



NEWSLETTER

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PIMS Announces James Colliander as Next Director



The Pacific Institute for the Mathematical Sciences (PIMS) is pleased to announce the appointment of James Colliander as Director of PIMS for a five-year period, starting on July 1, 2016.

James Colliander is currently a faculty member of the Department of Mathematics at the University of British Columbia and has held the position of Deputy Director of PIMS since July 1, 2015. His field of research is at the interface of partial differential equations, harmonic analysis and dynamical systems. Professor Colliander obtained his PhD at the University of Illinois in 1997. After postdoctoral positions at the Mathematical Sciences Research Institute and the University of California, Berkeley he took a faculty position at the University of Toronto, where he held a full professorship from 2007-2015. Among his many awards he was a recipient of a Sloan Foundation Fellowship (2003), the McLean Award (2007) and the Outstanding Teaching Award in Arts and Science (2010) at the University of Toronto. He has been a Visiting Professor at the University of Paris and a Member of the Institute for Advanced Study in Princeton. Professor Colliander is also the Founder and CEO of Crowdmark, an education technology company that was awarded the Connaught Seed Stage Startup Award at Toronto in 2013.

The Chair of PIMS Board of Directors, Brian Russell noted, “The appointment of James Colliander as Director is a significant step forward for PIMS. Professor Colliander is a world class mathematician who brings strong leadership skills to PIMS as well as a personal vision of its future. He is also a very collaborative individual who will work with both his team and the PIMS Board to arrive at a consensus of how our institute should evolve over the coming years. I want to thank Martin Barlow, our current Interim Director, for his vision and leadership of PIMS during his term. He has been a key figure in the leadership transition at PIMS.”

“I am excited to lead PIMS into its third decade,” said Colliander. “PIMS has a spectacular track record for promoting collaboration and discovery among our member universities. My goal as director will be to meaningfully enhance the research, teaching and collaboration capacity of all the mathematical scientists that PIMS serves.”

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Director's Message



At the end of June I will end my two years at PIMS, first as Deputy Director, and then for the last year as Interim Director. It has been a challenge but also a pleasure to look after PIMS over this period. With its multiple sites, complex structure and very varied activities, PIMS is a difficult organisation to understand. However, the unique elements present in PIMS have in the past led it to find innovative new ways of organising and conceiving of the role of a mathematics institute, and I am sure that this creativity will continue in the future under the guidance of our new Director, Jim Colliander.

PIMS has launched two new Collaborate Research Groups (CRGs) this year. The International CRG on Geometric Analysis involves a network of researchers from PIMS, Australian National University and the Beijing International Centre for Mathematical Research. The focus of this CRG will include the study of minimal surfaces and Ricci flows. The CRG on Geometric and Cohomological Methods in Algebra links researchers at UAlberta, UBC and UWashington. This CRG will focus on the impact of new ideas arising from geometry and topology on algebraic structures.

Interim Director: Dr. Martin Barlow
Deputy Director: Dr. James Colliander
Assistant Director: Dr. Mark Gotay

Site Directors:

Simon Fraser University – Dr. Nils Bruin
University of Alberta – Dr. Vakhtang Putkaradze
University of British Columbia – Dr. James Colliander
University of Calgary – Dr. Cristian Rios
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University of Regina – Dr. Donald Stanley
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University of Washington – Dr. Christopher Hoffman

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PIMS has many exciting events planned for this summer. As usual we have a strong and very diverse set of summer schools. The *Séminaire de mathématiques supérieures* has been running since 1961, and is the oldest summer school in Canada. This year it will be jointly sponsored by the CRM and PIMS and hosted at UAlberta; the topic is “Dynamics of Biological Systems.” As well as several shorter events, we will run several two-week summer schools in topics as diverse as abelian varieties, mathematical finance and representation theory. In addition, we will have an undergraduate summer *Two weeks in Vancouver* to encourage talented women to consider mathematics as a career. These summer schools provide a very valuable avenue for training the next generation of researchers.

Finally, I would like to thank PIMS' excellent staff, who have continued to work hard and effectively to make sure that everything connected with PIMS runs smoothly.

With best wishes,

Martin Barlow
Interim Director, PIMS

Thank you to:



PIMS Inaugural Vancouver Lunchbox Lecture | FEBRUARY 24, 2016 AT UBC ROBSON SQUARE



Vancouver's inaugural lecture of the PIMS Lunchbox Lecture Series featured speaker, Dr. Krisztina Vasarhelyi, leads the IMPACT-HIV Project – a collaboration between the Complex Systems Modeling Group at SFU's IRMACS Centre and the British Columbia Centre for Excellence in HIV/AIDS. Dr. Vasarhelyi received her PhD in Anthropology from the University of Zurich, joined the Complex Systems Modeling Group in 2005 and is an adjunct professor at SFU's Faculty of Health Sciences. Her work focuses on cross-sector modeling collaborations to address policy-relevant public health issues. This Lunchbox Lecture dealt with her current work with mathematicians in operations research analyses to inform government policy on testing and treatment protocols for HIV in BC and beyond.

Public health program managers and policy makers are regularly faced with complex decisions that affect the health and well-being of the public. Mathematical models and operations research tools can be used to consider diverse interacting factors, such as the epidemiology and clinical aspects of a condition, delivery methods of health services and constraints on budget and resources. Creating reliable, data-driven models that are tractable and useful for informing policy decisions requires close collaboration of stakeholders and mathematicians.

The presentation described the development and implementation of a health systems model that incorporates a wide variety of activities and factors impacting the process of HIV infection, spread, detection and treatment. The process reveals that a successful model requires a close collaboration between researchers and practitioners in health care, epidemiology, mathematics and systems analysis, along with input from computational experts and government representatives. Ultimately, the results of the project are being used to inform the delivery of HIV health services in Vancouver, which illustrates the promise, challenges and rewards of cross-sector collaborations and offers possible avenues for the expanded use of modeling in public policy.

There was a healthy exchange of ideas in the question period after the talk, as well as in the informal discussions that carried on well past the end of the formal session – all energetically fueled by a delicious light lunch provided by PIMS.

Our second talk in the series was on March 30. Dr. Alexander Rutherford (SFU) spoke on mathematical modeling applied to the criminal justice system in Canada.



University of British Columbia JAMES COLLIANDER

The year began with a number of high profile events and speakers, including *PIMS/ UBC Distinguished Colloquia* by Maria Chudnovsky (Princeton) on “Coloring Some Perfect Graphs,” Jacob Lurie (Harvard) on “The Siegel Mass Formula, Tamagawa Numbers, and Nonabelian Poincare Duality” and Robert Kohn (Courant Institute, NYU) on “A Variational Perspective on Wrinkling Patterns in Thin Elastic Sheets.” PIMS-UBC also co-hosted the *Constance Van Eeden Lecture* with Art Owen (Stanford) on “Bi-Cross-Validation for Factor Analysis” and the annual *Hugh C Morris Lecture* (see page 7).



ROBERT KOHN (COURANT INSTITUTE)

University of Manitoba KIRILL KOPOTUN

Since officially joining PIMS last year, Manitoba has held a number of events in the PIMS-UManitoba Distinguished Lecture Series, including talks by Richard A. Brualdi (UW-Madison), Kenneth R. Davidson (University of Waterloo), Steven P. Lalley (University of Chicago), Jianhong Wu (York University) and Mark Giesbrecht (University of Waterloo).

The site looks forward to a number of spring and summer events, including the Emerging Mathematics Instructor Workshop, coorganized by PIMS’ UManitoba Education Coordinator, Darja Kalajdziewska.



STEVEN P. LALLEY (UNIVERSITY OF CHICAGO)

University of Calgary CRISTIAN RIOS

PIMS UCalgary hosted three seminars under the *Explicit Methods for Abelian Varieties* CRG and welcomed several visitors to the *Algebraic, Applied and Geometric Topology* CRG. The *19th Conference on Quantum Information Processing* (QIP 2016) was held at the Banff Centre in January. Also in the area of quantum information, Francesco Buscemi (Nagoya University) offered a special lecture. An actuarial science information session was offered, the *37th Annual Meeting of Alberta Statisticians* took place and the *Calgary Mathematics and Philosophy Lecture* was “Potential Infinity: A Modal Account” with guest speaker, Stewart Shapiro (Ohio State University). PI Day was celebrated with undergraduate students. Finally, the Twitter account [@pimsmathuofc](#) was created.

University of Washington CHRISTOPHER HOFFMAN

In the *UW-PIMS Mathematics Colloquia* we had a beautiful talk by Brian Conrad (Stanford University) on the ABC conjecture and the status of the claimed proof. Also in this series was a lecture by Jennifer McCloud-Mann (University of Washington, Bothell) about a new family of convex pentagons that tile the plane. This work was part of a spectacularly successful undergraduate research project. Finally, in the interdisciplinary *CORE Seminar Series*, Katya Scheinberg (Lehigh University) spoke about randomized models in stochastic optimization.

University of Saskatchewan CHRIS SOTEROS

The successful *PIMS Applied Mathematics Seminar Series* continued this year with seminars by Andrew Odlyzko (University of Minnesota) and Alex Himonas (University of Notre Dame).

Regarding Education/Outreach, Stavros Stavrou, Math Outreach Coordinator, reports: For a third year, we have done outreach work in a local Cree/English bilingual school in Saskatoon, where we are currently working in four different classrooms. Each session, we bring a hands-on activity or lesson plan that gets the students thinking about mathematics in ways that tie to the Cree language and culture. These sessions run during the regular school year and will end in June and recommence in September.

We are also partnering with high schools throughout Saskatchewan (including rural and reserve schools) to offer math readiness sessions to students who are planning to attend the University of Saskatchewan. The sessions help students focus on the core pre-calculus concepts they will need to be successful in their first-year calculus courses.

University of Victoria ANTHONY QUAS

At UVic, Peter Lu (Harvard) and Edriss Titi (Texas A&M) gave public lectures with PIMS support on “Medieval Islamic Art” and “Modern Mathematics; and Mathematics of Turbulent Flows: A Million Dollar Problem” respectively. Bruce Shepherd (McGill) gave a *PIMS Distinguished Colloquium* on “Trees, Flows and Rooted Clusters.”

Philippe Thieullen (Bordeaux) was a Distinguished PIMS Visitor, working with Anthony Quas. *Math Mania* events were held at two local elementary schools.



PETER LU (HARVARD) AT MT. JOCELYN, VICTORIA

Simon Fraser University NILS BRUIN

SFU saw various lectures including Kilian Raschel (CNRS visitor) on relations between quadrant walk and elliptic functions and Shi Jin (University of Wisconsin) on “Asymptotic-Preserving Schemes for Multiscale Problems.”

In addition, the *Discrete and PIMS-CSC Seminar Series* met weekly and two editions of the joint *UBC/SFU Statistical Seminar* were held at the downtown location.

As part of a joint Abelian Varieties Multi-Site Seminar Series with Calgary, Washington and Colorado, SFU hosted lectures by Jens Bauch (SFU) and Jan Vonk (McGill).

On the educational front, SFU hosted three editions of the high-school lecture series, *A Taste of Pi*, and will host the *Changing the Culture* conference in May.

On the scientific front, we look forward to, among other things, the *Combinatorial Structures in Perturbative Quantum Field Theory* conference, FPSAC2016 – a Journées Combinatoires Franco-Vancouveroises – and various satellite events.

University of Regina DONALD STANLEY

On April 6, Leandro Cagliero (Universida Nacional de Córdoba) delivered a distinguished lecture on “The Nash-Moser Theorem of Hamilton and Rigidity of Lie Algebras.”

University of Lethbridge AMIR AKBARY

Our weekly *PIMS Lethbridge Number Theory and Combinatorics Seminar* continued with speakers Amy Feaver (King’s University), Mohammad Bardestani (University of Ottawa), Micah Milinovich (University of Mississippi) and Asif Zaman (University of Toronto). At the end of January we hosted a PIMS distinguished visitor, Francesco Pappalardi from Universita Roma Tre, Italy. As part of his visit, Dr. Pappalardi gave three lectures on the celebrated Artin’s primitive root conjecture and its many variations including an elliptic curve version due to Lang and Trotter. The speakers in our *PIMS Distinguished Speakers Series* include Vladimir Troitsky (University of Alberta), Rob Craigen (University of Manitoba) and Greg Martin (University of British Columbia).



FRANCESCO PAPPALARDI (UNIVERSITA ROMA)

Through the year our weekly *Fun With Math* sessions for middle and high school students were organized and run by Jana Archibald. A special session in January was attended by students from Kainai high school in the nearby Blood Reserve.

...CONTINUED ON PAGE 6

Around the Sites continued...

University of Alberta VAKHTANG PUTKARADZE

Distinguished Visitors: UAlberta had three distinguished lectures since the beginning of the year, featuring Raphael Krikorian (Université de Cergy-Pontoise, Paris) on “Almost Reducibility in Quasi-Periodic Dynamics,” George “Bud” Homsy (University of Washington) on “Greatest Hits of the 60s and 70s: Progress in Fluid Mechanics in the last 5 Decades” and Holger Dette (Ruhr-Universität Bochum) on “Optimal Designs, Orthogonal Polynomials and Random Matrices.”

Outreach: The second part of the *60th Alberta High School Mathematics Competition* was written on February 3, by 60 students representing 19 schools, and coordinated by Dragos Hrimiuc (UAlberta). The second annual workshop of *Computational Thinking, Design Thinking, Critical Thinking in the Elementary Classroom* was held at BIRS April 1-3, 2016

(see page 7 for more details). For more outreach activities at the UofA please see uofa.ualberta.ca/mathematical-and-statistical-sciences/outreach.



HOLGER DETTE (RUHR-UNIVERSITAT BOHUM)

PIMS Bits

- PIMS welcomes **Cristian Rios** as the new **site director at the University of Calgary**. His term began on January 1, 2016. Rios has previously been involved in a number of PIMS events and was an organizer for the PIMS CRG in Partial Differential Equations.
- The winner of the 2015 **UBC Mathematics and Pacific Institute for the Mathematical Sciences Faculty Award** is **Rachel Ollivier (UBC)**. This prize was created by two founding donors, Anton Kuipers and Darrell Duffie, to recognize young UBC researchers for their leading edge work in mathematics or its applications in the sciences. More information on the award may be found at www.pims.math.ca/news/msfa.
- PIMS' founder, **Nassif Ghoussoub**, was **appointed as an Officer to the Order of Canada**, one of this country's highest civilian honours.
- The winner of the 2016 **CRM - Fields - PIMS Prize** is **Daniel Wise (McGill University)**. The announcement was made at the banquet of the 2015 Canadian Mathematical Society (CMS) Winter Meeting. Wise will present a lecture at each of the institutes. More information on this award is available at www.pims.math.ca/pims-glance/prizes-awards.
- PIMS is pleased to welcome **Chris Soteris** as the **site director at the University of Saskatchewan**. She previously served as interim site director in 2012, and her current term began on November 1, 2015.
- **David Leeming**, PIMS' Education Coordinator at the University of Victoria, received the BC Council on Admissions and Transfer's (BCCAT) Franklin Gelin **Lifetime Achievement Award**.
- The winner of the **CAIMS/PIMS Early Career Award in Applied Mathematics** is **Jean-Philippe Lessard**. Lessard has made substantial contributions to the theory of rigorous computing, and was cited for being “one of the world leading experts in the area” and “at the forefront of applied mathematics in Canada.” He will receive his award and deliver a plenary lecture at the 2016 Annual CAIMS*SCMAI meeting at the University of Alberta in June, 2016.
- The annual **PIMS Marsden Memorial Lecture** has been announced! On July 19, **Richard Schoen (University of California, Irvine)** will speak on “The Constraint Manifold of General Relativity” at the Banff International Research Station, Banff Alberta.

Continuing to Connect: Computational Thinking, Design Thinking, Critical Thinking in the Elementary Classroom

PIMS' University of Alberta Education Coordinator, Sean Graves, together with Geri Lorway (Thinking 101) and Susan Crichton (University of British Columbia), organized a workshop at the Banff International Research Station (BIRS) from April 1-3, 2016 entitled *Continuing to Connect: Computational Thinking, Design Thinking, Critical Thinking in the Elementary Classroom*.

The workshop was attended by classroom teachers, administrators, academics, policymakers and industry professionals. Their common aim was to transform the teaching and learning of mathematics in the elementary school classroom – by connecting key elements of design-thinking, STEM, STEAM and making initiatives, computational thinking and 21st century competencies – through a focus on spatial-temporal skills and spatial reasoning.

During the weekend, working groups tackled ideas focused around (a) determining what supports and skills teachers might need to have provided or develop for themselves as they study and adapt their instruction and assessment, (b) spatializing current curricula by unpacking, translating and repackaging outcomes in ways that draw attention to how the key skills and mathematics concepts weave across grades K to 6 and (c) a plan for actions the group will initiate in order to continue and connect others to this work.

Pinpointing and deliberately attending to the authentic mathematics in STEM, STEAM and design thinking will be one of the key pieces that is shared out of this work. Curating the work of what is being called “making” in the classroom is a second. Creating pathways for scholars and practitioners to continue to meet, reflect and grow is a third.



The PIMS Medals



For many years, Camosun College and the Victoria Chapter of the Association of Professional Engineers and Geoscientists of BC have been sponsoring the BC Math Challengers event at the Interurban Campus of Camosun College. This half-day event takes place annually on the second Friday in February.

This year, seventy grades 8 and 9 students participated. PIMS UVic site has been a long-time sponsor of this event and provides the medals for the top student in each school. This year, in recognition of our continued support of this event, the organizers decided to formally name these medals The PIMS Medals. We are very honoured!

On March 4, 2016, David Aldous (University of California, Berkeley) gave a talk entitled *Probability, Outside the Classroom*. Beforehand, he sat down with us to chat about his career, insights on the present state of mathematics and his philosophy on the teaching of probability.

Aldous is full of anecdotes and when asked how he came to his career in mathematics, we encountered the first of many. “At age eight” he began, “I had a severe case of rheumatic fever (and essentially have not been sick since).” He described a tedious three months of bedridden convalescence. “I had always been good at arithmetic, but I think that one unusual experience, of being forced to entertain myself with paper and pencil and books, really sparked my interest in math.” In high school, he described a longstanding arrangement by which every few years a good student could be recommended to Cambridge. “I was recommended by my teachers and basically, became a mathematician because I never had the energy or ambition to stray from that path.” He developed his focus in probability because it was the most entertaining; “The Markov chains course from David Kendall had cute little made up stories “three people fighting a duel and who do you shoot at, etc etc,” which the other bits of math didn’t.”

In 1979, the second year of his three-year post-doctoral fellowship at Cambridge, he applied for two very desirable jobs. He interviewed at both Berkeley and UBC, and was offered the Berkeley position (UBC didn’t make an offer, “but we won’t go into that story!”). “Berkeley was one of the top places in the world for my subject at that time and it seemed silly not to accept. I’ve been there ever since. It’s the only job I’ve ever held in my life!”

“There was a lot of luck involved” he explained. “In terms of success, it’s almost impossible to disentangle skill and luck. This is something I touch on in my talk.”

At Berkeley, Aldous is housed within the department of statistics, and while some mathematicians might question this placement, he explained how it’s a very natural fit. At Cambridge, mathematics was divided between two buildings: one for pure mathematics and mathematical statistics and another for applied mathematics and theoretical physics. At Berkeley probability had traditionally always been part of statistics, so it wasn’t a choice, but rather just the order of things. However, he says, “It was the expectation that probabilists would kind of morph into statisticians, but I didn’t.” He doesn’t consider himself a statistician, but he

doesn’t have a designation he does like either. He dislikes the term “applied math” because it tends to mean boring traditional topics and he says “statistics” makes people think of baseball and sports. This he said, “is why I think we are all starting to call ourselves data scientists – it has this air of modernity and sophistication and science about it.”

“Data science is good in the sense of... ok, so I have no idea what data science is!”

he confessed, but said he would like it to be a broad subject that deals mostly with quantitative and to a lesser degree, categorical data. For example, if you had access to all of Google’s data, what could you do with it and what are the tools you would use on the data? Here, traditional probability models aren’t so relevant.

While Aldous’ career work has focused in traditional theorem-proof mathematics, he says that one of his common rants is that this paradigm is overrated. “There is nothing wrong with it. However, the analogy I use is that traditional theorem-proof mathematics is to mathematics as oil painting is to graphic art. I have no beef with the Mona Lisa, but nowadays graphic arts encompass everything to do with creating visually appealing things, and it’s not clear how oil paintings are central to this growing field. Similarly, traditional theorem-proof mathematics is far removed from what mathematics is actually useful for.”

At Berkeley, where teaching data science to new undergraduates is starting to really get rolling, he says that instead of focusing on the underlying math – the x s and y s in probability and statistics – it means things like performing operations directly on IPython (“Whatever that is!” he says, admitting obliviousness to the platform’s workings.).

While he considers his work to be outside of the data science trend, he takes inspiration from the current methodological advances and is looking beyond the traditional practices of mathematical probability. “I’m trying to do things two steps away from the data rather than infinitely many steps away from the data, as is the more traditional style.”

We asked Aldous about the rumor that he allegedly once claimed at a conference that nothing new had been discovered in the field of extreme value theory since the 1930s that could not have been found by applying simple heuristics. He cringed slightly and responded, “It’s a simple point which is hard to say. I guess I *should* have put it differently, but I was young and brash and full of myself at the time!” He explains that with extreme value theory you can start the mathematics via back-of-envelope calculations to roughly

figure out what is going on and make a conjecture. He says there are three possibilities at this point: you can prove it by known techniques; you can't prove it by known techniques and have to make up new ideas; or it's wrong and you didn't understand something in the calculations, whereupon you figure out what was wrong and learn something. He asserts that the first case is the least interesting. His controversial objection was that this was the case for much of then-contemporary extreme value theory.

“I could have put it more politely” he said, “but sometimes you have to be dramatic to get people’s attention!”

He has delivered today's talk, “Probability, Outside the Classroom,” to a wide variety of audiences. The attendees include mathematicians, computer scientists, statisticians, high school students and sometimes the general public, so he makes it largely non-mathematical, to accommodate any audience.

“I like to think of math as an app that you use to do things” he said.

It needs to work, but do we need to know how?

“The current [mathematics teaching] structure is almost impossible to change” he admitted, “because the education system is built in a way that as you progress, it's assumed you have the understanding of each previous layer, so therefore you can't just stop teaching one layer if the rest of the system is this edifice.” He confessed that his Berkeley course on this subject is under the radar. “I never wanted to go through the bureaucratic process of having this named as a course, but we have a blank slate course in which people teach anything they want, so that's where I do it.”

Much of what he is trying to impart with this lecture, and more broadly in his career, is that there are different ways of teaching; it is possible to give a course in some very different way and achieve similar or perhaps better, results. He leaves



He explained the choice of topic, “There is such a discrepancy between probability in and outside the classroom because it's taught by mathematicians who perceive mathematics as this logical structure that you go through layer by layer.” On one hand it is, he admitted, but asked us to consider an analogy. The computer industry can be considered from two main perspectives: those who design and build and those who use. It is absolutely not necessary to understand the intricate design and technology of a computer in order to use it but, he explains, the way mathematicians teach probability is akin to expecting just that.

us with some arguably obvious, yet insightful advice: “If you always go to the same place on vacation... you'll never see any other places.”

Aldous' talk was given as part of the Hugh C. Morris Lecture Series, and annual PIMS events that was generously endowed by Dr. Hugh C. Morris, former Chair of the PIMS Board of Directors, and long-time friend of the mathematical sciences. The series attracts the world's top mathematical scientists, who deliver presentations on current research topics to PIMS sites in Western Canada and Washington State.

Geometric Analysis: 2016-2019

Geometric analysis is one of the major fields in modern mathematics that involves using analytic methods, typically partial differential equations, to solve problems in differential geometry. Its applications to other areas have been spectacularly successful: Perelman's proof of the Poincaré conjecture via Hamilton's Ricci flow and Schoen-Yau's positive mass theorem in general relativity. In the last few years, several long-standing problems in the field have been resolved, e.g., Brendle's proof of Lawson's conjecture, Marques-Neves's proof of the Willmore conjecture.

In solving these problems, new techniques have been introduced to the field. After the great accomplishment of the proof of the Poincaré conjecture, the Ricci flow method has been studied for other problems, including the proof of the differentiable sphere theorem by Brendle-Schoen, and there is interest in using it in higher dimensions. The success of the min-max variation approach to the Willmore conjecture has stimulated considerable research activity in minimal surface theory and the geometry of Willmore surfaces. The recent breakthrough in the Kähler-Einstein metrics is expected to lead to important progress in the orbifold setting.

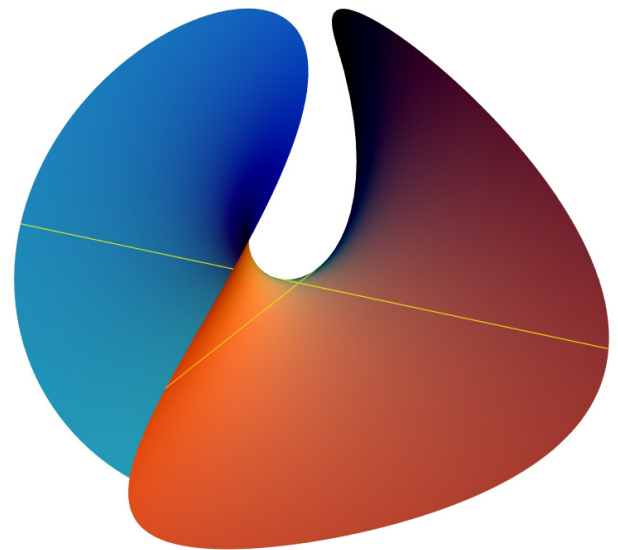
This three-year CRG aims to enhance connections and stimulate collaborations among the mathematicians at the four institutions (the Australian National University, the Beijing International Center for Mathematical Research, the University of British Columbia and the University of Washington) and beyond. Involvement of young researchers and training of graduate students constitutes a major component of the CRG. The idea of sending people, especially postdocs and students, to different places for a relatively long stay (one to three months) is new and exciting, and can be very productive. Summer schools and conferences will be organized in Beijing, Canberra, Seattle and Vancouver.

Research Interests: Connections will focus on, but not limited to:

- Geometric variational problems - minimal surfaces, harmonic maps and their applications
- Geometric evolution equations - mean curvature flow, Ricci flow and other curvature flows
- Complex differential geometry
- Mathematical general relativity
- Nonlinear PDEs - the Monge-Ampère equation, the special Lagrangian equation

Organizers:

- Australian National University: Ben Andrews, Xujia Wang, Neil Trudinger
- Beijing International Center for Mathematical Research: Gang Tian, Yuguang Shi, Xiaohua Zhu
- University of British Columbia: Albert Chau, Jingyi Chen, Ailana Fraser
- University of Washington: John Lee, Dan Pollack, Robin Graham, Yu Yuan



ENNEPER'S MINIMAL SURFACE EXTENDS TO A SELF-INTERSECTING SURFACE. COURTESY OF MATTIAS WEBER, www.indiana.edu/~minimal

2016 Planned Activities:

- March - April: Distinguished Visitor: Tobias Lamm, Karlsruhe Institute of Technology at UBC
- June 26 - July 7: Perspectives in Geometric Analysis, at the Beijing International Center for Mathematical Research
- Postdoctoral Fellows: Tobias Huxol (University of Warwick) and Nicolau Aiex (Imperial College London)

Geometric and Cohomological Methods in Algebra: 2016-2019

From June 29 to July 9 at UBC, 127 mathematicians (including 64 graduate students and postdocs) from around the world came together to exchange ideas related to manifolds and their geometry. The attendees included diverse groups who have overlapping interests, but do not usually meet together, including specialists in high- and low-dimensional manifolds, geometric group theory and differential geometry.

Universities in Western Canada have been traditionally strong in algebra, in particular in representation theory and the theory of Lie algebras. More recently, the algebra community in Western Canada was solidified and strengthened by the highly successful PIMS CRG in 2005-08, which helped junior researchers and recent arrivals integrate into preexisting networks. The algebraists in Western Canada are at the forefront of developments in algebra, which have been influenced by an infusion of new techniques from algebraic geometry and algebraic topology.

The community of algebraists at PIMS universities has been strengthened since 2008 and collectively, now has a strong regional group of researchers in algebra. The five CRG organizers work in overlapping research areas of central interest in algebra: Lie algebras, quadratic forms, central simple algebras, modular representation theory, algebraic groups, homogeneous spaces, Galois cohomology and motives.

Our impact and productivity will be amplified through scientific exchanges, joint seminars and workshops, sharing postdocs and distinguished visitors, and creating new research and training opportunities for our students.

Research Interests:

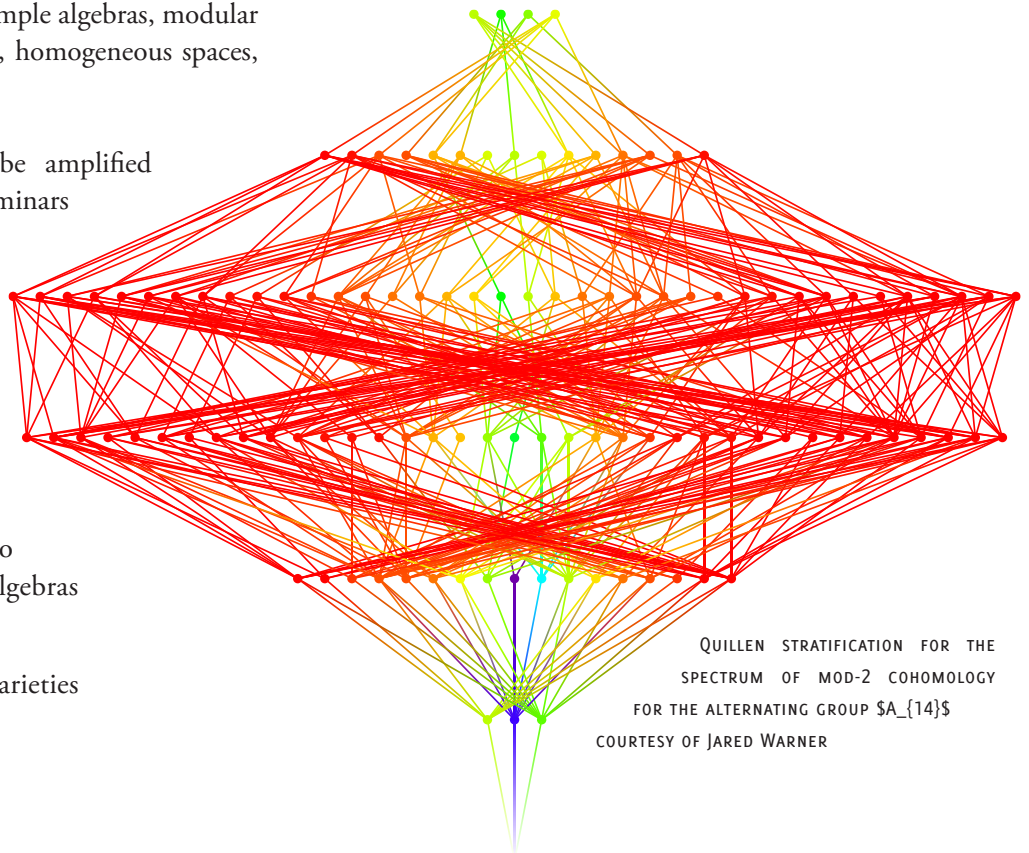
- Applications of Galois cohomology to the study of infinite-dimensional Lie algebras
- Essential and canonical dimension
- Representation theory and support varieties

Organizers:

- Vladimir Chernousov (UAlberta)
- Nikita Karpenko (UAlberta)
- Julia Pevstova (UWashington)
- Arturo Pianzola (UAlberta)
- Zinovy Reichstein (UBC)

2016 Planned Activities:

- Fall 2016: ABC Workshop at UAlberta
- April 24- May 18 : Distinguished Visitor, Mathieu Florence (University of Paris VI) at UAlberta and UBC
- June 24 - Aug 6: Distinguished Visitor, David Benson (University of Aberdeen) at UBC and UWashington
- Postdoctoral Fellow: Taiki Shibata (UAlberta)





Summer 2016 Event Highlights

EVENTS, CONFERENCES AND WORKSHOPS

2-5 June	Foundational Methods in Computer Science University of British Columbia
13-16 Jun	PIMS Young Researchers Conference in Mathematics and Statistics University of Alberta
13-17 Jun	Workshop on Nonlocal Variational Problems and PDEs University of British Columbia
20-24 Jun	Conference of the Canadian Number Theory Association University of Calgary
6-8 Jul	Canadian General Relativity and Relativistic Astrophysics Simon Fraser University
7-8 Jul	Canadian Abstract Harmonic Analysis Symposium University of British Columbia
10-15 Jul	International Biometrics Conference University of Victoria
10-15 Jul	Rarefied Gas Dynamics University of Victoria
25 Jul-19 Aug	Statistical Causal Inference and its Applications to Genetics CNRS, Montréal
8-13 Aug	Graduate Math Modelling in Industry Workshop University of British Columbia
14-20 Aug	Undergraduate Workshop in Supersymmetry University of British Columbia
15-19 Aug	Joint CRM/Fields/PIMS Industrial Problem Solving Workshop University of Toronto

DISTINGUISHED LECTURE

19 Jul	Marsden Memorial Lecture: Richard Schoen (University of California, Irvine) The Constraint Manifold of General Relativity Banff International Research Station
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SUMMER SCHOOLS

30 May-11 Jun	Séminaire de mathématiques supérieures: Dynamics of Biological Systems University of Alberta
25 Jun-6 Jul	Mathematical Finance University of Alberta
17-23 Jul	Superschool on Derived Categories and D-branes University of Alberta
27 Jul - 5 Aug	Geometric and Topological Aspects of the Representation Theory of Finite Groups University of British Columbia
15-26 Aug	Women in Math University of British Columbia and Simon Fraser University
22 Aug-4 Sep	Mathematical Physics Sirince, Turkey