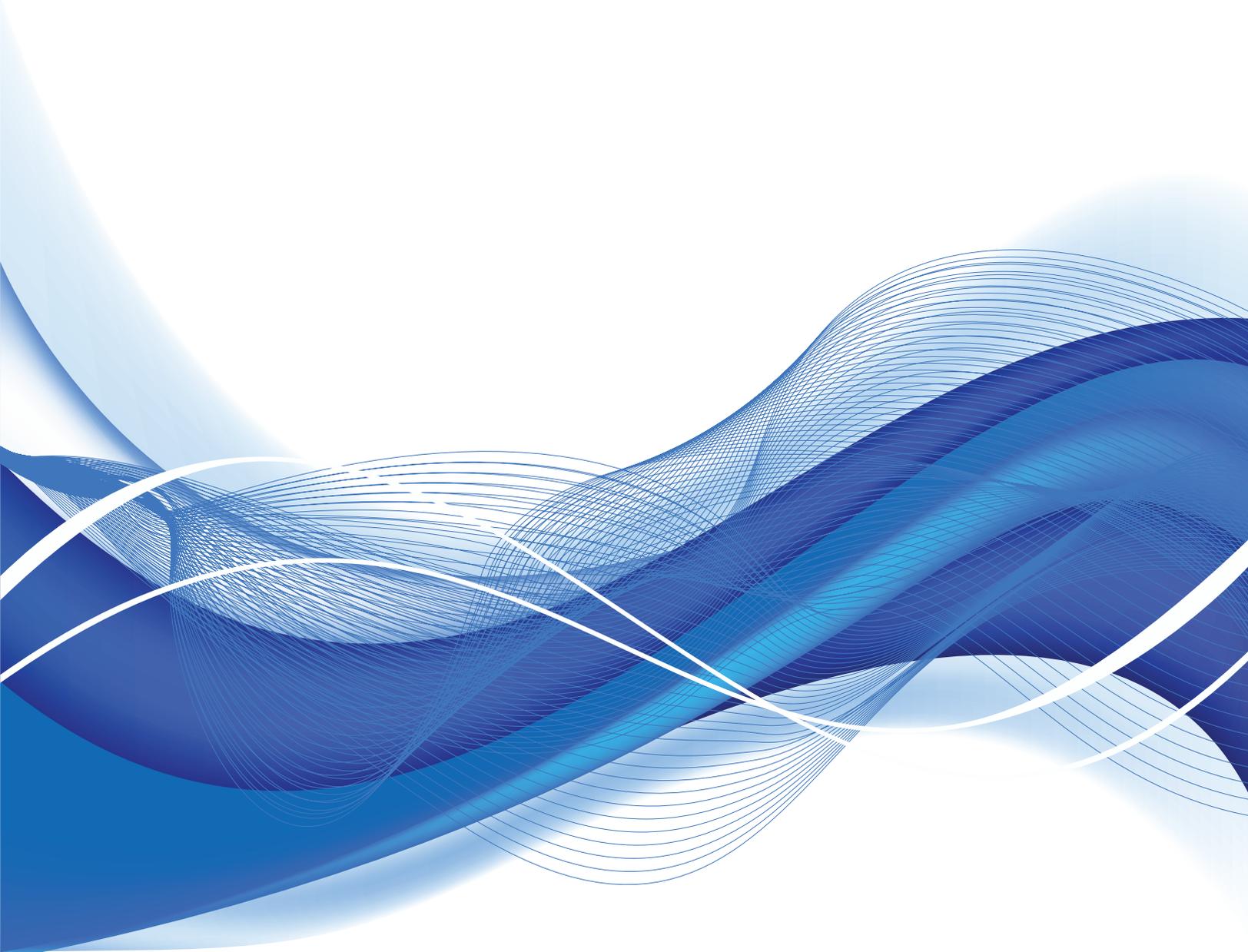


Pacific Institute *for the*
Mathematical Sciences

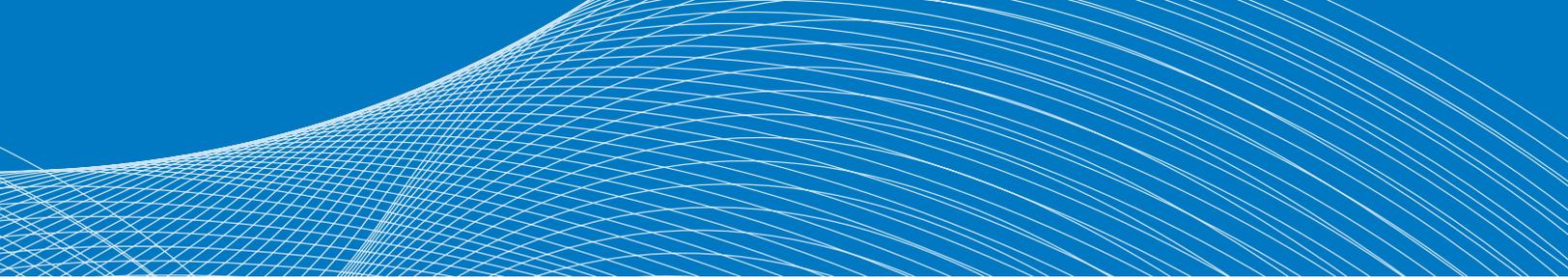


Annual Report 2017



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ANNUAL PROGRESS REPORT

CTRMS-342044-2014

Pacific Institute for the Mathematical Sciences

January 1–December 31, 2017



I. OVERVIEW OF 2017

1. HIGHLIGHTS

- 1. IX Positivity Conference at PIMS UAlberta:** The IX Positivity Conference was held during July 17-21, 2017. The subject of positivity goes back to F. Riesz and H. Freudenthal, and to the Nobel prize winning work of L. Kantorovich. Positivity conferences are normally held every second year. Previous Positivity conferences had been held in Turkey, Netherlands, Greece, Germany, UK, Spain, and China. This was the 9th Positivity conference, and the first one held in North America. With over 90 participants, this was one of the largest Positivity conferences.
- 2. Current Trends in Dynamical Systems and the Mathematical Legacy of Rufus Bowen Conference:** This conference, attended by almost 200 mathematicians young and old representing 19 countries, articulated and celebrated Bowen's mathematical legacy. Lectures were given by nineteen of the world's leading experts in dynamics, including Fields Medalist Stephen Smale, several ICM speakers and Fellows of various societies. Most lectures connected directly to Bowen's work and demonstrated the lasting vitality of his results. There was also a great deal of positive energy and sharing of mathematical ideas over two poster sessions with presentations by thirty-two young dynamicists, and three parallel problem sessions, each focusing on a sub-area of dynamics. A unique feature of the conference was a focus on Bowen's private notebook in which he had catalogued 157 open problems. The Notebook was briefly referenced in a footnote to Bowen's last paper which was posthumously published in 1979, but the Notebook itself was never published or widely distributed. In November, 2016, with the help of PIMS' IT staff, the Notebook was published online as an interactive website where users can comment on progress, discuss new problems and offer new directions to tackle any of the still-open problems noted by Rufus Bowen: <https://bowen.pims.math.ca>. In addition to one conference plenary session on the Notebook, a large number of problems from the Notebook were discussed in the context of the problem sessions. Held at UBC, this was the largest conference in the history of PIMS.
- 3. PIMS Summer School in Probability:** The 2017 Summer School in Probability was also held at UBC and attended by more than 120 participants from institutes representing 24 countries and every continent save Antarctica. It was our second-largest event ever by attendance and featured, among mathematicians like Marek Biskup, Hugo Duminil-Copin, Sandra Cerrai, and Christina Goldschmidt, a mini course taught by Fields Medalist Martin Hairer. The Summer School ran for four weeks and was a massive success.
- 4. BCDATA Workshop:** The first annual bcddata workshop, targeted at graduate students in the Institute of Applied Mathematics at UBC and students at SFU with similar interests, took place August 14-27, 2017. The workshop had two main goals: to bring together top researchers, industry professionals and BC Math students to tackle interesting research and industry problems; and to develop data science literacy in students with strong mathematical skills who may have little or no previous experience in the realm of "data science". The workshop hosted 50 graduate students in mathematics and interested industry members for a two week foray into foundational and crucial elements of the rapidly expanding field of data science. It showcased for industry partners and students alike the opportunity in data science tools—such as working with large data sets, statistical inference, and machine learning—that aid in research and broaden career options after graduation. The first week of the workshop covered introductory data science material through morning lectures and afternoon hands-on mini-projects. On the Wednesday, August 16, students attended a career panel where industry professionals and mathematicians spoke on the possibilities after graduation as well as the paths they took to get to where they are today. The second week covered advanced topics in data science through morning lectures hosted by a diverse range of professors. Students were broken into teams of 10 to tackle week-long projects guided by an industry mentor. All lecture notes, code and workshop materials were made available to students via a GitHub repository as students progressed throughout the weeks. Industry partner, Mobify, provided a venue for the career panel as well as for our new bcddata Colloquium Series which kicked-off in November with a talk from Eldad Haber.

- 
5. **PIMS 20th Anniversary Celebration at UBC:** Starting in 2016 and culminating in an event at UBC in Spring 2017, PIMS celebrated its 20th anniversary with an event at each site. The event in Vancouver, in partnership with the Peter Wall Institute for Advanced Studies, included three talks from Fields Medalist Cédric Villani. Villani's first talk was held at the Vogue Theatre in downtown Vancouver and was a soldout affair. This was followed by two Distinguished Lectures at the PIMS Central Office at UBC.

2. WHAT'S NEW

- **Cedric Chauve became Site Director at Simon Fraser University.**
- **Chris Hoffman became Site Director at the University of Washington.**
- **PIMS Launches Solutions Canada:** PIMS and its partner institutes AARMS, CANSSI, CRM and Fields launched the Solutions Canada website (<http://solutionscanada.com/>) which connects businesses with scientists and students across the institutes' post-secondary and industrial network to solve industrial problems using mathematical tools. Collaborations have so far included the aerospace sector with Bell Helicopter, the energy sector with Hydro Quebec, the quantum computing space with IQST, the oil and gas industry with Fotech Inc., the mining industry with Potash Corp., the forestry sector with FPInnovations, and the manufacturing industry with Michelin. Initiatives range from short projects and contracts to larger endeavours,
- **The PIMS Syzygy Platform Expands:** The PIMS, Compute Canada and Cybera partnership, has now expanded the cloud-hosted scientific computing and data science platform for Canada, syzygy.ca. The service delivers Jupyter notebooks to faculty, staff and students at Canada's universities using single-sign-on (SSO) via their university user account. By eliminating the requirement to install customized software on personal computers, syzygy.ca makes it easier for research teams to collaborate using the right tools for their investigations. The platform delivers an interactive coding environment for literate programming in Python 2, Python 3, R (and sometimes Julia, Octav, Sage and other languages). PIMS is leveraging syzygy.ca and other tools to develop expertise in scientific computing, data science, machine intelligence, optimization, etc. Jupyter service is now available at 15 universities including UBC, SFU, UofT, Waterloo, Queen's, Victoria, Saskatchewan, Calgary, and Lethbridge. Colleges, universities, and other prospective partners can request Jupyter service via syzygy.ca. What the PIMS team has accomplished with the Syzygy platform is the largest Jupyter hub in the world connected from Ontario to Washington; and each month, we're deploying the service at more and more institutions. The platform has been used for seminars on Python and Git, machine learning with SciKit Learn, neural networks and deep learning, undergraduate courses on mathematical computing, computer science, and statistics, and graduate courses on mathematical modeling for industry, seismic inverse problems, and computational finance. Academy-industry partnerships are forming to investigate data science challenges arising in business through a workshop built atop syzygy.ca.
- **Federal CanCode Grant:** PIMS, along with our partner Cybera, applied in November 2017 for Canada's Federal Government CanCode Program Grant. We were granted \$1.5 million over two years as part of this program to develop and support initiatives that aid coding and digital skills development among Canadian youth, from kindergarten to grade 12 (K-12). Our specific project, called Callysto, will centre around adapting the Jupyter 'All-in-One' Science Platform for a younger audience in a classroom setting. The team has already begun developing showcase models and will be hosting workshops to help train K-12 teachers to make effective use of this tool.

3. PROGRAMS, ACTIVITIES AND NUMBER OF USERS

PIMS has built an international reputation for excellence and has transformed the conditions of mathematical research in Canada. PIMS funds Collaborative Research Groups, Postdoctoral Fellowships, the Postdoctoral Training Centre in Stochastics as well as individual events and focus periods on a competitive basis.

- **Collaborative Research Groups:** Collaborative Research Groups (CRGs) consist of researchers with a common interest and a desire to collaborate in developing aspects of their research programs for 3-4 years. Groups organize focus periods, including workshops, summer schools, and seminars. They make joint postdoctoral fellowship (PDF) appointments, and develop joint graduate training programs. CRGs are designed to promote and support long-term, multi-event, multi-site coordinated activities.
- **Conferences and Workshops:** PIMS organizes and funds a variety of meetings around North America and the Pacific Rim each year. These range from small one-day workshops to multi-week conferences involving hundreds of participants. PIMS also hosts or cosponsors various meetings by professional societies.
- **Summer Schools:** Every year PIMS runs a number of topical summer schools. They are intended to educate graduate students and early career researchers on current developments.
- **Focus Periods:** These intensive activities may occur as part of a CRG or on their own depending on current mathematical trends and collaborative prospects. Each covers a specific but substantial area of research of current importance to Canada, with participants ranging from students to world experts in the mathematical sciences.
- **Lecture and Seminar Series:** PIMS supports various seminar series at member universities and industrial centres throughout the year. Some of these are for specialists, while others are geared towards the general public, with the goal of unculcating in the citizenry the importance of mathematical research and its applications.
- **Industrial Activities:** PIMS also fosters collaborations with industry. Graduate Math Modeling in Industry Workshops enable graduate students to learn various aspects of high-level techniques for solving industrial mathematics problems. Industrial workshops, short courses, summer schools and seminar series are organized by PIMS researchers with topics of interest to both industry and academia that serve to disseminate newly developed mathematical tools that can be of use in industry.

ACTIVITY	2015		2016		2017		2018	
	Activities	Users	Activities	Users	Activities	Users	Activities	Users
Conferences/Workshops	41	2138	40	3476	34	4251	22	2750
Summer Schools	5	307	11	652	3	202	4	300
Collaborative Research Groups	6		6		6		4	
Lecture / Seminar Series	24	883	29	1458	21	893	28	1680
Industrial Activities	7	393	6	233	6	280	5	250
Other	15	2193	26	1691	7	1130	10	1600

Figure 1: Numbers of each type of activity supported by PIMS by year.

Note: The category “Conferences/Workshops” includes CRG events and Focus Period Activities. Not all 2018 events are known at this time.

II. ACCESS TO THE RESOURCE

1. COMMUNICATIONS PLAN

This plan identifies communication objectives, key messages, identifies stakeholders and sets out the strategies and tools that will be used.

Objectives and communication priorities:

- Build a consistent communications framework to raise the profile of PIMS in the global scientific community.
- Demonstrate to existing and potential new sponsors, as well as the global scientific community that PIMS has given thought and priority to communicating with them.
- Place education as a top priority in terms of gathering funding, program organization and awarenessraising.
- Build the PIMS community through regular, consistent and targeted formal and informal communications.

Key messages:

- PIMS is a leading mathematical institute in North America, with worldwide influence on research and industry. It has established innovative programs that have had a transformative impact on the mathematical sciences and the training of HQP.
- The PIMS community is inclusive; from K-12 to research faculty. PIMS' distributed structure throughout the Pacific Northwest enables all who are engaged to do so locally, while still benefitting from all of PIMS' resources.
- PIMS is nurturing the pipeline of younger generations in Western Canada, including those with Aboriginal backgrounds. PIMS promotes numeracy as an integral part of development and learning.

Strategies:

- Create consistency, clarity and regularity of communications.
- Respond to the needs of stakeholders as to how they would like to receive information.
- Add a more human touch, include photos, personal stories and testimonials.
- Become more proactive and opportunistic in promoting PIMS to stakeholders.
- Increase internal and external community building opportunities.

Tools:

- Websites and electronic
 - **PIMS website:** The PIMS website (www.pims.math.ca) offers easy global access to information on all PIMS activities, recent news and resources. One feature is the PIMS News/Press section that is highlighted on the home page; stakeholders can easily access the most current and noteworthy happenings at PIMS via this section, be they award notices, media coverage, funding announcements or site appointment updates.
 - **Mathtube.org:** A dedicated site that will eventually archive all of PIMS written, video and audio media. mathtube.org was created to meet the increasing demand to see footage of past PIMS lectures. It provides global exposure to PIMS events and gives event attendees the chance to review. For others, it offers a chance to see what they've missed. This resource also gives added value to conference organizers and participants, as well as a forum to see world-class speakers from all areas of the mathematical sciences. These materials are an important resource and include contributions from some of the world's most distinguished contemporary mathematicians. Whether one is a student, a researcher, an industry professional or a mathematics teacher, mathtube.org includes useful content that will help advance one in their field.



- **PIMS Connection, monthly e-newsletter:** This brief email includes links to upcoming events, updates and news items. Its circulation is over 3,700. In 2014, PIMS switched from a purely text-based format, to one that used an online resource (Mailchimp), which allows us to utilize a more brand-savvy digital template, and track the number of opens and link clicks.
- **Social Media:** PIMS now uses Twitter, Facebook, LinkedIn and Medium to connect with and provide all of our updates and news to the PIMS community. These posts cover a range of content from event photo highlights, notices of publication availability, weekly event updates and more. (The same content is provided on both Twitter and Facebook.)
- **Hardcopy Publications**
 - **Year in Review** is a booklet designed to summarize the range of PIMS activities. The 2009–2016 & 2017 Years in Review can be downloaded from www.pims.math.ca/resources/publications/pims-year-review.
 - **PIMS Newsletter** is produced twice yearly. It contains reports on the recent activities at PIMS, announcements of upcoming scientific, industrial and educational events, accolades and breakthroughs within the PIMS community, and upcoming opportunities and how to apply. The latest issue can be found at pims.math.ca/resources/publications/pims-newsletter. It has a circulation of 800 hardcopy issues. We also use Mailchimp to send it in electronic format to a list of over 1000 recipients.
 - **Pi in the Sky** is primarily aimed at high-school students and teachers, with the main goal of providing a cultural landscape for mathematics. It has a natural extension to junior high school students and undergraduates, with articles that put curriculum topics in a different context. *Pi in the Sky* accepts material on any subject related to mathematics and its applications, including: articles, problems, cartoons, statements, jokes, etc. *Pi in the Sky* is produced once a year and mailed to various institutes and private subscriptions throughout Canada and the world (estimated circulation is 1,700) and can be downloaded from the PIMS website: www.pims.math.ca/resources/publications/pi-sky.
- **Other**
 - **Advertising** PIMS-funded events and opportunities are advertised both electronically and in print. We advertise through websites and publications at institutions such as AMS, CMS, IMS and SIAM and by offering custom-designed event posters that are distributed to the major mathematical departments and institutes in Canada and the US, as well as an annual poster highlighting all of PIMS main events for the year, which is distributed to over 200 of the top scientific institutions worldwide.
 - **Reports** Conference proceedings, abstracts, lecture notes, websites and final event reports are all made available for download from the PIMS website in .pdf format. (See www.pims.math.ca). Conference materials are attached to the corresponding event, which are listed chronologically and are searchable by keyword for ease of access. PIMS also produces an annual report that is sent to sponsors, administrators at PIMS-affiliated universities, representatives from the business, industry and resource sectors as well as the major professional societies. Past annual reports (1997-2017) can be viewed at www.pims.math.ca/resources/publications/annual-reports.

2. AUDIO/VIDEO FACILITIES

Seminars and Lectures: Seminar organizers at PIMS are offered the ability to include remote participants by picking from a wide variety of technologies. In addition to operating traditional h.323-based videoconferencing systems we integrate software solutions such as Skype and BlueJeans and Vidy, to provide as low a barrier to participation as possible.

- As the UBC-Vancouver WestGrid/Compute-Canada collaboration node, PIMS-UBC participates in the WestGrid and Coast-to-Coast seminar series. The latter includes participants from through-out Canada and 2017 saw two series being run. The first was on “The Power of Linked Administrative Health Data for Population Health Research” and the second was on “Foundations and Applications of Big Data.” PIMS-UBC hosted many of the speakers for these events. Historically, these seminars have been valuable to PIMS by bringing PIMS researchers into contact with a wide variety of external groups and offering an opportunity to showcase PIMS at the same time.
- In the winter of 2017 and into the spring semester of 2018, PIMS sites are participating in the dedicated Focus Period: *Representations in Arithmetic*. This Focus Period Seminar series has so far featured speakers Benedict Gross from Harvard University, Antonio Lei from Université Laval, Marie-France Vigneras from Paris 7, Sandra Rozensztajn from Ecole Normale Supérieure de Lyon, Jared Weinstein from Boston University, Florian Herzig from University of Toronto and ten other high-profile presenters.

Academic Courses:

- R. Jardine of U Western Ontario is conducting a course during the winter term. It includes students from Western and UBC.
- D. Rolfsen of UBC provided a course in Topology to students at UBC. The format of the course was a mix of in-person and electronic sessions. This flexible structure was essential to accommodate the schedules of the participants, and the course would not have been possible otherwise.

Other Uses:

- The PIMS education coordinators hold a virtual meeting to give program updates and to share techniques and best practices. This meeting has become a regularly scheduled event within PIMS due to the enthusiasm and buy-in from our Education Coordinator team.
- As in previous years our facilities were used to allow researchers to take care of academic duties such as participating in thesis defenses or academic job interviews.

III. CONTRIBUTIONS TO RESEARCH

More information about PIMS can be obtained under “PIMS News/Press” at pims.math.ca and in “Year in Review” at pims.math.ca/resources/publications/pims-year-review.

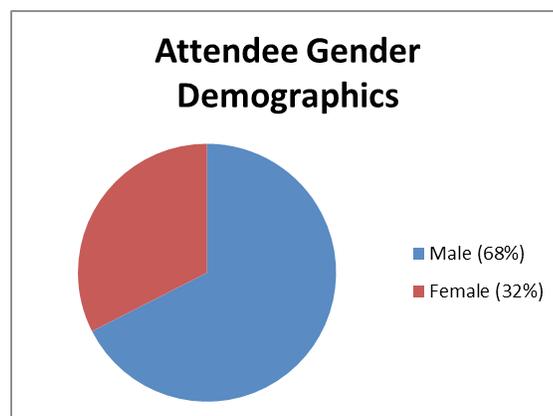
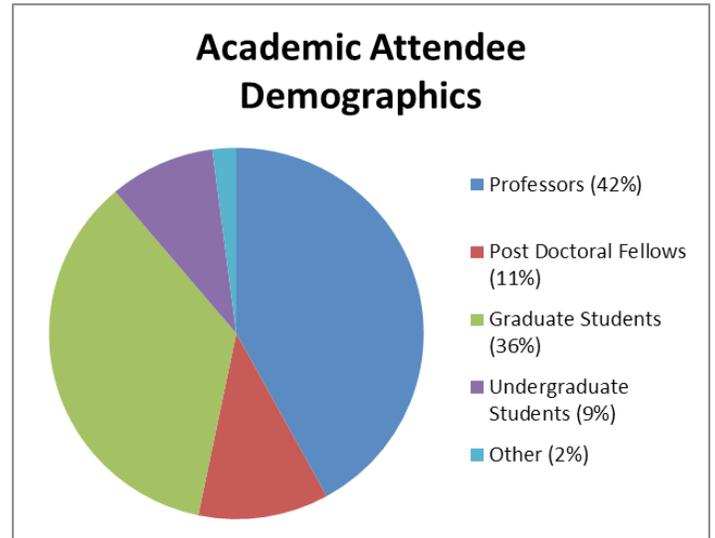
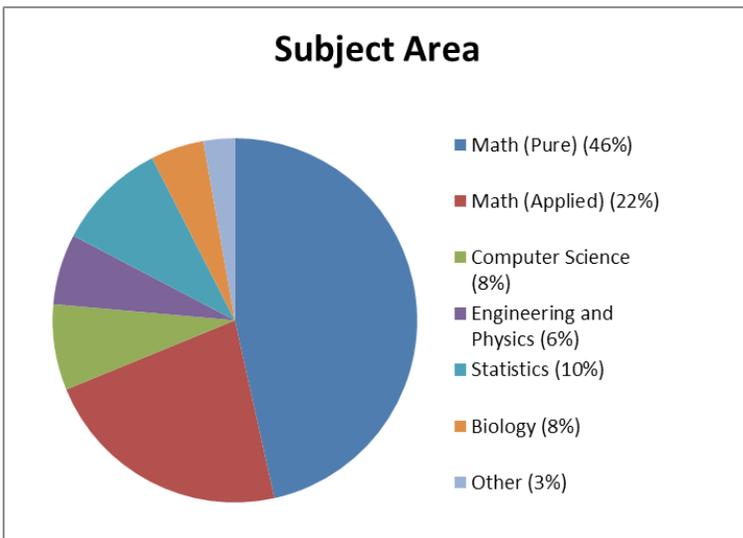
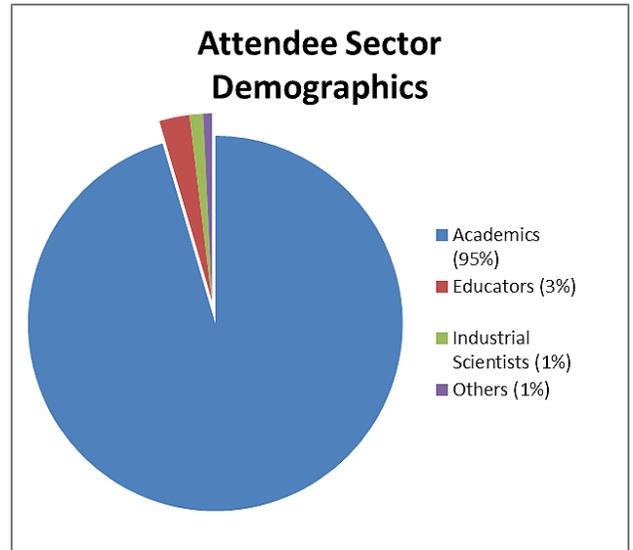


IV. DISTRIBUTION OF USERS

In 2017, the total number of attendees was 6,756.
76% were from Canadian institutions, of which:

- 20% were from Alberta,
- 35% were from British Columbia,
- 10% were from Manitoba,
- 5% were from Atlantic Provinces,
- 26% were from Ontario and Quebec, and
- 4% were from Saskatchewan.

15% were from other North American institutions,
9% were from elsewhere.



V. TRAINING AND DEVELOPMENT OF HIGHLY QUALIFIED PERSONNEL

1. POSTDOCTORAL FELLOWS & CNRS/PIMS SCIENTISTS

PIMS sponsors numerous postdoctoral fellows (PDFs) – 49 in 2017 – attracting outstanding young scientists who contribute to PIMS research programs, many of whom later become faculty members at leading Canadian universities. They are distributed throughout PIMS sites on a competitive basis. Postdoctoral candidates from institutions in France are eligible for CNRS/PIMS fellowships. PIMS PDFs are closely mentored by sponsoring faculty at PIMS host institutions. In the case of CRG or PTCS PDFs, they are inducted into appropriate research groups. PIMS Central also monitors PDF progress, and follows up on PDFs after their tenures have ended. PIMS PDFs are looked after intellectually and professionally: PIMS Central holds yearly one-day workshops on professional development topics such as Postdoc/Grad Student Job Forum and workshop discussions including “ Postdoctoral life in different kinds of institutions”.

2. PIMS POSTDOCTORAL TRAINING CENTRE IN STOCHASTICS

As part of the PTCS networking activities across Canada, a Summer School in Mathematical Finance was held at UA, Probability Seminars at UBC were broadcast to UA and UC and the Annual PTCS Retreat was held at BIRS. The purpose of the retreat was to enable the PDFs in the program and supervising faculty to get acquainted as well as to give the young researchers an opportunity to present their work to the Western Canadian probability community.

3. ALBERTA GRADUATE FELLOWSHIPS

In 2017, PIMS sponsored 3 Graduate Fellowships in Alberta. This provided graduate students the opportunity to work and learn in fields including Mathematical Biology and Geomathematics.

VI. PARTNERSHIPS AND OUTREACH

1. NATIONAL

PIMS has a national mandate to support the mathematical sciences in Canada. To this end, in partnership with the Fields Institute (FI) and the Centre de Recherches Mathematiques (CRM), it has created major national programs such as the Atlantic Association of Research in the Mathematical Sciences (AARMS). Together with the Mathematical Sciences Research Institute (MSRI), PIMS created the Banff International Research Station (BIRS), which is now the premier mathematical research station in North America.

PIMS coordinates with AARMS, BIRS, CRM and Fields to support a number of Canadian activities such as meetings of the societies (CAIMS, CMS and SSC), the Seminaire de Mathematiques Superieres in Montreal, and the regularly scheduled Canadian Discrete and Algorithmic Mathematics and CNTA meetings.



In 2016, we began a yearly national rotation for the IPSW, which were created by PIMS and then emulated by CRM and Fields. PIMS funding for activities in Atlantic Canada through AARMS is an important link to another region of the country. As part of the Long Range Plan for Mathematical and Statistical Sciences in Canada, PIMS and the other institutes commit significant resources to support the Canadian Statistical Sciences Institute (CANSSI). Joint activities have been underway for several years.

PIMS and Mitacs, a national not-for-profit research and training organization, have partnered to see graduate and postdoctoral researchers solve challenges using mathematical sciences in collaboration with industry and not-for-profit organizations. The partnership will provide companies in Alberta, British Columbia, Manitoba and Saskatchewan with access to top mathematical scientists in order to support the development of technologies and services in all sectors.

Graduate students and postdoctoral fellows will have opportunities to transfer their skills from theory to real-world application, while companies gain competitive advantages by accessing high-quality research expertise.

2. INTERNATIONAL

Part of the PIMS mandate is to establish international partnerships in order to provide mechanisms for Canadian researchers to participate in activities outside Canada and attract visitors from abroad. The establishment of the Centre National de la Recherche Scientifique (CNRS) Unite Mixte internationale, at PIMS (the first in mathematics in North America) has led to year-long visits by more than 35 researchers from France since 2007, fully funded by CNRS. Similarly, the leadership role played by PIMS in establishing the Pacific Rim Mathematical Association (PRIMA) has provided ample opportunities for Canadian exchanges with countries in this huge region. Our connections with Latin America have led to joint events (Canada-Mexico meetings), as well as facilitating the existing North American partnership at BIRS, to the benefit of the entire community.

3. EDUCATION AND OUTREACH

PIMS has a mandate to promote mathematics vigorously in Canada and takes upon itself the mission to help provide the elements for success that are necessary for current and future generations of teachers, scientists and engineers. In addition, the educational programs at PIMS advocate strongly for the participation of people of all backgrounds in mathematics. PIMS is actively involved in promoting mathematical outreach events in schools throughout Western Canada, either directly or through mechanisms such as science fairs. These involve students, teachers and parents and seek to convey the excitement of discovery and learning that underlies mathematics and its applications.

PIMS has developed partnerships with Aboriginal schools in western Canada that have been supported by provincial governments as well as by private donors. The activities under this program include summer camps for students, teacher training sessions, and a coordinated mentoring program where undergraduate students from universities work with local teachers and students to provide support in mathematics.

Many teachers, especially in elementary schools, do not have the necessary knowledge or experience to feel comfortable teaching mathematics. To address this, PIMS developed a 4-week Summer School for In-service Teachers. The goal is to create a team of teachers at each school that could foster a cultural and academic shift with respect to the learning and enjoyment of mathematics.

Colleges and universities within the BC, Alberta, Saskatchewan and Manitoba post-secondary systems that do not qualify for regular membership in PIMS may become PIMS Education Associates. The PIMS educational network allows for the exchange of successful practices in outreach, teaching, and professional development amongst its members. Currently PIMS has 16 educational associates in Alberta and British Columbia.

VII. CONSULTATION MECHANISMS AND COLLABORATIVE ACTIVITIES WITH AARMS AND CANSSI

As part of a national mandate, PIMS supports mathematical activities in the Maritime Provinces in conjunction with the Atlantic Association for Research in the Mathematical Sciences (AARMS). Together they co-sponsored the following activities in 2017 (PIMS' financial contribution to each activity is listed in parentheses):

- *Collaborative Research Group in Iterated Function Systems, Fractals, Invariant Measures and Applications* led by Shafiqul Islam at UPEI, with assistant (\$20,500). Events included:
 - *The Graph Searching in Canada (GRASCan) 2017 Workshop* (\$2,740) The purpose of this ongoing, invitation-only workshop is to bring together graph searchers working in any and all aspects of vertex pursuit games on graphs and their variants, such as Cops and Robbers, edge searching, firefighting, burning, and graph cleaning.
 - *Blundon Seminar Camp* in St. John's (\$3,000)
 - *Category Theory Conference* in Halifax (\$3,760)

PIMS also supports statistical activities throughout Canada through CANSSI. In 2017 these included:

- *VanSash (Sports Analytics)* (\$2,831)
- *Microbiome Data* (\$9,737)
- *Longitudinal Data in Biomedical Research* (\$2,848)
- *SSC/CSSC Meetings* (\$5,695)
- *ICSA* (\$5,356)
- *Medical Physics & Statistics* (\$7,000)
- *Causal Inference* (\$2,795)
- *Applied Longitudinal Data Analysis* (\$2,987)
- *Student Travel support* (\$18,743)
- Scientific Coordinator (\$52,540), Postdoctoral Fellows (\$11,042), Research Assistants (\$100,631)

PIMS provides in-kind contributions to CANSSI in the form of facilities for their events held at PIMS sites and **administrative and logistical support provided by PIMS Manager of Finance & Administration and Site Admin**

VIII. MANAGEMENT AND BUDGETS

Resource Revenues (collected during the period January 1 to December 31 2017)

a)	User Fees (Registration Fees collected)	118,447
b)	Contributions from Partner Universities	
	UBC	285,533
	Simon Fraser University	80,000
	University of Alberta	77,700
	University of Calgary	67,710
	University of Victoria	66,600
	University of Saskatchewan	50,000
	University of Regina	35,000
	University of Washington	14,941
	University of Lethbridge	35,000
	University of Manitoba	50,000
	Portland State University	5,006
c)	Contributions from MITACS/NSF	
	NSF for Geometric Analysis	11,708
	NSF for Dynamical Systems	35,880
	NSF for Summer School in Probability	23,548
d)	Alberta Government	44,000
e)	Private Donations	56,974
f)	Other Contributions	
	FIELDS Institute for Dynamical Systems	5,000
	Tutte Institute for Mathematics & Computing for Sage Days	5,000
	UW Support for Dynamical Systems	24,116
	CRM Support for Summer School in Probability	20,000
	UM Various Depts	11,127
	UBC Various Depts	29,361
	Other Miscellaneous	47,504
g)	NSERC Connect	4,740
h)	NSERC CTRMS Grant	1,195,450
i)	NSERC Industrial Grant	136,000
j)	Carried Forward from December 31 2016	1,714,905
	TOTAL REVENUES (January 1 to December 31 2017)	4,251,250
	Revenue less Expenses	1,424,169

PIMS CTRMS NSERC Activity Report January 1 to December 31 2017

	Use of the resource (i.e. PIMS) Paid from ALL revenue sources January 1 to December 31 2017	Planned use of CTRMS funds Jan 1 to December 31 2018
<u>Resource Expenditures</u>		
1) Salaries & Benefits		
a) Administrative Staff	364,768	0
b) Directors & Site Directors Teaching Releases/Stipends	123,209	0
c) Scientific Support Personnel	306,316	178,547
d) Postdoctoral Fellows (inc. CRG PDFs)	547,587	453,514
e) Technical/Professional Assistants (inc. Education)	29,825	0
f) Graduate Students	20,000	0
2) Equipment or Facility		
a) Purchase or Rental	21,837	0
b) Operation and Maintenance Costs	28,548	0
3) Materials & Supplies		
a) Refreshments	10,292	0
b) Office Supplies	23,227	0
4) Meetings/Collaborations/Staff Travel		
a) PIMS Meetings (SRP, PDF, Board, Admin, Exec)	52,336	0
b) Staff/PDF Travel	14,957	0
c) Director Research Support and Scientific Consultation	49,449	0
5) Dissemination Costs		
a) Publication Costs	14,250	0
b) Advertising & Networking	10,487	0
6) Scientific Activities (inc. CRGs and IGTC)		
a) Conferences/Symposia	487,398	138,814
b) Summer Schools	166,156	52,000
c) Workshops/Seminars/Colloquia (inc. MMIW)	196,964	83,000
d) Distinguished Visitors/Chairs/Speakers	22,921	32,100
7) Education Initiatives	84,349	0
8) AARMS Activities		40,000
a) Scientific Meetings	9,500	
b) CRG IFS, Fractals, Invariant Measures and Applications	10,000	
c) Administrator	10,500	
9) CANSSI		200,000
a) Scientific Meetings	82,992	
b) Scientific Coordinator	52,540	
c) Postdoctoral Fellow	11,042	
d) Research Assistant	75,631	
TOTAL EXPENDITURES	2,827,081	1,177,975

GLOSSARY OF ACRONYMS

PIMS	Pacific Institute for the Mathematical Sciences
AARMS	Atlantic Association of Research in the Mathematical Sciences
AMS	American Mathematical Society
BIRS	Banff International Research Station
CAIMS	Canadian Applied and Industrial Mathematics Society
CANSII	Canadian Statistical Sciences Institute
CMS	Canadian Mathematical Society
CNRS	Centre National de la Recherche Scientifique
CNTA	Canadian Number Theory Association
CRG	Collaborative Research Group
CRM	Centre de Recherches Mathématiques
IMA	Institute for Mathematics and its Applications
IPSW	Industrial Problem Solving Workshop
Mitacs	Mathematics of Information Technology and Complex Systems
MMIW	Mathematical Modeling in Industry Workshops
MSI	Mathematical Sciences Institute
MSRI	Mathematical Sciences Research Institute
NSERC	National Sciences and Engineering Research Council
PDF	Postdoctoral Fellow
PNRMS	Prairie Network for Research in the Mathematical Sciences
PRIMA	Pacific Rim Mathematical Association
PSU	Portland State University
PTCS	PIMS Postdoctoral Training Centre in Stochastics
SFU	Simon Fraser University
SFU-V	Simon Fraser University-Vancouver
SIAM	Society for Industrial and Applied Mathematics
SRP	Scientific Review Panel
SSC	Statistical Society of Canada
UA	University of Alberta
UBC	University of British Columbia
UBC-O	University of British Columbia–Okanagan
UC	University of Calgary
UL	University of Lethbridge
UM	University of Manitoba
UR	University of Regina
US	University of Saskatchewan
UV	University of Victoria
UW	University of Washington