida State University)
Kiwi, Jan (Pontificia Universidad Católica de Chile)
Krieger, Holly (University of Cambridge)
Looper, Nicole (Northwestern University)

Manes, Michelle (University of Hawaii at Manoa)
MAVRAKI, NIKI (University of British Columbia)
Moreno Rocha, Monica (Centro de Investigación en Matemáticas)
Nopal, Victor (Centro de Investigación en Matemáticas)
Okuyama, Yusuke (Kyoto institute of technology)
Pérez Buendía, Jesús Rogelio (CONACyT CIMAT-Mérida)
Poonen, Bjorn (Massachusetts Institute of Technology)
Quinn, Joseph (Instituto de Matemáticas Unidad Cuernavaca)
Raissy, Jasmin (Institut de Mathématiques de Toulouse)
Ramadas, Rohini (Harvard University)
Rivera-Letelier, Juan (University of Rochester)
Robles Montero, Rodrigo (Universidad Nacional Autónoma de México)
Ruggiero, Matteo (Université Paris 7 (Paris-Diderot))
Rumely, Robert (University of Georgia)
Verjovsky, Alberto (UNAM Mexico)
Yasufuku, Yu (Nihon University)

Challenges and Synergies in the Analysis of Large-Scale Population-Based Biomedical Data

November 26 - December 1, 2017

Organizers:

Quaid Morris (University of Toronto)

Jennifer Listgarten (Microsoft Research)



The goal of this workshop was to bring together experts working in various biomedical research areas that deal with large populations of individuals, cells, or organisms, to solve complex computational and mathematical problems that are common among their fields. This workshop will provide a forum to translate existing solutions into new fields, as well as identify upcoming challenges, and ultimately, prepare biomedical researchers for the rapidly approaching onslaught of data from large populations.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5134>

Participants:

Abreu-Goodger, Cei (Langebio - Cinvestav)
Azizi, Elham (Memorial Sloan Kettering Cancer Center)
Balding, David (University of Melbourne)
Campitelli, Laura (University of Toronto)
Cantera, Luis Alberto (CINVESTAV)
Casale, Francesco Paolo (Microsoft Research)
Cortes, Adrian (Oxford)
Demeulemeester, Jonas (The Francis Crick Institute)
Engelhardt, Barbara (Princeton University)
Fernandez-Valverde, Selene Lizbeth (CINVESTAV)
Funnell, Tyler (BCCRC)
Gravel, Simon (McGill University)
Greenwood, Celia (Lady Davis Institute for Medical Research)
Gresham, David (NYU)
Hallett, Michael (Concordia University)
Halperin, Eran (University of California, Los Angeles)
Ingraham, John (Harvard Medical School)
Krishnaswamy, Smita (Yale)
Lambert, Sam (University of Toronto)

Leiserson, Max (University of Maryland)
Listgarten, Jennifer (Microsoft Research)
Marks, Debora (Harvard Medical School)
McVean, Gil (Oxford University)
Morris, Quaid (University of Toronto)
Najafabadi, Hamed (McGill University)
Pachter, Lior (Caltech)
Palmedo, Perry (MIT/HMS)
Pe'er, Itsik (Columbia University)
Peña Castillo, Lourdes (Memorial University)
Sélem Mojica, Nelly (Langebio)
Siepel, Adam (Cold Spring Harbor Laboratory)
Singh, Ritambhara (University of Virginia)
Sunyaev, Shamil (Harvard Medical School and Brigham & Women's Hospital)
Van Loo, Peter (The Francis Crick Institute)
Wang, Wenyi (The University of Texas MD Anderson Cancer Center)
Wedge, David (University of Oxford)
Wintersinger, Jeff (University of Toronto)
Zaitlen, Noah (University of California San Francisco)

Bayesian Nonparametric Inference: Dependence Structures and their Applications

December 3 - 8, 2017

Organizers:

Ramsés Mena (Universidad Nacional Autónoma de México)

Igor Pruenster (Bocconi University)

Peter Müller (The University of Texas at Austin)



Despite the massive development of Bayesian Nonparametric (BNP) techniques in the last 40 years, there is an urgent need for new models and methodology that address practical issues that arise from diverse applied fields. Modern challenges have to do with the high-dimensionality of the data and with the complex dependence structures they feature: current methods and computational tools are not adequate to provide effective answers to a number of inferential problems that involve any of these two aspects. Indeed, traditional BNP models are not able to capture forms of dependence more general than exchangeability, which are, however, required in the analysis of several phenomena in epidemiology, genetics, medicine, finance, economics, etc. Hence, the theme of the workshop was the interplay between methodology and applications. A comprehensive environment, ranging from theoretical methodology to real-world applications of BNP models, was the key for the success of the workshop.

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/5-day-workshops/17w5060>

Participants:

Bacallado, Sergio (University of Cambridge)

Banerjee, Sudipto (University of California LA)

Bhattacharya, Anirban (Texas A&M University)

Broderick, Tamara (Massachusetts Institute of Technology)

Campbell, Trevor (Massachusetts Institute of Technology)

Castillo, Ismaël (University of Paris 6)

Dahl, David B. (Brigham Young University)

De Blasi, Pierpaolo (University of Torino and Collegio Carlo Alberto)

De Iorio, Maria (University College London)

Dunson, David (Duke University)

Ghoshal, Subhashis (North Carolina State University)

Gil Leyva Villa, Maria Fernanda (IIMAS-UNAM)

Griffin, Jim (University of Kent)

Guglielmi, Alessandra (Politecnico di Milano)

Guindani, Michele (University of California Irvine)

Gutiérrez-Peña, Eduardo (IIMAS-UNAM)

Holmes, Chris (Oxford University)

Jara, Alejandro (Pontificia Universidad Católica de Chile)

Johnson, Wesley O. (University of California Irvine)

Klejin, Bas (University of Amsterdam)

Kottas, Athanasios (University of California Santa Cruz)

Lee, Juhee (University of California Santa Cruz)

Lee, Jaeyong (Seoul National University)

Lijoi, Antonio (Bocconi University)

Ma, Li (Duke University)

MacEachern, Steven (Ohio State University)

Martínez Martínez, Asael Fabian (CIMAT)

Martínez-Ovando, Juan Carlos (ITAM)

Mena, Ramsés (UNAM)

Müller, Peter (The University of Texas at Austin)

Nguyen, Long (University of Michigan)

Nieto-Barajas, Luis E. (ITAM Mexico)

Nipoti, Bernardo (Trinity College Dublin)

Orbanz, Peter (Columbia University)

Pruenster, Igor (Bocconi University)

Quintana, Fernando (Pontificia Universidad Católica de Chile)

Rodríguez Hernández Vela, Carlos Erwin (UAM-I)

Rousseau, Judith (Université Paris-Dauphine)

Ruggiero, Matteo (University of Torino and Collegio Carlo Alberto)

Spanò, Dario (University of Warwick)

Srivastava, Sanvesh (The University of Iowa)

Tokdar, Surya (Duke University)

van der Vaart, Aad (Leiden University)

van Zanten, Harry (University of Amsterdam)

Williamson, Sinead (University of Texas at Austin)

Xu, Yanxun (Johns Hopkins University)

Casa Matemática Oaxaca

2017

Summer Schools

Summer Schools

2017 IMO Summer Training Camp July 2 - 16, 2017

Organizers:

Jacob Tsimmerman (University of Toronto)

Rogelio Valdez (Universidad Autónoma del Estado de México)



The purpose of the International Mathematical Olympiad (IMO) Training Camp was to be an intensive preparation for the Canadian and Mexican students attending the upcoming IMO, and also to allow these students to get to know each other well. In the last ten years, most of the Summer IMO Training Camps have been held at BIRS, and each was a complete success for all concerned, from the point of view of contest preparation, but also because of the chance our Team had to experience the natural beauty of the surroundings. Incidentally our Canadian IMO Teams in these years all performed extremely well and it is certain that some of the credit for the team's excellent results can be attributed to the students' time spent at BIRS. The team leader of Math Team Canada would like to thank the CMS, BIRS-CMO, and the Mexican IMO organization for making the joint Canada-Mexico training camp a great success. The CMS's Media Release on the results of the 2017 IMO is available at: <https://cms.math.ca/MediaReleases/2017/imoresults>

For details, please refer to the workshop webpage
<http://www.birs.ca/events/2017/summer-schools/17ss037>

Participants:

Brennan, Matthew (Massachusetts Institute of Technology)

Domínguez Silva, Víctor Antonio (MMO)

Figuroa Ibarra, Marco Antonio (MMO)

García Hernández, Luis Eduardo (MMO)

García Morán, Leonardo Ariel (MMO)

Garza Vargas, Jorge (MMO)

Guo, Thomas (IMO)

Jiménez Uribe, Isaac Jair (MMO)

Perales Anaya, Daniel (MMO)

Pineda Reyes, Alfredo Alef (MMO)

Qi, Qi (IMO)

Rickards, James (Colonel By Secondary School
Ottawa)

Rong, Victor (IMO)

Sánchez Garza, Maximiliano (MMO)

Solé Pi, Oriol (MMO)

Sun, Sarah (IMO)

Torres, David (MMO)

Treviño López, Enrique (MMO)

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Zhao, William (IMO)



Casa Matemática Oaxaca (CMO) is an International research facility affiliated with the Banff International Research Station (BIRS) of Canada. CMO will host scientific activities and gather mathematicians from around the world in an environment that will promote innovative ideas in the mathematics field. CMO will also support activities to promote local development through research and teaching of mathematics.

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The **Banff International Research Station** for Mathematical Innovation and Discovery (BIRS) is a collaborative Canada-US-Mexico venture that provides an environment for creative interaction as well as the exchange of ideas, knowledge, and methods within the Mathematical Sciences, with related disciplines and with industry. The research station is located at The Banff Centre in Alberta and is supported by Canada's Natural Science and Engineering Research Council (NSERC), the US National Science Foundation (NSF), Alberta Economic Development and Trade, and Mexico's Consejo Nacional de Ciencia y Tecnología (CONACYT).

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