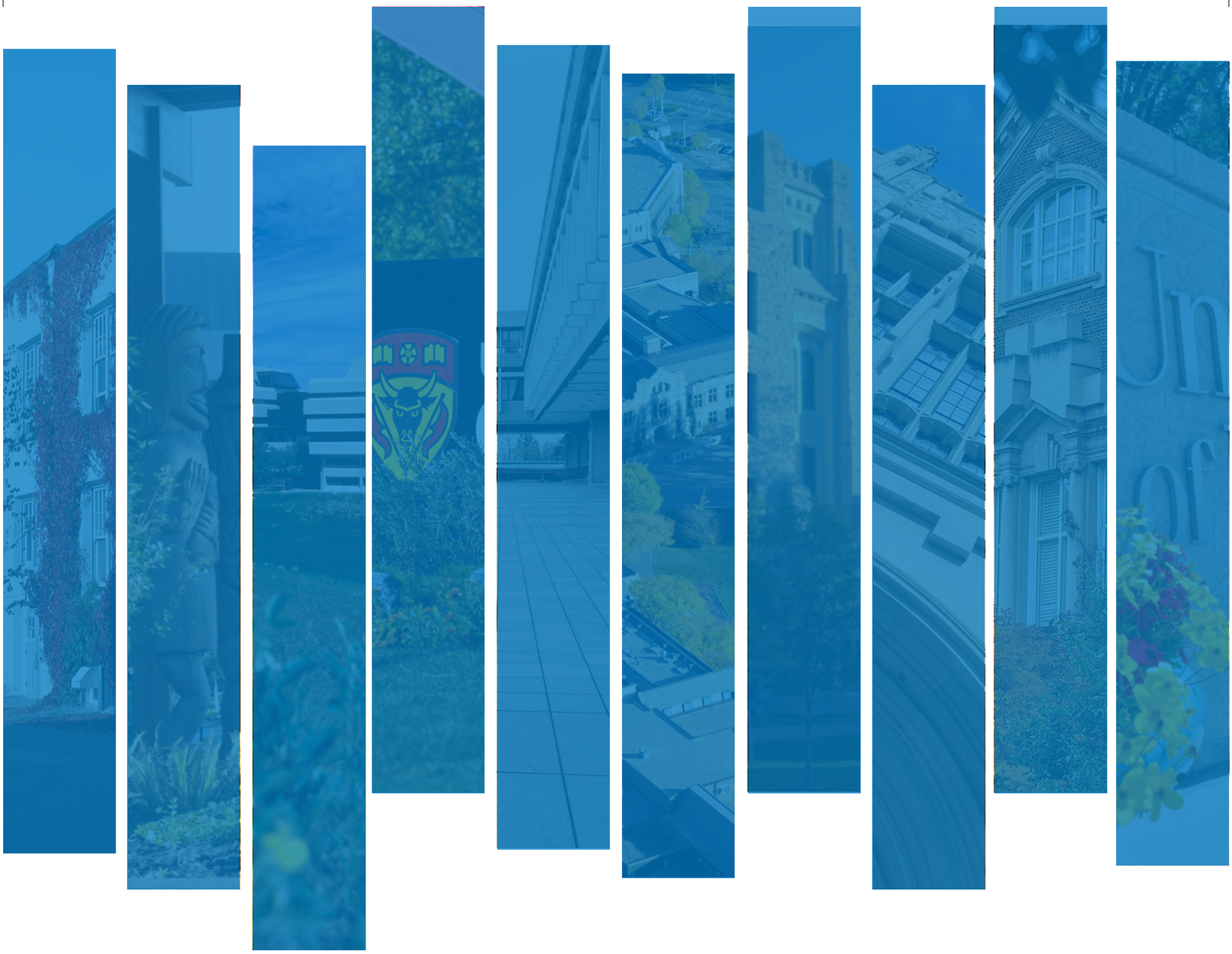

2024

YEAR IN REVIEW

Pacific Institute *for the* Mathematical Sciences

SFU UBC

ABOUT PIMS:

ADVANCING THE MATHEMATICAL SCIENCES SINCE 1996.

The Pacific Institute for the Mathematical Sciences was founded in 1996. It is a consortium of universities in Western Canada and the University of Washington in the USA.

Member Universities include: Simon Fraser University, University of Alberta, University of British Columbia, University of Victoria, University of Calgary, University of Lethbridge, University of Manitoba, University of Regina, University of Saskatchewan, and University of Washington.

Affiliate Institutions: Portland State University, the University of Northern British Columbia, Athabasca University, and First Nations University.

CONTENTS

The Pacific Institute for the Mathematical Sciences (PIMS) is a collaborative network dedicated to the promotion of discovery, understanding, and awareness in the mathematical sciences. PIMS brings together leading researchers from major universities across western Canada, as well as the University of Washington, and is an International Research Lab of the National Centre for Scientific Research (Le centre national de la recherche scientifique, CNRS).

Our mandate is to promote research in the mathematical sciences and their applications, to facilitate the training of highly qualified personnel, to create an equitable, diverse, and inclusive community, to enrich public awareness of and education in the mathematical sciences, and to create mathematical partnerships with similar organizations in other countries (with a particular focus on the Pacific Rim). PIMS funds research networks, collaborative research groups, postdoctoral fellowships, workshops, summer schools, seminars, and other individual events on a competitive basis. PIMS activities are funded by the Natural Sciences and Engineering Research Council of Canada (NSERC), Simons Foundation, Prairies Economic Development Canada, member universities, and by private donors.

ORGANIZATION

The PIMS central office is located at the University of British Columbia, with a site office and a site director at each of the ten member universities. The site directors help create local opportunities and foster synergies, while the PIMS site offices offer administrative support for organizing local events. This decentralized structure is what makes it unique, with robust local offices and activities that extend its reach across western Canada and beyond.

The Board of Directors oversees the administration of PIMS, with membership consisting of a senior academic administrator from each of the member universities, as well as distinguished scientists and representatives from industry. An independent Scientific Review Panel composed of internationally renowned mathematical scientists assesses proposals for scientific events and programs.

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Özgür Yilmaz
PIMS Director

Kristine Bauer
PIMS Co-Director, Industry

Gabriel Paternain
PIMS Interim Co-Director, International

FROM THE DIRECTORATE

A Year of Progress, Collaboration, and Impact

As we close the chapter on 2024, we are proud to reflect on a year of remarkable achievements at the Pacific Institute for the Mathematical Sciences (PIMS). This year, PIMS researchers have continued to advance fundamental research in the mathematical sciences as well as demonstrate the vital role of mathematics in solving global challenges. Through new research networks, international collaborations, and innovative training programs, we have strengthened our impact across academia, industry, government, and the public sector. Looking ahead to 2025, we remain committed to fostering discovery, training the next generation of mathematical leaders, and expanding our reach to new communities.

Scientific Excellence and Recognition

2024 was an exceptional year for mathematical research at PIMS. Our research communities made advances in optimal transport, graph theory, number theory, forecasting, mathematical modeling and numerical methods, tackling challenges that span disciplines. The Comparative Prime Number Theory Symposium at UBC Vancouver convened global experts to discuss new insights into prime number distributions, while the Kantorovich Initiative continued to push the boundaries of optimal transport theory, with applications in machine learning, biology, and finance.

We also launched new research networks that foster collaboration across institutions. The Maud Menten Institute, established this year, is integrating mathematics with biological research, while our Structure-Preserving Discretizations CRG, introduced in 2024, is enhancing the accuracy of computational models across physics and engineering.

Recognizing Excellence

- We are delighted to share that **Dr. Leah Edelstein-Keshet** was awarded the 2025 **CRM-Fields-PIMS Prize** for her pioneering contributions to mathematical biology. Her work has shaped our understanding of cellular and developmental processes, reflecting the high caliber of research PIMS supports.

Looking forward, we are excited to launch a new CRG in topology in April 2025, focusing on homotopy theory, and we anticipate continued growth in our collaborative research networks.

Strengthening Global Collaborations

Mathematics is a global enterprise, and PIMS remains committed to fostering international partnerships. This year, we renewed the CNRS-PIMS International Research Laboratory, solidifying our long-standing collaboration with France and ensuring continued joint research in multiple mathematical disciplines. We also deepened engagement with researchers across the Pacific through the NCTS-PIMS Workshop in Partial Differential Equations in Taiwan.

Our interdisciplinary efforts extended beyond mathematics. In February 2024, the France–Western Canada Workshop on Oceans and Polar Science convened climate scientists, policymakers, and mathematicians to model environmental change and its impacts. Cross-disciplinary initiatives such as this illustrate how mathematics can contribute to solutions for some of the most pressing global challenges.

Expanding Education and Outreach

Investing in the next generation of mathematical scientists is at the heart of PIMS's mission. This year, we launched new training and mentorship opportunities to support students and early-career researchers.

Major Training Initiatives

- **PIMS Postdoctoral Summit (June 2024, Calgary):** A dedicated space for early-career researchers to collaborate and build professional networks. The next summit will take place in Calgary in April 2025.
- **Increasing Diversity in Mathematical Sciences Summer School (July 2024, Halifax):** Encouraging undergraduates from underrepresented backgrounds to engage with advanced mathematical topics.
- **Summer School in Probability (June 2025, Vancouver):** A major upcoming event providing intensive training in modern probability theory.

Education and Outreach Highlights

PIMS continues to strengthen the connection between mathematics and society. This year's **Changing the Culture** conference focused on the impact of AI in math education. Public lectures also featured renowned speakers, including **Dr. Shohini Ghose**, who celebrated the vital contributions of women in quantum physics, and **Po-Shen Loh**, who provided valuable insights on fostering creative problem-solving skills in students for a post-AI world. Additionally, Professor **Peter Cameron** delivered an engaging talk, *Sudoku and Mathematics*, as part of the **Louise and Richard K. Guy Lecture**, which highlights the joy and wonder of mathematical discovery. In recognition of outstanding teaching, we proudly awarded the **2024 PIMS Education Prize** to **Dr. Trefor Bazett** for his dedication to innovative mathematics education.

Innovation and Public Sector Engagement

Bridging Mathematics, Industry, and Public Impact

PIMS continues to strengthen its role in translating mathematical research into practical applications for industry, government, and the non-profit sector.

The PIMS central office building located in the Earth Sciences Building at UBC

- **Math to Power Industry (M2PI) Program:** In 2024, this initiative supported 30 participants, working on 7 industry-sponsored projects spanning politics, renewable energy and climate science, marine crime and architecture. The program has now facilitated over 40 partnerships, preparing graduate students and postdocs to apply their expertise in all areas of the mathematical sciences to real world problems.
- **PIMS Industry Day:** PIMS hosted its first industry day event in June. The day included a job fair and networking event. M2PI student presented the outcomes of their projects at a graduation celebration in the afternoon, held in downtown Calgary.
- **Women in AI Canada In-Person Career Fair:** In November, PIMS partnered with the Women in AI Canada network to sponsor a career fair. The event drew approximately 200 participants, including Nazanin Hashemenijad and Golnoush Farzanfard, winners of M2PI travel awards enabling them to attend. Heather Vooys (Aerium Analytics, M2PI partner 2020-2022) and Sogol Ghattan (NCIS, M2PI partner 2024) participated on panels where they offered their insights into careers in artificial intelligence and machine learning.

Key Impact: Through M2PI, we are equipping emerging mathematical scientists with the skills and experience needed to contribute meaningfully across public and private sectors, reinforcing the essential role of mathematics in addressing complex societal challenges.

Equity, Diversity, and Inclusion (EDI) Initiatives

Building an Inclusive Mathematical Community

Equity, diversity, and inclusion remain central to PIMS's mission. This year, we expanded programming that fosters a more inclusive research environment:

- **PIMS-BIRS Team Up! Program:** Providing research stays for scholars disproportionately affected by family obligations, professional isolation, and the COVID-19 pandemic.

- **JMM Special Session on Indigenous Voices in Mathematics:** A platform to amplify Indigenous perspectives in the mathematical sciences.
- **Increasing Diversity in Mathematical Sciences Summer School:** Supporting underrepresented students in their transition to graduate studies and research careers.

Key Commitment: PIMS remains dedicated to ensuring that mathematical research and education are accessible and inclusive, cultivating a diverse and engaged community of scholars.

Looking Ahead to 2025

What's Next?

- **CRG in Topology (April 2025):** A new initiative in homotopy theory, deepening research connections in algebra and geometry.
- **Maud Menten Institute HQP Summit (July 2025, Edmonton):** Expanding interdisciplinary collaborations in mathematical biology.
- Follow-up workshops from the **France–Western Canada climate science workshop** and the **3MC-PIMS-ICMS Winter School**.

As we look to the future, we are excited about the opportunities ahead for PIMS. The progress we have made in 2024 reflects the dedication of our researchers, students, and partners, and we look forward to another year of collaboration, discovery, and impact. Thank you to everyone who has contributed to our shared success - we eagerly anticipate what we will achieve together in 2025.

Sincerely,
The PIMS Directorate

2024 NEWS & ANNOUNCEMENTS

PIMS Announces New Interim Co-Director International

In 2024, PIMS appointed Gabriel Paternain as Interim Co-Director International, effective July 1. A faculty member in the University of Washington's Department of Mathematics, Paternain holds a Licenciatura from Universidad de la República in Uruguay (1987) and a PhD from SUNY Stony Brook (1991). He became a lecturer at the University of Cambridge in 2001 and a professor in 2008, serving as head of the Department of Pure Mathematics and Mathematical Statistics from 2014 to 2018. His research spans geometry, analysis, and dynamical systems.

PIMS Announces the Departure of Dr. Jayadev Athreya, Co-Director International

2024 saw Dr. Jayadev Athreya step down as PIMS Co-Director, International. After serving as Interim Director from July 2021 to June 2022, he led a successful proposal to the Simons Foundation, securing funding for programs like PRIMA, the Institute Exchange Program, PIMS-BIRS Team Up, and the PIMS-Simons Postdoc program. Though we greatly miss his leadership, Dr. Athreya remains at PIMS as the University of Washington Site Director.

Professor Steven Rayan Becomes University of Saskatchewan Site Director

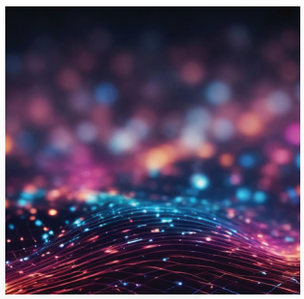
This year, PIMS welcomed Dr. Steven Rayan as the new Site Director at the University of Saskatchewan. A full professor in the Department of Mathematics and Statistics and founding director of the Centre for Quantum Topology and Its Applications (quanTA), Dr. Rayan has actively contributed to PIMS initiatives, including the Distinguished Network Colloquia, VXML, and M2PI programs. PIMS also extends its gratitude to Dr. Chris Soteros for her service as the previous site director.

Joint Mathematics Meeting (JMM) Partnership

In late 2023, PIMS, along with the Centre de recherches mathématiques (CRM) and the Atlantic Association for Research in Mathematical (AARMS), singed a joint long-term partnership agreement with the American Mathematical Society. The first CRM-PIMS-AARMS invited address, given by Henri Darmon (McGill University), took place on January 5, 2024.

New Affiliate Member

In Spring 2024, First Nations University (FNUniv) became an Affiliate Member of PIMS. This partnership recognizes the valuable contributions Indigenous ways of knowing can bring to the mathematical sciences. It will enable PIMS to support Indigenous-led initiatives while providing FNUniv with access to enhanced funding opportunities and a wide array of education and outreach programs for K-12 students.

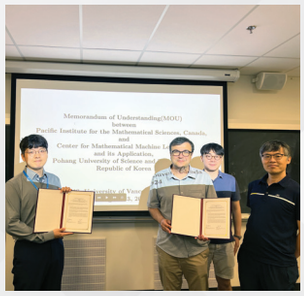


PIMS Partners with Distriq, the Quantum Innovation Zone of Quebec

In 2024, PIMS and Distriq, Quebec's Quantum Innovation Zone, signed an MOU to strengthen collaboration in quantum science and the mathematical sciences. This partnership links PIMS' Math to Power Industry (M2PI) program with Distriq's innovation ecosystem, fostering collaboration and excellence in quantum technologies and mathematics. Together, they aim to push the boundaries of both fields.

CNRS-PIMS International Research Lab Renewed

2024 saw the third renewal of the Centre national de la recherche scientifique (CNRS) PIMS International Research Lab (IRL). This collaboration, established in 2007, champions the mutual exchange of knowledge between western Canada and France. This alliance has led to the development of several flagship programs, including CNRS Visitors, PIMS-Europe Fellowships, the PIMS-CNRS Student Mobility Program, and PIMS-CNRS Postdoctoral Fellowships.



CM2LA Partnership

PIMS and the Centre for Mathematical Machine Learning and its Applications (CM2LA) of Pohang University of Science and Technology in Korea signed an MOU in the fall of 2024. This MOU will pave the way for joint research initiatives, researcher exchange programs, and collaborative projects that will benefit both academic communities.

IMERL Partnership

In late 2024, PIMS signed a third MOU with the Instituto de Matemática y Estadística Rafael Laguardia (IMERL) in Uruguay. This partnership, which aims to foster international collaboration, will focus on facilitating the exchange of researchers and exploring opportunities to collaborate on common research initiatives.

2024 PIMS PRNs

PIMS Research Networks (PRNs) are large-scale collaborations between academic, industrial, and public sector partners. These partnerships are intended to help the mathematical science community address grand challenges such as the ongoing climate emergency, sustainable resource management, resilience to future epidemics and fairness and justice in human society.

The Maud Menten Institute: 2024 - 2026
The primary purpose of the Maud Menten Institute (MMI) is to provide a collaborative research platform for mathematical biologists at PIMS sites to promote interactions with life science experts and decision-makers in government, industry, and NGOs. New generations of mathematical biologists will get to impact biological fields inside and outside of academia and establish mathematical biology as a powerful tool of investigation in biology.

Kantorovich Initiative: 2023 - 2026
The Kantorovich Initiative is dedicated to advancing research in optimal transport and sharing modern mathematical developments with a broad audience, including researchers, students, industry professionals, policymakers, and the general public. Initially a Pacific Interdisciplinary Hub on Optimal Transport (PIHOT) Collaborative Research Group, it has since grown to become the first awarded PIMS Research Network.

2024 PIMS CRGs

At the core of PIMS activities are the Collaborative Research Groups (CRGs), which bring together researchers across many universities to focus on particular topics with funding for conferences, workshops and support of highly qualified personnel, including postdoctoral fellows.

Structure-Preserving Discretizations and their Applications: 2024 - 2027
This CRG brings together research specialists in structure-preserving discretizations to share their knowledge, expertise, and current challenges in their respective fields. The research group's three main themes are: Development of Structure-Preserving Discretizations, Applications of Structure-Preserving Discretizations, and Structure-Preserving Machine Learning Methods.

Forecasting and Mathematical Modeling for Renewable Energy: 2023-2026
This CRG aims to develop meso, submeso, and micro-scale forecast methods for wind and solar power, creating quantitative tools to support a wide range of decision-making problems related to wind and solar power systems and their integration into the power grid and electricity markets.

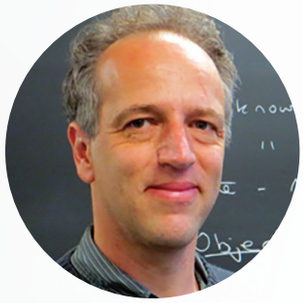
L-Functions in Analytic Number Theory: 2022 - 2025
Analytic number theory focuses on arithmetic questions through the lens of L-functions with connections to a host of other mathematical fields, including algebraic number theory, harmonic analysis, probability, and representation theory. This CRG's main focuses include moments of L-functions and automorphic forms, explicit results in analytic number theory, and comparative prime number theory.

Movement and Symmetry in Graphs: 2021 - 2024
The focus is on graph theory, a thriving discipline that lies at the interface of computer science and pure mathematics. Their group's goal is to strengthen overlapping and complementary areas of algebraic graph theory, combinatorial matrix theory, graph and hypergraph infection and percolation, and extremal combinatorics.

The Maud Menten Institute Summit
UBC, September 2024

2024 Around the Sites

Throughout the year, the PIMS network offers a diverse range of in-person, online, and hybrid events, including seminars, workshops, and colloquia. Additionally, PIMS supports outreach programs and postdoctoral fellowships, fostering collaboration and engagement across the mathematical sciences community.



UNIVERSITY OF VICTORIA
Site Director: Dr. Anthony Quas

In 2024, PIMS welcomed several postdoctoral fellows, including Kumar Roy (mentored by Boualem Khouider), Keshav Krishnan (working with Gourab Ray), and Tyler Jia (collaborating with Slim Ibrahim and Adam Monahan as part of the Collaborative Research Group on Forecasting and Mathematical Modeling for Renewable Energy). In early 2025, Felix Clemens will join PIMS under the supervision of Natasha Morrison and Jonathan Noel. Additionally, the newly established Maud Menten Institute PRN has one of its two leaders based at UVic.

Throughout the year, PIMS supported regular seminars in probability and dynamical systems, statistical data science, discrete mathematics, and fluid dynamics. The PIMS Network-Wide Colloquium Series continued to run through UVic, alongside two Network-Wide courses: Anthony Quas's course on Ergodic Theory and Jon Noel's course on Extremal Combinatorics. Several UVic students also participated in network-wide courses offered at other institutions.

PIMS offered major support to a conference and summer school held at the International Centre for Theoretical Physics (ICTP) in Trieste, Italy, that featured Boualem Khouider. ICTP has a mission of providing opportunities to students in the developing world and is emerging as a strategic partner with PIMS. Additionally, PIMS supported a summer camp at UVic, aimed at offering mathematical enrichment opportunities to young women in grades 11 and 12. PIMS also supported two Cascadia Combinatorial Feast meetings, which are regional two-day meetings in discrete mathematics that are organized by UVic faculty members.

UNIVERSITY OF BRITISH COLUMBIA
Site Director: Dr. Brian Marcus

The mathematical sciences are, as usual, very much alive and well at UBC, thanks in large part to support from PIMS. Research activities at UBC Vancouver include several weekly seminars in topics ranging from algebraic geometry to mathematical biology, a weekly mathematics colloquium, special workshops on initiatives such as the Kantorovich project in optimal mass transport, the Maud Menten Institute in mathematics and the life sciences, and the France-Western Canada Workshop on Ocean and Polar Sciences, as well as specialized conferences in comparative number theory and information theory.

In 2024, there were two intensive summer schools aimed at graduate students: a four-week summer school in probability, sponsored jointly by PIMS and the Centre de Recherches Mathématiques (CRM), held in Montreal, continuing an almost annual tradition going back to 2004 (held mostly at UBC), and a two-week summer school on the mathematics of renewable energy held at UBC Okanagan, jointly sponsored by PIMS and the Banff International Research Station (BIRS). The renewable energy summer school is part of a PIMS collaborative research group (CRG) that provides funding for workshops and specialized postdocs as well. In addition, the annual National Canadian Undergraduate Mathematics Conference was held this year at UBC.

At UBC, PIMS supports a host of outreach activities aimed at K-12 students. These include DREAMS, an online event focused on diversity in mathematics; Math Ninjas; UBC Girls in Data Science Summer Camp (hosted by UBC Statistics); Math Circles; and the Elementary Math Contest (ELMACON).

PIMS also sponsored three public lectures. Two of the lectures by Carnegie Mellon University Professor Po-Shen Loh ("Future Proofing our Children" and "AI Is Here. How Can We Help All the Humans? Answer: Math,

with a Twist") outlined ways to prepare our children for the role and impact of artificial intelligence in the coming years. The third public talk was the annual UBC Math Niven lecture featuring PIMS' University of Washington Site Director Dr. Jayadev Athreya.

The PIMS central administrative site at UBC offers a welcoming environment for researchers, including several PIMS postdoctoral fellows, to collaborate and engage in dynamic discussions. Finally, we would be remiss if we failed to mention PIMS Tea, which is held every Wednesday afternoon during the academic year. It is where mathematical scientists gather together informally for coffee, snacks, conversation, and lots of math.

SIMON FRASER UNIVERSITY
Site Director: Dr. Razvan C. Fetecau

In 2024, SFU continued to hold four seminars previously supported by PIMS: Discrete Mathematics Seminar, Operation Research Seminar, Number Theory and Algebraic Geometry Seminar, and Mathematics of Computation, Application and Data (MOCAD) Seminar. SFU also hosted two PIMS-supported conferences and meetings: Frontiers in Biophysics and Statistical Learning for Large Scale Data.

During 2024, SFU hosted three PIMS postdoctoral fellows, plus a graduate student supported by the Maud Menten Institute. On the education side, PIMS supported the Changing the Culture conference and SFU Math camps. PIMS also supported activities such as Women in Mathematics Day (May 10) and provided funding for participants who travelled from across Canada to the Symposium on Theory of Computing in Vancouver (June 24 - 28, 2025) and a MATRIX-supported conference in Australia. Lastly, faculty at SFU offered a Spring 2024 PIMS Network Wide Graduate Course titled Algebraic and Probabilistic Techniques in Combinatorics.

UNIVERSITY OF CALGARY
Site Director: Dr. Wenyuan Liao

During 2024, the University of Calgary continued our strong and diverse program, featuring many high-profile PIMS activities. The 19th Louise and Richard K. Guy Lecture Series (September 26) was given by Peter Cameron, Professor of Mathematics at the University of St Andrews, and PIMS' 4th Math to Power Industry (M2PI) workshop, led by Dr. Kristine Bauer, was held in June 2024.

In 2024, we welcomed Antoine Leudiére, a PIMS Postdoctoral Fellow working with Renate Scheidler and Trisha Lawrence, a Collaborative Research Group Postdoctoral Fellow working with Deniz Sezer. Including Gregory Knapp, who joined UCalgary in 2023, there are currently three postdoc fellows at the Calgary site.

PIMS Calgary continued to support prizes in Mathematics at the Calgary Youth Sciences Fair, which was held on April 11-13, 2024. We also hosted several PIMS-supported seminar series: Algebra & Number Theory Seminar (organized by Dr. Dang Khoa Nguyen), Biostats Seminar (organized by Dr. Qingrun Zhang), Coffee at the Lounge Series (organized by Dr. Cristian Rios), and the Math Writing Café series (organized by PhD student Sedanur Albayrak). In addition, Prof. Katarzyna Sznajd-Weron (Wroclaw University of Science and Technology) gave a PIMS lunchbox talk on September 17, 2024.

UNIVERSITY OF ALBERTA
Site Director: Dr. Eric Woolgar

PIMS support during 2024 enabled the University of Alberta to host five postdoctoral fellows, including two new arrivals and two

2024 Around the Sites

who left during the academic year. The PIMS postdoctoral fellowship program is one of the most important components of PIMS activity at the University of Alberta.

Generous PIMS funding enabled the University of Alberta's Campus Saint-Jean to host a very successful Alberta Math Dialogue (AMD) in May, with well over one hundred people in attendance from across the Province of Alberta and beyond. The AMD, an annual event hosted at a different Alberta post-secondary institution each year, enables connections not only between PIMS universities in the province but also between the universities and the province's other post-secondary colleges and institutions, strengthening bonds between researchers and educators across the province. PIMS support also helped us host the Alberta Graduate Mathematics and Statistics Conference (July 6 - 8, 2024). This conference allowed graduate students in mathematics, statistics, biostatistics, actuarial science, data science, and other related fields to meet and share their research with peers from other universities who work in related areas.

PIMS funding has played a key role in revitalizing the University of Alberta's colloquium series, enabling us to invite several external speakers and strengthen the program after the disruptions of the pandemic. The colloquium remains a vital part of our department's research and graduate education ecosystem. Additionally, PIMS support has helped sustain our Mathematical Biology Seminar. Researchers from the University of Alberta are also actively involved in two PIMS Research Networks: the Kantorovich Initiative and The Maud Menten Institute.

Lastly, PIMS provided key funding for several of our outreach events. With this support, our active student chapter of the Association for Women in Mathematics hosted study sessions, a movie night, and a talk. Outreach coordinator Trevor Pasanen also organized and led a variety of PIMS-supported initiatives, including Math Circles, Math Fairs, a Math Fair Workshop, and math contests.

UNIVERSITY OF LETHBRIDGE

Site Director: Dr. Nathan Ng

In 2024, the University of Lethbridge hosted four PIMS Postdoctoral Fellows: Kubra Benli, Felix Baril Boudreau, Abbas Maarefparvar, and Emily Quesada-Herrera. Each of these postdocs has been actively involved in the organization of PIMS events.

Lethbridge has two active weekly hybrid seminars. Now in its 17th year, the Number Theory and Combinatorics Seminar (co-organizers: Baril-Boudreau and Maarefparvar) held thirteen talks, while the CRG L-functions in Analytic Number Theory seminar (co-organizers: Benli and Quesada-Herrera) held twenty-one talks by speakers from all over the world (Australia, China, France, UK, USA). On March 8, the University of Lethbridge held a Distinguished Speaker talk featuring Deniz Sezer (Calgary). Professor Sezer gave a wonderful presentation on her research in wind and renewable energy.

The University of Lethbridge has benefited enormously from the PIMS connection to BIRS. PIMS provided funding for two BIRS workshops: Alberta Number Theory Days XV (co-organizer: Baril-Boudreau) and Movement and Symmetry in Graphs (co-organizer: Joy Morris). University of Lethbridge Mathematics Professor, Habiba Kadiri, organized and participated in the PIMS-BIRS Team Up: Generalizations of the Prime Number Theorem workshop (July 28 - August 10, 2024), and thanks to support from the PIMS-BIRS-Simons Travel Award, we were able to host three visitors in 2024. In the fall, Professor Kadiri also held a PIMS Europe Fellowship at Aix-Marseille Université.

Two of our mathematics students participated in the PIMS Math to Power Industry (M2PI) event and the Women in AI Canada In-Person Career Fair. These activities have been extremely beneficial, and some past students have obtained internships in industry because of them.

University of Lethbridge faculty, postdocs, and students have been actively involved in events associated with two Collaborative Research Groups (CRGs). The CRG Movement and Symmetry in Graphs (2021-2024) held a capstone workshop 24w5298 at BIRS in November 2024. This was an extremely productive meeting that gathered the CRG leaders (Karen Gunderson, Karen Meagher, and Joy Morris) and many of the CRG participants. The workshop was focused around six in-person and one online group who worked together on topics related to graph theory. In June 2024, the CRG L-functions in Analytic Number Theory (2022-2025) held its last major event, the Comparative Prime Number Theory Symposium (co-organizers: Alia Hamieh, Habiba Kadiri, Greg Martin, and Nathan Ng) at UBC. This was the first major conference on this topic and is already making an impact in the field. The symposium had 49 in-person participants, 32 talks, and produced a problem list that is available on arXiv.org. The problem list has inspired several research projects and articles.

In terms of Math Outreach, the University of Lethbridge held a successful community Math Fair (organizers: Jana Archibald and Nathan Ng) on March 24, 2024. The fair drew 80 participants, predominantly school-aged children, and featured twelve engaging math activities. Fourteen students assisted with the preparation and execution of the event. Additionally, in December, a winter-themed math outreach activity titled "Snowflakes and Fractals" took place.

UNIVERSITY OF SASKATCHEWAN
Site Director: Dr. Stephen Rayan

The University of Saskatchewan PIMS site has been collectively engaged in various PIMS-supported activities during 2024. The PIMS Collaborative Research Group (CRG) on Structure-Preserving Discretizations and their Applications officially commenced on April 1, 2024, with USask as one of the anchor sites and Prof. Raymond Spiteri as a local principal investigator. As part of the CRG's activities, an eponymous in-person mini-symposium was held at the SIAM Annual Meeting in Spokane, WA, in July 2024, as well as a scientific session at the CMS Winter Meeting in Richmond, BC, during late November to early December 2024. The CRG also co-sponsored the Marsden Memorial Lecture "A Friendly Introduction to Calculus and Geometry on Meshes and Graphs," delivered by Professor Anil Hirani on October 24, 2024.

The PIMS CRG on Novel Techniques in Low Dimension: Floer Homology, Representation Theory, and Algebraic Topology sponsored an Applied Topology Mini-course and related scientific session at the CMS Summer Meeting in late May and early June in Saskatoon. These events brought together international researchers from diverse backgrounds and levels of expertise to discuss and learn about important applications of topology to modelling, with topics including DNA, material science, and data analysis.

The PIMS CRG on Quantum Topology and Its Applications has enjoyed a major anchor at the University of Saskatchewan with six investigators from three USask departments, including lead investigator Prof. Steven Rayan. The CRG concluded its 4-year run in 2024 with two closing events. The PIMS Math2PowerQuantum Quantum Computing Summer School, a satellite event of the 2024 CMS Summer Meeting in Saskatoon, drew 45 student participants from across Canada. In addition to lectures and hands-on, fingertip-to-keyboard demonstrations of quantum computing, the event featured a quantum career panel with both academic and industry representation, including Professor Kristine Bauer, PIMS Co-Director Industry. In July, the CRG co-organized a major scientific event at USask, the International Workshop on Hyperordered Structures and Quantum Materials, which was co-funded by PIMS and the Hyperordered Structures (HOSS) Grant-in-Aid for Transformative Research Area, a national science project in Japan. The event attracted roughly 70 participants from around the world, of which roughly half are based in Japan. The conference featured a graduate student poster competition as well as Canadian Light Source tours that were thoroughly enjoyed by our guests from Japan. USask's Centre for Quantum

2024 Around the Sites

Topology and Its Applications (quanTA) is the continuing legacy of the CRG.

Researchers at USask are also actively involved in the PIMS PRN Maud Menten Institute: Mathematics for the Life Sciences. Prof. Chris Soteros is the local representative for the initiative. Several faculty and students from USask presented at the September HQP Summit and working group discussions.

The University of Saskatchewan has continued to lead PIMS VXML teams: in 2024, one was co-led by Professor Chris Soteros (USask) and Professor Margherita Maria Ferrari (Manitoba), and a second was led by Professor Juxin Liu (USask). Professor Steven Rayan served for the second year in a row as one of the members of the PIMS VXML Steering Committee.
We are also pleased to have hosted four PIMS postdoctoral fellows at our site during 2024. These postdocs include Dr. Benjamin Anderson-Sackaney (PIMS-Simons Postdoctoral Fellow), Dr. Konstantin Druzhkov, Dr. Matthew Rupert, and Dr. Seth Taylor (PIMS CRG Postdoctoral Fellow for Structure-Preserving Discretizations and their Applications). We are also thrilled to report that Dr. Rupert took up a tenure-track position at Texas A&M University in August 2024, while Dr. Anderson-Sackaney joined another PIMS site, the University of Victoria, as a tenure-track faculty member in December 2024.

Finally, we are grateful to PIMS for its contributions as a sponsor for the CMS Summer Meeting that took place on the USask campus in late spring 2024. Nearly 300 participants made their way to Saskatoon for the conference, and a number of special events associated with the meeting received additional PIMS support.

UNIVERSITY OF REGINA
Site Director: Dr. Allen Herman

In 2024 the University of Regina hosted four PIMS Distinguished Lecturer events, supported six PIMS Postdoctoral Fellows, and hosted or organized three PIMS-supported conferences.

The 2024 University of Regina PIMS Distinguished Lecturers included:

- David Haziza (University of Ottawa), Statistical inference in the presence of imputed survey data through regression, Feb. 12 (in person)
- Teena Gerhardt (Michigan State University), Interactions between Topology and Algebra: Advances in Algebraic K-theory, March 8 (virtual)
- Marco Gualtieri (University of Toronto), Generalized geometry, stacks, and physics, April 9 (in person)
- Shakhawat Hossein (U. Winnipeg), Non-penalty shrinkage: A new approach to log-logistic proportional hazards modelling, November 22 (in person)

The University of Regina hosted four regular PIMS PDFs in 2024 and two special-case PIMS PDFs. The regular PIMS PDFs were/are: Prateek Vishwakarma (to August 31), Himanshu Gupta (all year), Samir Mondal (from September 1), and Sushil Singla (from September 1). The special case PIMS PDFs were/are: Venkata Raghu Tej Pantangi (PIMS CRG PDF to June 30) and Alice Lacaze-Masmonteil (PIMS-CNRS PDF, from July 1). Three of our PIMS PDFs, Vishwakarma, Gupta, and Singla, made use of PIMS Travel Awards in 2024. In addition, a December research visit to Regina by the Fields PDF Adrianahermana Sarobidy Razafimahatratra is being supported with a PIMS-BIRS-Simons Travel Award.

In 2024, PIMS awarded funding for three conferences through the University of Regina PIMS site. On May 2 to 4, 2024, the University of Regina hosted the 5th Annual 2SLGBTQ+ in STEM Conference. On May 21 to 23, our new PIMS Affiliate Member, First Nations University of Canada, played host to the 2024 Turtle Island Indigenous Science Conference. Also, PIMS funding awarded to the Special Western Canada Linear Algebra Meeting honouring Peter Lancaster, held May 25-26, 2024, at the University of Calgary, organized by Shaun Fallat (University of Regina), was managed through our University of Regina site.

2024 Around the Sites

UNIVERSITY OF MANITOBA
Site Director: Dr. Stéphanie Portet

In 2024, the University of Manitoba benefited significantly from PIMS funding, which supported research, training, and outreach activities in mathematics and its applications. Two new PIMS postdoctoral fellows joined three ongoing fellows, strengthening the university's research community. Noteworthy events included the PIMS Tea in February and the continuation of the 05C50 biweekly online seminars on graphs and matrices, organized by H. Monterde and S. Kirkland. Outreach initiatives, such as the SWIM Workshop for teachers (S. Lui), the Grade 9 Summer Math Camp (M. Davidson), and Math Mania at Pinaymootang First Nation (D. Barr), engaged educators and students in mathematics.

The Maud Menten Institute (MMI), a PIMS Research Network for Mathematics for the Life Sciences founded by M. Lewis (UVic) and S. Portet, launched in April 2024 as a collaborative platform for PIMS mathematical biologists. It supports graduate and postdoctoral collaborative research through awards and funded attendance at the first in-person MMI HQP Summit (September 26–29, Vancouver). Since September, MMI seminars have been co-hosted by the University of Victoria and the University of Manitoba.

Additional PIMS support included a PIMS-BIRS-Simons Travel Award for H. Martin's visit (hosted by J. Arino) and out-of-network travel funding for PIMS PDFs to disseminate research. The PIMS/BIRS Team Up! Program also facilitated collaboration in Quantum State Transfer, led by H. Monterde and S. Kirkland.

UNIVERSITY OF WASHINGTON
Site Director: Dr. Jayadev Athreya

PIMS activities at UW in 2024 continued to grow and thrive. PIMS supports several seminars, colloquia, and conferences at UW, including the Distinguished Seminar in Optimization and Data, the UW Combinatorics and Geometry Seminar, the UW-PIMS Mathematics Colloquium, and the Northwest Probability Seminar. UW researchers across several departments (Soumik Pal, Math; Zaid Harchaoui, Statistics; Yanqin Fan, Economics) are leaders in the Kantorovich Initiative (KI), the first PIMS Research Network, which focuses on Optimal Transport (OT) and its applications. KI activities with UW organizers include a Women in OT workshop in April, a summer school in Optimal Transport, Stochastic Analysis, and Machine Learning in June with KAIST held in Korea, and joint funding from INRIA (France) to help support graduate student exchanges. UW topologist John Palmieri is part of a newly approved CRG in Homotopy Theory, and PIMS-Simons-UW postdoc Xioawen Zhu has leveraged PIMS support to speak at several prestigious conferences (including the PIMS International Workshop on Hyperordered Structures and Quantum Materials) and publish new results.

University of Washington
Photo by Rick Han, courtesy of Pexels

POSTDOCTORAL FELLOWS

Each fall, the Pacific Institute for the Mathematical Sciences (PIMS) invites nominations for outstanding young researchers in the mathematical sciences for postdoctoral fellowships in the following year. Candidates must be nominated by a mathematical scientist or a department at a PIMS member university. These fellowships are intended to supplement the support provided by the sponsor and can be held at any of PIMS' Canadian member universities: Simon Fraser University, the University of Alberta, the University of British Columbia, the University of Calgary, the University of Lethbridge, the University of Manitoba, the University of Regina, the University of Saskatchewan, and the University of Victoria.

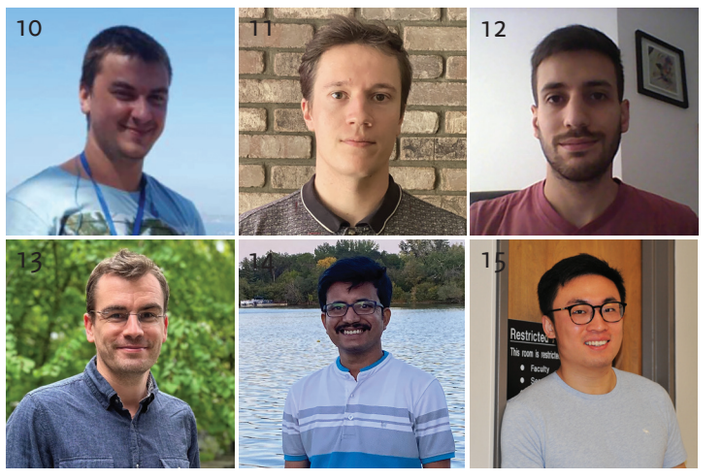
In addition, each of the PIMS' Collaborative Research Groups and Research Networks is allocated several postdoctoral fellows, the selection of which is determined by an assessment panel. Thanks to the support of the Simons Foundation, the PIMS-Simons Postdoctoral Award is a salary supplement awarded to excellent candidates from any of the PIMS universities. PIMS PDFs are required to attend an orientation at the beginning of their term and are asked to present their work at PIMS' Emergent Research Seminars.

2024 Postdocs

1. Alice Lacaze-Masmonteil** (URegina)
2. Antoine Leudière (UCalgary)
3. Daniyar Omarov (UAlberta)

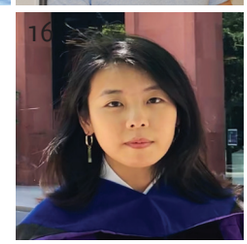
4. Emanuela Marangone (UManitoba)
5. Emily Quesada-Herrera* (ULethbridge)
6. Federico Trinca* (UBC)

7. Felix Christian Clemen (UVIctoria)
8. Jeet Sampat (UManitoba)
9. Jin-Cheng Guu (UAlberta)



10. Konstantin P. Druzhkov (USaskatchewan)
11. Seth Taylor (USaskatchewan)
12. Lucas Villagra Torcomian* (SFU)

13. Pawel Morzywolek* (UWashington)
14. Samir Mondal (URegina)
15. Tianxia (Tylar) Jia (UVictoria)



16. Jin-Cheng Guu (UAlberta)
17. Trisha Lawrence (UCalgary) - photo unavailable

***PIMS-Simons PDF | **PIMS-CNRS PDF**

POSTDOCTORAL FELLOW FEATURE: BENJAMIN ANDERSON-SACKANEY

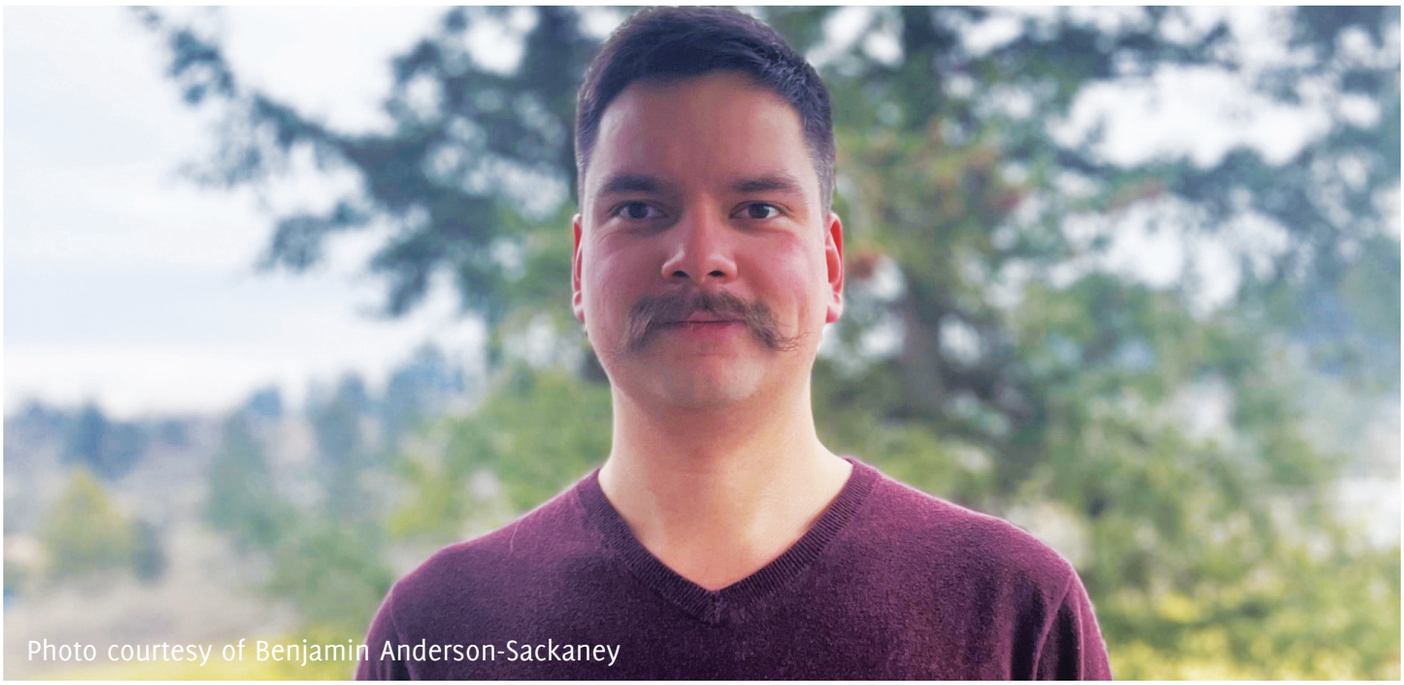


Photo courtesy of Benjamin Anderson-Sackaney

Benjamin Anderson-Sackaney is an Assistant Professor of Mathematics and Statistics at the University of Victoria. Having obtained his PhD at the University of Waterloo in 2022, Professor Anderson-Sackaney was appointed a PIMS-Simons Postdoctoral Fellowship at the University of Saskatchewan from September 2023 to November 2024. His research interests lie in quantum groups, abstract harmonic analysis, and operator algebras, along with other closely related fields.

PIMS had a chance to talk to Professor Anderson-Sackaney about what inspired him to study mathematics, his current research, and the advice he has for early career researchers.

What inspired you to study mathematics?

In university, I started off in mining engineering. An inclination towards mathematics over every other subject was certainly involved in this choice; however, what really inspired me to pursue STEM, and hence university at all, were science communicators like Neil DeGrasse Tyson. Before this, I never even considered leaving my hometown, Timmins. Another thing that was impactful early on was seeing the mathematical ideas discussed on the YouTube channel 10thdim. This showed me that math could be fun, something I never experienced in a classroom at the time. I owe a great deal to my nation, Fort Albany, for their sponsorship of my university studies. Their sponsorship is the thing that made my career path an option. That led me to engineering, and in my engineering curriculum I had the feeling that I didn't really care about engineering; what really interested me was math. For some time I was afraid to switch from a "safe" major like engineering to something that seemed "not so safe" like mathematics (this was a fear born out of ignorance; a mathematics major is a good option). A big turning point for me was going to the Timmins library and finding a book on group theory. I had difficulty understanding what I was reading, but I had to know more. With that, the switch became too compelling, and I eventually did it. Although I've had great doubts along the way, from that point on I knew in my heart that pure math was what I wanted to do. I knew I wanted to eventually get a PhD and do math research.

Can you briefly describe your research and any of your recent significant findings?

My research takes place at the interface of quantum symmetry, operator algebras (algebras of operators on a Hilbert space), and harmonic analysis. More specifically, I consider special classes of operator algebras (in particular, reduced (quantum) group C*-algebras) arising from the (quantum) symmetries of a Hilbert space in the form of a group or, more generally, a quantum group. I use tools such as a generalized Fourier transform to study them. For this, the theory of quantum groups provides the "correct context" to discuss things like a Fourier transform where group theory alone is insufficient. Towards the end of the 2010s, the question of understanding the simplicity of reduced group C*-algebras in group-dynamical terms had achieved a remarkable resolution in terms of so-called "boundary actions." These ideas and results paved the way for many further developments in the years that followed. The question of simplicity for quantum group C*-algebras (beyond those coming from groups), however, has remained completely open. Together with my collaborators Fatemeh Khosravi and postdoc mentor Roland Vergnioux, we managed to make significant progress on developing the theory of simplicity in the setting of quantum groups while answering some related open problems.

What does being a PIMS postdoc mean to you and your work?

Being a PIMS postdoc means being a part of and sponsored by the PIMS network (and Simons Foundation in my case). It helps me focus on my research, which has been crucial for establishing myself as a researcher. On top of that, networking and travel opportunities are extremely important for an early-career researcher, and PIMS gave me a means to have these things.

What advice would you give to students or early-career researchers considering a path in your field?

My first piece of advice would be to have a backup plan and an investment in skills outside of academia. Keep an open mind about your opportunities. Talk to folks from your program or field who have gone into industry. This keeps your options as open as possible and, as well, gives you a wider perspective on what it means to have a career. The job market is tough, and I think it's a bad outcome when one feels like they are forced to continue in academics because they don't think they have any other option. On the other hand, there are good things about academics, and you can appreciate those things more if you have awareness of the experiences of people in industry. My next piece of advice is oriented more specifically towards building an academic career: talk to people. Make yourself known. The people you talk to are potentially collaborators, able to give you ideas, able to give you advice, able to introduce you to other people, able to give you a job, and able to direct you to job openings.

"Networking and travel opportunities are extremely important for an early-career researcher, and PIMS gave me a means to have these things."

Looking back on 2024, what were you most proud of as a researcher?

I'm most proud of my joint work with Fatemeh Khosravi, a paper we put up at the end of 2023 and published last year, in 2024, in which we solved an open problem together. The reason for this answer is that it represents a time where I successfully persevered through a major setback and accomplished the goal I was after. To explain, this was a problem I worked on during my PhD for which I thought I had a solution and then later found a mistake. To put the circumstances into perspective, I had already announced the result, presented it at conferences, and then found the mistake between my PhD defence and finishing the revisions of my thesis. I continued to work on this problem during my first postdoc and, using new ideas, found another avenue to approach it. Later, I met Fatemeh, who had also spent time working on this problem. We ended up being able to put our ideas together and finally solve it, like a jigsaw puzzle being completed. ◆

Aerial view of the University of Victoria
Photo courtesy of Gregory Miller

2024
PRIZES & AWARDS

2024 CRM-Fields-PIMS Prize
Ram Murty, Queen's University

Professor Ram Murty of Queen's University was awarded the 2024 CRM-Fields-PIMS Prize for his outstanding contributions to number theory. Known for his early work on Artin's conjecture and elliptic curves, Murty's research has advanced several key areas, including L-functions, modular forms, and transcendence results. He played a pivotal role in refining the Birch-Swinnerton-Dyer conjecture and clarified important aspects of the Langlands program. Beyond his research, Murty has mentored over 50 PhD students and 39 post-doctoral fellows, contributing significantly to the Canadian number-theoretic community through initiatives like the CNTA conferences and CICMA lab.

PIMS Education Prize
Trefor Bazett, University of Victoria

Assistant Teaching Professor Trefor Bazett from the University of Victoria's Mathematics and Statistics department was awarded the 2024 PIMS Education Prize at the annual Changing the Culture conference on May 17, 2024. This prestigious prize honours individuals who have significantly contributed to education in the mathematical sciences. Prof. Bazett is dedicated to making mathematics accessible, creating hundreds of math-related videos on YouTube, and amassing over 408,000 subscribers. His work inspires and educates a wide audience, fostering a deeper understanding of mathematics.

PIMS-UBC Early Career Prize
Christos Thrampoulidis, UBC

Dr. Christos Thrampoulidis, Associate Professor in the Department of Electrical and Computer Engineering at the University of British Columbia, was awarded the 2024 PIMS/UBC Mathematical Sciences Early Career Award. This award recognizes UBC researchers for their innovative contributions to mathematics or its applications in the sciences. Notably, Dr. Thrampoulidis is the first recipient of this honour from outside the Mathematics or Statistics Department. Dr. Thrampoulidis' research lies at the intersection of statistical signal processing, machine learning, high-dimensional statistics, and optimization.

PIMS-Europe Fellowship Award
Corina Birghila, University of Lethbridge

University of Lethbridge Assistant Professor of Mathematics and Computer Science, Corina Birghila, was the recipient of the 2024 PIMS-Europe Fellowship Award. This award will support Prof. Birghila's research visit with Dr. Marine Demangeot at the Institut Montpelliérain Alexander Grothendieck (IMAG), Université of Montpellier in the summer of 2025.

PIMS COLLABORATIONS

PIMS-CNRS PROGRAMS

PIMS has expanded its global presence through partnerships with various international research organizations. The PIMS-CNRS IRL #3069, first established in 2007 and renewed in 2019, has played a key role in fostering and promoting research collaborations between mathematical scientists at PIMS member universities in North America and researchers throughout France.

CNRS Visitors
Distinguished French researchers (at CNRS or a French university) spend the academic year at a PIMS member university and participate in research activities. PIMS has hosted 41 visitors since 2007.

PIMS-CNRS Fellowship
This program supports faculty at PIMS member universities for long-term visits to France, fostering collaboration.

PIMS–CNRS Student Mobility Program
This program is geared towards senior undergraduates, graduates, and postdoctoral scholars. Support is provided for 3-6 month student exchanges between PIMS member universities and universities/eligible institutions in France.

PIMS-CNRS Postdoctoral Fellowships
This award is targeted to applicants that are French or who have completed their PhD degree in France. Since 2007, PIMS has awarded more than 25 PIMS–CNRS postdoctoral scholarships.

COLLABORATIONS WITH OTHER INSTITUTIONS

In collaboration with our partners, PIMS has created several programs aimed at promoting cooperation among mathematical scientists across our institutes. These include the PIMS/BIRS Team Up! program, the PIMS Institutional Exchange Program, which launched in 2022, and, more recently, the PIMS-ICMS Collaboration.

PIMS/BIRS Team Up!
The PIMS/BIRS Team Up! program provides opportunities for in-person collaboration to teams of mathematical scientists, targeting researchers who are traditionally underrepresented in the mathematical sciences.

PIMS Institutes Exchange Program
The PIMS Institutes Exchange Program aims to reduce the carbon footprint of travel for research purposes by maximizing the scientific impact of each visit. Researchers travelling between PIMS and a partner institute for a scientific event may be eligible for funding to extend their visit to include nearby universities or institutes. Partner institutes include the Institute for Computational and Experimental Mathematics (ICERM), the Centre International de Rencontres Mathématiques (CIRM), the International Centre for Theoretical Sciences (ICTS), the Institut Henri Poincaré (IHP), and the Institute for Mathematical and Statistical Innovation (IMSI).

PIMS-BIRS-Simons Travel Award
The PIMS-BIRS-Simons Travel Award aims to help researchers attending one of the BIRS 5-day (or longer) workshops maximize the scientific impact of their travel by visiting researchers at one of the PIMS member institutions.

PIMS-ICMS MOU
Following an established connection at the 2022 Pacific Rim Mathematical Congress (PRIMA), PIMS, along with the International Centre for Mathematical Sciences (ICMS) in Edinburgh, UK, recently signed a memorandum of understanding. The aim of the MOU is to promote collaboration between the two institutes. A recent focal point of the agreement was the 3MC-PIMS-ICMS Winter school - Multiscale Modeling: Infectious Diseases, Cancer and Treatments, which was held from December 2 to 13, 2024.

Photo courtesy of Chris Montgomery on Upsplash

PIMS ONLINE PROGRAMS

PIMS Network-Wide Graduate Courses

These courses utilize the PIMS network to deliver a rich variety of graduate-level courses in the mathematical sciences at PIMS member universities. This program benefits instructors by reaching a larger potential audience and students by offering a broader variety of courses. Students at PIMS sites can typically receive credit for the courses in this program through the Western Deans Agreement (some conditions and fees may apply). Instructors offering courses apply in the Spring and Fall semesters, and if selected, meet with members of the PIMS Digital Collaboration Committee to discuss logistics and support.

Courses offered between Jan 1, 2024, and Dec 31, 2024:

- Algebraic and probabilistic techniques in combinatorics: Bojan Mohar (Simon Fraser University)
- Algebraic Number Theory: Lior Silberman (University of British Columbia)
- Ergodic Theory: Anthony Quas (University of Victoria)
- Hodge theory, Deligne cohomology, and algebraic cycles: James D. Lewis (University of Alberta)
- Hyperbolic Systems of Conservation Laws: Thomas Hillen (University of Alberta)
- The geometry and arithmetic of schemes: Clifton Cunningham (University of Calgary)
- Topics in harmonic analysis: Fourier restriction and decoupling: Joshua Zahl (University of British Columbia)
- Extremal Combinatorics: Jonathan Noel (University of Victoria)
- Introduction to Cohomology of Arithmetic Groups: Manish Patnaik (University of Alberta)
- Topics in Mathematical Biology: biological image data and shape analysis: Khanh Dao Duc (University of British Columbia)

Network-wide Colloquium Series

In 2021, PIMS inaugurated a high-level, network-wide colloquium series. Distinguished speakers gave talks across the full PIMS network, with one talk per month during the academic term. The series continues to be a steady feature of our online programming.

September 10, 2024 | Machine Assisted Proofs: **Terence Tao**, UCLA

October 17, 2024 | Computing Equilibrium Distributions Of Interacting Particles: **Sheehan Olver**, Imperial College London

November 14, 2024 | Finding Needles in Haystacks: Boolean intervals in the weak order of $\mathfrak{S}n$: **Pamela Harris**, University of Wisconsin-Milwaukee

Winter 2025 speakers:

January 23, 2025 | Dynamical Symmetry Is Atypical: **Amie Wilkinson**, The University of Chicago

February 27, 2025 | Ranks, Lines, Progressions, and Sets: **Jordan Ellenberg**, University of Wisconsin-Madison

March 20, 2025 | **Mariel Vazquez**, UC Davis

Photo courtesy of Sigmund on Upsplash

Digital Collaborations

PIMS First Year Interest Groups (FYIG)

The PIMS First Year Interest Groups (FYIG) Program brings together early career researchers to study active research topics in the mathematical sciences. Each First Year Interest Group is led by a PIMS postdoctoral fellow and centres on an accessible subject for beginning graduate students. The PDF leads a small reading group (up to 4 students) of early-year (1st and 2nd-year MSc or PhD) graduate students on books or papers that inspired them. In 2024, groups focused on modelling ecological population dynamics, Diophantine approximation, partial differential equations, and interactions between linear algebra and combinatorics.

PIMS
INDUSTRY HIGHLIGHTS

Math INDUSTRY

Math to Power Industry (M2PI)

In June 2024, PIMS held a hybrid M2PI workshop. This popular workshop paired industry problems with mathematical talent and aimed to benefit both the trainees participating in the program and the industrial partners. The M2PI program builds on skills with a training bootcamp (software best practices, business, communications, project management), group collaborations with industry partners, and also creates a funnel leading to job placements in industry. For the past five years, PIMS and partners have offered a virtual rapid response program to train and place young mathematical scientists into jobs in important industry sectors in western Canada (agrifood, energy, forestry, and healthcare).

Thank you to our project partners:

Awesense

FiniteCarbon

NCIS
NAUTICAL CRIME INVESTIGATION SERVICES

ioto

2024 M2PI Graduating Cohort:

Akina Kuperus (UVictoria)
Aniket Mane (SFU)
Ashna Wright (UVictoria)
Boaz Elazar (UBC)
Brian Andres Zambrano Luna (UAlberta)
Canzhu Song (UAlberta)
Clotilde Djuikem (UManitoba)
Emily Au (UAlberta)
Fatemeh Hasheminejad (BrockU)
Golnoush Farzanfard (ULethbridge)
Hiva Gheisari (ULethbridge)
Hossein Ghadjari (UCalgary)
Irushi Jayathunga (UCalgary)
Isaac Dante Asamoah (USaskatchewan)
Jack Kendrick (UWashington)
Jialin He (UAlberta)
Keivan Mirzaei UCalgary)
Marco Caoduro (UBC)
Masoomeh Akbari (UOttawa)
Mathew Lewis (UVictoria)
Mustafa Amin (ULethbridge)
Patrik Coulibaly (UBC)
Reihaneh Ghaffari (UCalgary)
Sepehr Yadegarzadeh (SFU)
Sumin Leem (UCalgary)
Syeda Atika Batool Naqvi (UManitoba)
Varun Neelamana (URegina)
Yasaman Shahhosseini (UVictoria)
Youssef Mousaaid (Perimeter Institute)



EDUCATION **OVERVIEW**

PIMS sponsors and coordinates a wide assortment of educational activities. We are dedicated to increasing public awareness of the importance of mathematics and want young people to see that mathematics is a subject that opens doors to careers in science, industry, and many other exciting fields.

PIMS believes that training the next generation of mathematical scientists and promoting diversity within mathematics cannot begin too early. From its inception, PIMS has supported educational initiatives, including:

- Organizing interesting, fun, and challenging math events for children of all ages.
- Facilitating access to information about math education matters to parents, teachers, and university faculty (newsletters, workshops, conferences, special publications, etc.).
- Coordinating workshops to facilitate communication between parents, teachers, mathematicians, and math educators.
- Holding the Elementary Math Contest (ELMACON) for grades 5-7 students.
- Organizing a series of mathematical events in schools (Math Fairs in Alberta and Math Mania in B.C.).
- Supporting Math on the Move in rural Saskatchewan.
- Hosting the annual Changing the Culture conferences for school teachers.
- Publishing *Pi in the Sky* magazine. *Pi in the Sky* is an educational magazine aimed at high school students and teachers. Issue 23 was released in the fall of 2024.

Science Rendezvous: May 11

Science Rendezvous is a FREE festival that takes science, technology, engineering, art, and math (STEAM) research and innovation out of the lab and onto the street. Taking place at the UBC Point Grey campus on May 11, 2024, Science Rendezvous had an exciting program lineup of hands-on activities, demos, and tours, from robotics and programming to biochemistry and molecular biology demos and fun math activities.

Changing the Culture: May 17

The annual Changing the Culture conference took place on May 17, 2024, at SFU Harbour Centre in Vancouver. Mathematicians, educators, and school teachers from all levels worked together to discuss narrowing gaps between mathematicians and teachers of mathematics. This year's panel discussion focused on AI and featured workshops and talks, as well as the 2024 PIMS Education Prize award ceremony.

2025 Outlook

PIMS events and activities to look forward to in 2025:

May 5 - 9: Spring Time in Mathematical Quantum Physics

The Spring Time in Mathematical Quantum Physics workshop gathers leading experts and emerging researchers to explore analytical and topological aspects of many-body quantum mechanics at the University of British Columbia.

May 5 to 23: 2025 M2PI Industry Workshop

The Math to Power Industry (M2PI) industry Workshop will take place over three weeks in May. This hybrid workshop pairs industry partners with mathematical talent, aiming to benefit both trainees participating in the program and our industry partners.

May 20 to 24: PIMS Mathematics for the Future: Mathematical Foundations of Quantum Advantage

A workshop aimed at connecting mathematicians, physicists, and computer scientists interested in topics such as contextuality and nonlocality, classical simulation of quantum computations, and measurement-based quantumcomputation.

June 2 - 6: LG&TBQ2: Geometry, Topology, and Dynamics

The weeklong LG&TBQ2 conference, to take place at McGill University, will celebrate LGBTQ mathematicians in geometry, topology, and dynamics.

June 2 - 27: PIMS-CRM Summer School in Probability

The 2025 PIMS-CRM summer school will take place in Vancouver, June 2 to 27. There are two long courses, given by Tom Hutchcroft and Mathav Murugan. There will also be three mini-courses, given by Nathanael Berestycki, Nina Holden, and Tianyi Zheng.

June 16 to 27: 3MC-PIMS-IDMS-ICMS Summer School on Quantitative Molecular and Cellular Biology

Held on the Fort Garry campus at the University of Manitoba, the 3MC-PIMS-IDMS-ICMS Summer School on Quantitative Molecular and Cellular Biology aims to equip students with essential tools and methodologies for investigating complex molecular and cellular questions.

April 28: PIMS PDF Summit

The second PIMS PDF Summit will bring together PIMS postdoctoral fellows from all of the PIMS member universities. PDFs will be given the opportunity to showcase their research, expand their networks, and form new collaborations.

September 2025: New Collaborative Research Group - Diagram Categories in Homotopy Theory

A new Collaborative Research Group has been approved for 2025: Diagram Categories in Homotopy Theory. This CRG will study diagram categories in homotopy theory, focusing on functor calculus, equivariant homotopy theory, and polyhedral products.

December 9 to 12: ICMS-PIMS Big Data Before Data Science

The workshop will define and clarify directions for future research, bringing together international historians of statistics/data science and current practitioners to explore how legacies of past data practices continue to inform the present.

2025 Event Highlights

SEMINARS, CONFERENCES & WORKSHOPS

1 January - Ongoing	**Distinguished Colloquium** University of British Columbia, University of Regina, University of Lethbridge, and University of Manitoba
1 January - Ongoing	**PIMS-SFU MOCAD Seminar Series** Simon Fraser University
1 January - Ongoing	**Probability and Dynamics Seminar Series** University of Victoria
1 January - Ongoing	**PIMS Invited Speaker Series** University of Calgary
1 January - Ongoing	**Mathematical Biology Seminar Series** University of Alberta
1 January - Ongoing	**Mathematics and Statistics Colloquium** University of Saskatchewan
1 January - Ongoing	**UW-PIMS Colloquium** University of Washington
1 January - Ongoing	**Emergent Research: The PIMS PDF Seminar Series** Network Wide - Online
8 - 9 January	**Joint Mathematics Meeting: CRM-PIMS-AARMS Special Session on Indigenous Voices in Mathematics** Seattle Convention Centre
10 January	**Joint Mathematics Meeting: CRM-PIMS-AARMS Invited Address - Wilfred Gangbo** Seattle Convention Centre
10 - 11 January	**Joint Mathematics Meeting: CRM-PIMS-AARMS Special Session on Optimal Transport - Theory and Applications** Seattle Convention Centre
23 January	**PIMS Network Wide Colloquium: Amie Wilkinson, The University of Chicago** Network Wide - Online
27 February	**PIMS Network Wide Colloquium: Jordan Ellenberg, University of Wisconsin-Madison** Network Wide - Online
20 March	**PIMS Network Wide Colloquium: Mariel Vazquez, UC Davis** Network Wide - Online
26 - 27 April	**Western Algebraic Geometry Symposium** University of British Columbia - Vancouver
28 April	**Postdoc Summit** University of Calgary
1 - 2 May	**Alberta Mathematics Dialogue (AMD) 2025** University of Calgary
2 - 4 May	**Alberta Number Theory Days XVI** Banff International Research Station (BIRS)
5 - 9 May	**Spring Time in Mathematical Quantum Physics** University of British Columbia - Vancouver
20 - 24 May	**PIMS Mathematics for the Future: Mathematical Foundations of Quantum Advantage** Simon Fraser University - Burnaby
20 - 23 May	**Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM) 2025** University of Ottawa
2 - 6 June	**LG&TBQ2: Geometry, Topology, and Dynamics** McGill University
11 - 13 July	**The Maud Menten Institute HQP Summit 2025** University of Alberta
1 - 31 December	**UBC-PIMS Harmonic Analysis and Fractal Geometry Seminar: Emerging Leaders Lecture Series** University of British Columbia - Vancouver
9 - 12 December	**ICMS-PIMS Big Data Before Data Science** University of British Columbia - Vancouver

SUMMER SCHOOLS

2 - 27 June	**2025 PIMS-CRM Summer School in Probability** University of British Columbia - Vancouver
16 - 25 June	**Structure-Preserving Scientific Computing and Machine Learning Summer School and Hackathon** University of Washington
16 - 27 June	**3MC-PIMS-IDMS-ICMS Summer School on Quantitative Molecular and Cellular Biology** University of Manitoba

COLLABORATIVE RESEARCH GROUPS

2022 - 2025	**L-functions in Analytic Number Theory**
2023 - 2026	**Forecasting and Mathematical Modeling for Renewable Energy**
2024 - 2027	**Structure-Preserving Discretizations and their Applications**
2025 - 2028	**Diagram Categories in Homotopy Theory**

PIMS RESEARCH NETWORKS

2023 - 2026	**Kantorovich Initiative**
2024 - 2027	**The Maud Menten Institute**

INDUSTRY EVENTS

Feb - Ongoing	**Math to Power Industry (M2PI) Case Studies Virtual Seminar** Online
5 - 23 May	**Math to Power Industry (M2PI) Workshop** Online
28 May	**PIMS Industry Day and M2PI Graduation (tentative)** University of Saskatchewan

K-12 EDUCATION EVENTS

3 May	**Elementary Math Contest (ELMACON)** University of British Columbia - Vancouver
10 May	**Science Rendezvous** PIMS Sites Canada-wide
16 May	**Changing the Culture** Simon Fraser University

For more information and updates, visit www.pims.math.ca

University of Saskatchewan
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