

Pacific Institute *for the*
Mathematical Sciences

2010

ANNUAL REPORT

I. OVERVIEW

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1. BACKGROUND

The Pacific Institute for the Mathematical Sciences (PIMS) was founded in 1996 by a consortium of five universities in Alberta and British Columbia (the University of Alberta, the University of Calgary, the University of British Columbia, Simon Fraser University and the University of Victoria). Later the University of Washington in the United States and more recently the Universities of Regina and Saskatchewan joined PIMS as full members, and the University of Lethbridge and Portland State University in Oregon joined as affiliates.

The mandate of PIMS is to:

- Promote research in and application of the mathematical sciences of the highest international calibre,
- Facilitate the training of highly-qualified personnel at the graduate and postdoctoral levels,
- Enrich public awareness of mathematics through outreach,
- Enhance the mathematical training of teachers and students in K-12, and
- Establish partnerships with similar organizations in other countries, with a particular focus on Latin America and the Pacific Rim.

2. UNIQUE STRUCTURE OF PIMS

PIMS is unique in several ways, most fundamentally because of its distributed structure. Most institutes organize activities at a central location where international scientists are brought in residence; PIMS, on the other hand, has a site at each of eight major universities in Alberta, British Columbia, Saskatchewan and Washington State. PIMS events and programs are organized at each of the eight sites and PIMS researchers are distributed throughout the network. PIMS is institutionally bi-national (the University of Washington is a full member, and Portland State University is an affiliate) and it is the only institute of this kind in mathematics. This unique international structure projects PIMS beyond the boundaries of Canada, notably towards the Pacific Rim, to allow Canada to benefit from international scientific and economic developments.

3. SCIENTIFIC HIGHLIGHTS

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 as well as individual events and programs on a competitive basis. The following is a partial list of current scientific highlights:

- The innovative PIMS *Collaborative Research Groups* (CRGs) aim to develop permanent research and training networks, establishing lasting links between geographically separate groups of researchers at member universities. PIMS has developed 23 CRGs since its inception, in areas ranging across all the mathematical sciences. This has served as a catalyst for producing mathematical research of the highest quality in Canada and attracting outstanding faculty to PIMS universities. In 2010 two new CRGs on *Number Theory* and *The Mathematics of Quantum Information* began and *Applied and Computational Harmonic Analysis* will begin in 2011.

- Every year PIMS sponsors numerous *postdoctoral fellows* (PDFs), 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.

- In 2007, PIMS launched the *International Graduate Training Centre in Mathematical Biology*. This is a graduate training program focused on strategic topics of great current interest such as the mathematical modelling of ecosystems. Special fellowships are awarded to students and there are conferences and research summits connected to the program. This represents a coordination of resources and ideas from several PIMS sites, further emphasizing contact between the student community and the frontiers of scientific research.

- PIMS organizes international summer schools to train the new generation of mathematical scientists in emerging areas of mathematics and its applications as diverse as seismic imaging, the mathematics of sustainability, string theory, atmospheric modelling and climate change, quantum information and cryptography, environmental metrics and mathematical finance.

- PIMS has a lively program in industrial mathematics, and runs *Graduate Industrial Mathematical Modelling Camps* as well as *Industrial Problem Solving Workshops* for students, faculty and industry. PIMS has also recently developed focused industrial programs in areas of strategic interest, such as a project on the mathematics of oil exploration (based in Calgary) that connects the oil industry with world-class academics working in geomathematics. Continuing in this direction, in August of 2010, PIMS held a Summer School on Computer Models and Geophysical Risk Analysis in Vancouver. Another industrial event, held in Guanajuato, México, was the Math Modelling in Industry Workshop. This was a joint effort of PIMS, the Institute for Mathematics and its Applications (IMA) and the Centro de Investigación en Matemáticas (CIMAT).

- Each year PIMS awards several prestigious prizes. In 2010, the *CRM-Fields-PIMS Prize* went to Gordon Slade of UBC, and Andy Liu of UA was the recipient of the 2010 *PIMS Education Prize*. Last year the *Canadian Applied and Industrial Mathematics Society* (CAIMS) and PIMS created the *Early Career Award in Applied Mathematics* to recognize exceptional research in any branch of applied mathematics. The first awardee, in 2010, was Daniel Coombs of UBC.

4. NATIONAL AND INTERNATIONAL COLLABORATIONS

PIMS has taken a leadership role in both the national and international mathematical communities. In partnership with the two other mathematical institutes in Canada, it has created major national programs such as MITACS (Mathematics of Information Technology and Complex Systems) and AARMS (Atlantic Association of Research in the Mathematical Sciences). Together with the Mathematical Sciences Research Institute (MSRI) in Berkeley, it created the Banff International Research Station (BIRS), which is now the premier mathematical research station in North America.

PIMS has built close partnerships with mathematical institutes in México and Chile, and has been instrumental in creating the Pacific Rim Mathematical Association (PRIMA), a network of mathematical institutes in Canada, the United States, México, Chile, New Zealand, Australia, Singapore, China, Korea, and Japan, bound by a cooperative agreement. The first PRIMA Congress was held in July 2009 in Sydney, Australia, and had over 400 participants. The second PRIMA Congress will take place in 2013 in Shanghai, China.

PIMS is affiliated with the Centre National de la Recherche Scientifique (CNRS), the French national agency for scientific research, as an “Unité Mixte Internationale”, thus allowing PIMS to host French researchers throughout its different sites (see §II.2). PIMS has also signed cooperative agreements with RIMS/Kyoto University, the Mathematical Sciences Institute (MSI) at the Australian National University, the Chern Institute in Nankai, China and with the NSF-funded IMA in Minnesota. This year PIMS signed a collaborative agreement with the Yangtze Center of Mathematics at Sichuan University in Chengdu, China.

In late 2010, PIMS partnered with the Sociedad Matemática Mexicana (SMM), Society for Mathematical Biology (SMB) and CAIMS to sponsor the highly successful First Joint North American Meeting on Industrial and Applied Mathematics, an event that brought together the Mexican, American and Canadian scientific communities in Oaxaca, México, helping to establish new links between researchers. Several of our events in 2010 were organized in collaboration with MITACS, including the Summer School in Risk Management and Risk Sharing at UBC, the 2010 Canadian Conference on Computational Geometry at the University of Manitoba, and the 7th Annual Mathematical Biology Workshop: Mathematics of Biological Systems at the University of Alberta.

5. ADMINISTRATIVE STRUCTURE AND FUNDING

The central office and the Director of PIMS are based at UBC, and each of the other seven universities has a PIMS site office and a site director (see pims.math.ca/contact). The role of the site directors is to look for local opportunities and synergies, while the PIMS site offices provide administrative assistance for organizing on-site PIMS activities. The distributed structure has allowed the institute to locally support and energize departments of mathematical sciences across Western Canada.

The strong presence of PIMS at the university level gives it access to a vast reservoir of scientists from all disciplines. Over the years, PIMS has been able to lower disciplinary barriers, and create innovative research teams, making a sustained effort to extend the PIMS community beyond mathematics and statistics departments so as to include scientists in areas such as physics, biology, engineering, informatics, operations research and economics.

The governing structure of PIMS consists of **Alejandro Adem** (Director), **George Homsy** (Deputy Director) and **Mark Gotay** (Assistant Director), who are located at PIMS Central at the University of British Columbia. PIMS operations are overseen by its *Board of Directors*, which includes a senior academic administrator from each of the founding universities and representatives from the business, industry and resource sectors and professional societies. Board members are listed at pims.math.ca/pims-glance/board-directors. Scientific events are adjudicated by an independent *Scientific Review Panel* composed of internationally renowned mathematical scientists. For biographies of Panel members, see pims.math.ca/pims-glance/scientific-review-panel. PIMS Site Directors are Steven Ruuth (SFU), Charles Doran (UA), George Homsy (UBC), Clifton Cunningham (UC), Donald W. Stanley (UR), Raj Srinivasan (US), Ian Putnam (UV) and Gunther Uhlmann (UW).

PIMS receives funding from NSERC, its member universities and provincial governments. It also receives contributions from industry and private donors for specific events such as the Summer Math Camps for Aboriginal Students. Its events are co-sponsored by funding agencies such as the U.S. National Science Foundation (NSF), the U.S. National Security Agency and Alberta Advanced Education and Technology (AAET), by other Canadian institutes such as AARMS, the Canadian Institute for Advanced Research (CIFAR), Centre de Recherches Mathématiques (CRM), Fields Institute, MITACS, and Pacific Institute for Theoretical Physics (PiTP), by professional societies such as the American Mathematical Society (AMS), American Statistical Association (ASA), CAIMS, CMS, International Association for Cryptologic Research (IACR), International Mathematical Union (IMU), Mathematical Association of America (MAA), Society of Actuaries, Society for Industrial and Applied Mathematics (SIAM), SMM, Society for Mathematical Biology (SMB), and Statistical Society of Canada (SSC), and by international partner institutions such as the CNRS, IMA, MSI, PRIMA, Research Institute for Mathematical Sciences (RIMS) and Universidad Nacional Autónoma de México. Other partners include the ARC Centre of Excellence for Mathematics and Statistics of Complex Systems (Australia), Australian Mathematical Sciences Institute (AMSI), Australian Mathematical Society, BC Centre for Disease Control, CIBC, Capital One, Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), Centre for Experimental and Constructive Mathematics (CECM), Centre International de Mathématiques Pures et Appliquées (CIMPA), Centro de Investigación en Matemáticas (CIMAT), CERTICOM, Clay Mathematics Institute, D-Wave Systems, ENCORA, Federal Interlocutor for Métis and Non-status Indians, FP Innovations, Gouvernement

de Benin, Grant MacEwan University, Hokkaido University, H.R. MacMillan Space Centre, Institut des Hautes Études Scientifiques (IHES), Institute for Pure and Applied Mathematics (IPAM), Institute of Industrial Mathematics (IIMS), Interdisciplinary Research in the Mathematical and Computational Sciences Centre (IRMACS), International Centre for Theoretical Physics (ICTP), JMP, John Templeton Foundation (USA), Kyoto University Global COE Program, Mathematical Sciences Research Institute (MSRI), MapleSoft, Microsoft Research, Mount Royal University, National Institute for Mathematical and Biological Synthesis (NIMBioS), Nelson Education, Pearson, the Prairie Network for Research in the Mathematical Sciences (PNRMS), Quantum Works, Quest 4D, SAS, Schlumberger, Science World (Vancouver), SEAMOCS, Seoul University, Shell Canada, Springer–Verlag, Stanford University, StataCorp, Statistical and Applied Mathematics Institute (SAMSI), Swedish Foundation for International Cooperation in Research (STINT), SYREON Corp., TD Bank, University of Abomey Calavi, University of California (Santa Barbara), University of Manitoba, University of New South Wales, University of Oregon, W.H. Freeman & Co., Wiley and York University.

The PIMS annual budget is approximately \$3.2 million, with roughly one-third of this amount coming from NSERC.

6. 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, and find models and activities to facilitate, the participation of people of all backgrounds in the mathematical endeavour. PIMS is actively involved in promoting mathematical outreach events in schools throughout Western Canada, either directly or through mechanisms such as regional 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 a partnership with First Nations schools in British Columbia which is supported by the BC and local 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. In 2010 and prior years we received funding from the federal government for these programs.

Colleges and universities within the BC and Alberta post-secondary systems which 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 eleven educational associates in Alberta and British Columbia.

7. PIMS NEWS IN 2010:

- PIMS cosponsored the *Mathematical Institutes Open House* reception at the 2010 Joint Meetings of the AMS and the MAA in San Francisco on January 13. The event highlighted research initiatives by North American mathematical institutes regarding climate change and sustainability.
- Dr. Hugh Morris, former Chair of the PIMS Board of Directors and a longtime friend of the mathematical sciences, has generously endowed a yearly lecture series at PIMS. To recognize his generous gift, it will be called the *Hugh C. Morris Lecture Series*. The objective will be to attract the top mathematical scientists in the world to deliver presentations on current research topics to PIMS sites in Western Canada and Washington State.
- PIMS signed a collaborative agreement with the Yangtze Center of Mathematics at Sichuan University in Chengdu, China. Cooperation between the Yangtze Center and PIMS will take place through exchanges of scholars and students as well as by the organization of joint events.
- The Alberta Ministry of Advanced Education and Technology awarded \$1.2 million in support of PIMS programs in Alberta for the period 2010-2014. These funds will support a variety of activities including post-doctoral positions, graduate fellowships in mathematical biology, industrial short courses and summer schools, as well as multiple scientific, educational and outreach events.
- PIMS Central will relocate to an upper floor of the new Earth Sciences Systems Building on the UBC Main Mall. The building, already in the construction phase, is scheduled to be ready for occupancy in 2012.

More information about Education programs can be obtained at pims.math.ca/education

II. CURRENT ACTIVITIES

PIMS efforts are focused in several overlapping directions: scientific, postdoctoral training, and educational. We discuss actual and planned activities as well as accomplishments in these areas below.

1. SCIENTIFIC

PIMS scientific activities divide into two categories: programs and stand-alone events. Under programs, PIMS enables and funds Thematic Programs, Collaborative Research Groups (CRGs) and the International Graduate Training Centre (IGTC) in Mathematical Biology amongst the affiliated universities and PIMS sister institutes. Under stand-alone events, PIMS sponsors and facilitates conferences and workshops, runs summer schools for graduate students, finances lecture and seminar series, and cultivates interactions between academia and industry via various industrial activities. These activities typically take place at PIMS institutions around the Pacific Northwest and Prairie Provinces, but can range as far afield as Malta, Japan and Benin. Some of these activities are a way to stimulate and lay the groundwork for later developments. The 2009 Sydney PRIMA meeting played this role for our Pacific Rim initiatives, as will the 2013 Shanghai PRIMA congress.

A. Numbers and Types of Activities

- **Conferences and Workshops:** PIMS organizes and/or 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. The larger meetings are selected each year on a competitive basis by the PIMS Scientific Review Panel. Smaller events are often funded at the discretion of the Director and Deputy Director.
- **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.
- **Collaborative Research Groups:** *Collaborative Research Groups* (CRGs) consist of researchers with a common interest, and with a desire to collaborate in developing aspects of their research programs. Groups organize thematic activities, such as workshops and summer schools as well as seminars, make joint postdoctoral fellowship (PDF) appointments, or develop joint graduate training programs. CRGs are designed to promote and support longer term, multi-event, multi-site coordinated activities. During its period of operation, typically 3-4 years, a CRG can expect to receive priority access to the full gamut of PIMS resources. See pims.math.ca/scientific/collaborative-research-groups for more information.
- **Thematic Programs:** These intensive activities each cover a specific but substantial area of research of current importance to Canada, with participants ranging from students to world experts in the mathematical sciences. Thematic Programs are special opportunity events that take place approximately every 2-3 years, depending on current mathematical trends. They are usually concentrated in the four summer months, are often associated with CRGs, and can be assigned a complement of PIMS PDFs. Proposals are evaluated by the PIMS Scientific Review Panel to ensure the highest scientific quality and appropriateness of the subject.

• **Lecture and Seminar Series:** PIMS supports various ongoing 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 inculcating in the citizenry the importance of mathematical research and its applications.

• **International Graduate Training Centre:** Recognizing the importance of mathematics in biology, PIMS created the IGTC in Mathematical Biology in 2007. This has served as the core of a specialized graduate program shared between several PIMS universities. PIMS serves as a catalyst by supporting the program with summer schools; bringing international students to them; arranging for distinguished visitors from partner institutions to teach in the program; and awarding graduate fellowships to the program. After five years of operation, the impact of this IGTC will be reviewed, and a decision will be made to begin a new IGTC in another critical area. See pims.math.ca/scientific/graduate-training-igtc.

• **Industrial Activities:** PIMS also fosters collaborations with industry. *Industrial Problem Solving Workshops* (IPSW) are based on the Oxford Study Group Model, in which problems of interest to participating industrial companies are posed to the workshop attendees. Participating graduate students and faculty spend five days working on the problems, and the results are published. The advantages for participating students and academics are:

- (i) the challenge of applying one's skills to new and relevant problems directly applicable to industry,
- (ii) the opportunity for continued collaboration with the workshop's academic and industrial participants, and
- (iii) helping PIMS and mathematics by demonstrating to businesses and governments the tangible benefits of supporting the mathematical sciences. The IPSW are now held biennially, as they have been emulated in Ontario and Québec.

PIMS *Graduate Industrial Mathematics Modelling Camps* (GIMMC) have graduate students from Canadian universities attend to learn various aspects of high-level techniques for solving industrial mathematics problems. The camp prepares them for the IPSW, which typically follows the GIMMC.

As well, industrial workshops, short courses, mini-courses, summer schools and seminar series are organized by PIMS researchers, with topics of interest to both industry and academia, which serve to disseminate newly developed mathematical tools that can be of use in industry. For instance, with the sponsorship of Shell Canada Limited, PIMS presents a series of lunch hour lectures at Calgary Place Tower 1. These lectures, given by experts from the PIMS universities, focus on mathematical techniques and applications relevant to the oil and gas industry and demonstrate the utility and beauty of applied mathematics. The talks – 6 in 2010 – are aimed at a general audience. See pims.math.ca/industrial for more information.

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

ACTIVITY	2009	2010	2011
CONFERENCES/WORKSHOPS	43	30	45
SUMMER SCHOOLS	8	8	4
COLLABORATIVE RESEARCH GROUPS	6	7	4
THEMATIC PROGRAMS	2		2
LECTURE AND SEMINAR SERIES	17	19	22
INTERNATIONAL GRADUATE TRAINING CENTRE	2	3	1
INDUSTRIAL ACTIVITIES	3	6	3
OTHER	2	20	13

Summer Thematic Programs are special events that take place every 2-3 years, depending on exceptional opportunities. In 2009 two such events took place simultaneously, which was a first time occurrence at PIMS. Consequently, this led to a substantial number of workshops and conferences for 2009 as compared to 2010. For 2011 we are planning thematic programs in *Applied Mathematics* and in *Number Theory*, the first built around the ICIAM 2011 meeting in Vancouver and the second on activities organized by the recently created CRG in Number Theory. PIMS has also hosted or cosponsored several meetings by professional societies such as the CMS, CAIMS and SSC in recent years.

All activities are listed individually below. The sheer number of PIMS endeavours precludes us from doing more than merely mentioning them here; however, details about specific activities can be obtained at pims.math.ca or by request. Such details typically include lists of organizers and plenary speakers, titles and abstracts of talks, scientific background and summaries, schedules, and so forth. Because of their importance, more detail is given on the CRGs and the IGTC in §§D & E following.

B. Listing of Activities 2010

Conferences and Workshops

1. PIMS Calgary CRG Launch 2010, University of Calgary, April 6.
2. 44th Cascade Topology Seminar, Banff, April 9-11.
3. Joint UBC/SFU Graduate Student Workshop in Statistics, University of British Columbia, April 10.
4. Alberta Colleges Mathematics Conference & North South Dialogue in Mathematics, Grant MacEwan University, April 29-30.
5. Alberta Number Theory Days, Banff, April 30-May 2.
6. Western Algebraic Geometry Symposium, University of British Columbia, May 1-2.
7. Western Canada Linear Algebra Meeting, Banff, May 7-9.
8. Pacific Northwest Number Theory Conference 2010, Simon Fraser University, May 8-9.
9. 7th Annual Mathematical Biology Workshop: Mathematics of Biological Systems, University of Alberta, May 11-21.
10. Workshop on Non-commutative Dynamics and Quantum Probability, University of Regina, May 14-17.
11. Canadian Young Researchers Conference in Mathematics and Statistics, University of Alberta, May 8-21.
12. Statistical Society of Canada Annual Meeting, Université Laval, May 23-26.
13. CMS Summer Meeting, Fredericton, June 4-6.
14. Wave Phenomena IV: Waves in Fluids from the Microscopic to the Planetary Scale, University of Alberta, June 14-18.
15. Social Networks Workshop, Whistler, BC, June 25-26.
16. Conference on Selected Topics in Non-commutative Geometry, University of Victoria, June 27- July 2.
17. New Trends in Nonlinear Analysis and Applications, Benin, June 28-July 3.
18. CAIMS Annual Meeting, Memorial University, July 17-20.
19. PRIMA Conference on Geometric Analysis, University of British Columbia, July 20-30.
20. Workshop on Quantum Algorithms, Computational Models, and Foundations of Quantum Mechanics, University of British Columbia, July 23-25.
21. The Mathematics of Klee & Grunbaum: 100 Years in Seattle, University of Washington, July 28-30.
22. Canadian Abstract Harmonic Analysis Symposium 2010, University of Saskatchewan, August 5-6.
23. 2010 Canadian Conference on Computational Geometry, University of Manitoba, August 9-11.
24. New Trends in Noncommutative Algebra, University of Washington, August 9-13.
25. Computational Math Day 2010, Simon Fraser University, August 12.
26. Bellingham Algebraic Geometry Seminar, Western Washington University, October 16.
27. Alberta Topology Seminar, Banff, November 12.
28. Autumn Cascade Topology Seminar, University of Washington, November 13-14.
29. CMS Winter Meeting, Vancouver, December 4-6.
30. PRIMA-PARC-PIMS Meeting in PDE, Vancouver, December 7-8.

Summer Schools

1. First Montreal Spring School in Graph Theory, McGill University, June 7-29.
2. Summer School in Risk Management and Risk Sharing, University of British Columbia, June 7-July 9.
3. Summer School on Operator Algebras and Non-commutative Geometry, University of Victoria, June 14-25.
4. Modelling and Computation for Social Networks, Whistler, BC, June 21-25.
5. PIMS Summer School in Probability 2010, University of Washington, June 21-July 10.
6. 10th Canadian Summer School on Quantum Information, University of British Columbia, July 17-30.
7. Summer School on Computer Models and Geophysical Risk Analysis, University of British Columbia, August 6-10.
8. West Coast Algebraic Topology Graduate Summer School, University of Oregon, August 9-14.

Collaborative Research Groups

1. CRG 14 – Geometric Analysis, 2007–2010.
2. CRG 15 – Environmetrics, 2007–2010.
3. CRG 18 – Bayesian Modelling and Computation for Networks, 2008–2011.
4. CRG 19 – Partial Differential Equations, 2008–2011.
5. CRG 20 – Operator Algebras and Non-commutative Geometry, 2009–2012.
6. CRG 21 – Number Theory, 2010–2013.
7. CRG 22 – Mathematics of Quantum Information, 2010–2013.

Lecture and Seminar Series

1. IAM-PIMS-MITACS Distinguished Colloquium Series, University of British Columbia.
2. PIMS-UBC-SFU Number Theory Seminar, University of British Columbia & Simon Fraser University.
3. PIMS Postdoctoral Colloquium Series, University of British Columbia.
4. Seminars and Colloquia at the University of Victoria, University of Victoria.
5. CRM-Fields-PIMS Prize Lecture, University of British Columbia.
6. The AMI Seminar Series, University of Alberta.
7. PIMS Distinguished Lecture Series, University of Regina.
8. Niven Lecture, University of British Columbia.
9. PIMS/CSC Distinguished Lecture Series, Simon Fraser University.
10. PIMS West End Number Theory Seminars, University of Calgary.
11. UW-PIMS Colloquium, University of Washington.
12. Interdisciplinary seminar series on theoretical and applied mechanics, University of Alberta.
13. PIMS Distinguished Seminar Series in Bayesian Methodologies, University of Regina.
14. Applied Mathematics Seminar, University of Saskatchewan.
15. Quantum Information Seminar Series, University of Calgary.
16. PIMS-UBC Distinguished Lecture Series, University of British Columbia.
17. Seminar on Mathematical Modelling in Public Health, University of Alberta.
18. PIMS/CSC Weekly Seminar Series, Simon Fraser University.
19. Mathematical Biology Seminars, University of British Columbia.

International Graduate Training Centre in Mathematical Biology

1. Mathematics for Biological Networks I, University of Victoria, May 10-20.
2. Mathematics for Biological Networks II, University of Victoria, May 23-June 2.
3. IGTC Summit and Workshop 2010, Naramata, BC, October 1-3.

Industrial Activities

1. Short Course in Monte Carlo Methods for Quantitative Finance, University of Calgary, February 17-18.
2. 45th Actuarial Research Conference, Simon Fraser University, July 25-28.
3. IMA-PIMS-CIMAT Graduate Industrial Mathematics Modelling Camp, Guanajuato, México, August 2-11.
4. First Joint North American Meeting on Industrial and Applied Mathematics SMM-SIAM-CAIMS, Oaxaca, México, December 8-10.
5. PIMS/Shell Lunchbox Lecture Series, University of Calgary.
6. Industrial Fluids, University of British Columbia.

Other

1. Joint Initiative of the North American Mathematics Institutes: Climate Change, Sustainability and the Mathematical Sciences, San Francisco, January 13.
2. Workshop on the Creation of a PIMS Environmetrics Research & Training Centre, Simon Fraser University, April 10.
3. PIMS Distinguished Chair (Richard Schoen, Stanford University), University of British Columbia, July 14-30.
4. PIMS Visitor/Lecturer (Dominique Orban, École Polytechnique, Montréal), University of British Columbia, mid-September–mid-December.
5. PIMS/Math. Dept. Postdoc & Graduate Student Forum, University of British Columbia, September 28.
6. Workshop on Mathematical Challenges for Sustainability, Rutgers University, November 15–17.
7. Distinguished Chairs (Joachim Cuntz, University of Münster; George Kiladis, NOAA), University of Victoria, 2010.

PIMS also provided administrative, financial and/or travel support for a number of activities and organizations, including:

8. International Conference on Ultracold Molecular Physics, University of British Columbia, May 20-23.
9. UW Inverse Problems and Partial Differential Equations Summer School 2010, University of Washington, June 28-July 16.
10. A Minisemester on Evolution of Interfaces, Sapporo 2010, Hokkaido University, Sapporo, Japan, July 12-August 13.
11. New Researchers Conference in Statistics and Probability, University of British Columbia, July 27–30.
12. Alberta Statisticians Meeting, University of Alberta, October 16.
13. Pacific Northwest Probability Seminar, Microsoft Research, Redmond, WA, October 18–22.
14. Workshop on Elliptic Curves and Computation, Microsoft Research, Redmond, WA, October 18–22.
15. Who Wants to be a Mathematician, University of British Columbia, October 21.

16. Quantum Phenomena Lecture Series, University of British Columbia.
17. Canadian Prairie Theoretical Physics Network, University of Regina.
18. SCAIM Seminars, University of British Columbia.
19. American Women in Mathematics Mentor Network.
20. MSRI Math Institutes Reception.

C. Planned Activities for 2011

Conferences and Workshops

1. Joint Alberta-British Columbia 4-day Harmonic Analysis Seminar, University of British Columbia, February 15-18.
2. Frontiers in Biophysics, University of British Columbia, February 26.
3. Joint UBC/SFU Graduate Student Workshop in Statistics, University of British Columbia, April 5.
4. Cascade Topology Seminar, University of Victoria, April 22-23.
5. PIMS Young Researchers Conference in Mathematics, University of British Columbia, May 2-5.
6. Pacific Northwest Number Theory Conference, Western Washington University, May 7-8.
7. Eleventh International Conference on Logic Programming and Nonmonotonic Reasoning, Simon Fraser University, May 16-19.
8. Computational and Analytical Mathematics, Simon Fraser University, May 16-20.
9. The 2011 Canadian Workshop on Information Theory, University of British Columbia, May 18-20.
10. Canadian Operator Symposium, Victoria, May 24-28.
11. Alberta Number Theory Days, Banff, May 28-29.*
12. Workshop on Analytic Aspects of L-functions and Applications to Number Theory, University of Calgary, May 29-June 3.*
13. CanaDAM 2011, University of Victoria, May 31-June 3.
14. 2011 Pacific Northwest PDE Meeting, TBD, Spring.
15. 2011 Pacific Northwest Geometry Seminar, TBD, Spring.
16. Special Session in Number Theory, University of Alberta, June 3-5.*
17. CMS Summer Meeting, Edmonton, June 3-5.
18. Statistical Society of Canada Annual Meeting, Wolfville, NS, June 12-15.
19. L-Packets, Banff, June 26-July 1.*
20. Groups, Rings and Group Rings, University of Alberta, July 11-15.
21. Applied Analysis & Applied PDEs, University of Victoria, July 12-July 15.†
22. Reproducible Research: Tools and Strategies for Scientific Computing, University of British Columbia, July 13-16. †
23. Delay Differential Equations in Applications: Common Themes and Methods, University of British Columbia, July 14-16. †
24. Numerical Methods for Incompressible Fluid Flow, University of British Columbia, July 14-16. †
25. Advances in the Numerical Solution of Constrained Differential Equations, University of British Columbia, July 15-17. †
26. Numerical Ricci Flow in Computer Science, Geometry, and Physics, TBD, July. †
27. CT2011 International Category Theory Conference, University of British Columbia, July 17-23.

28. Graphs, Designs and Algebraic Combinatorics, University of Regina, July 22-23.
29. 2011 Prairie Discrete Math Workshop, University of Regina, July 22-23.
30. WAVES 2011, Simon Fraser University, July 25-29.
31. International Conference on Applied Harmonic Analysis and Multiscale Computing, University of Alberta, July 25-28.
32. The 5th G.J. Butler Memorial Conference on Differential Equations and Population Biology, University of Alberta, July 25-30.
33. Hyperplane Arrangements and Applications, University of British Columbia, August 8-12.
34. Computational Math Day, Simon Fraser University, August 12.
35. Joint Alberta-British Columbia 4-day Harmonic Analysis Seminar, University of Calgary, August 15-18.
36. West Coast Optimization Meeting, University of British Columbia–Okanagan, August 27.
37. Workshop on Quantum Methods Applied Outside of Quantum Information, University of Washington, Summer.
38. 3rd Pacific Northwest Meeting on Computational Neuroscience, UW, September 30-October 1.
39. GEOMED 2011: University of Victoria, October 20-21.
40. Workshop on Cycles on Modular Varieties, Banff, October 30-November 4.*
41. WIN 2: Women in Numbers, Banff, November 6-11.*
42. Cascade Topology Seminar, TBD, Fall.
43. Bellingham Algebraic Geometry Seminar, Western Washington University, Fall.
44. Northwest Functional Analysis Symposium, Banff, Fall.
45. CMS Winter Meeting, Toronto, December.

Summer Schools

1. Séminaire de Mathématiques Supérieures: Metric-Measure Spaces, Université de Montréal, June 27-July 8.
2. Gene Golub SIAM Summer School, University of British Columbia, July 3-16.
3. Computational Harmonic Analysis Summer School, University of Alberta, July 29-31.
4. West Coast Algebraic Topology Summer School, University of Oregon, August.

Collaborative Research Groups

1. CRG 20 - Operator Algebras and Non-commutative Geometry, 2009-2012.
2. CRG 21 - Number Theory, 2010-2013.
3. CRG 22 - Mathematics of Quantum Information, 2010-2013.
4. CRG 23 - Applied and Computational Harmonic Analysis, 2011-2014.

Thematic Programs

1. Number Theory, May-July & November.
2. Applied Mathematics Perspectives 2011, July.

Lecture and Seminar Series

1. IAM-PIMS-MITACS Distinguished Colloquium Series, University of British Columbia.
2. PIMS Postdoctoral Colloquium Series, University of British Columbia.
3. 2011 CRM-Fields-PIMS Prize Lecture, University of Alberta, April 11.
4. The AMI Seminar Series, University of Alberta.
5. PIMS Distinguished Lecture Series, University of Regina.
6. Niven Lecture Series, University of British Columbia.
7. PIMS/CSC Distinguished Lecture Series, Simon Fraser University.
8. Hugh C. Morris Distinguished Lecture Series, University of British Columbia.
9. Interdisciplinary Seminar Series on Theoretical and Applied Mechanics, University of Alberta.
10. UW-PIMS Colloquium, University of Washington.
11. Seminars and Colloquia at the University of Victoria, University of Victoria.
12. MathAcrossCampus Colloquium Series, University of Washington.
13. West End Number Theory Seminar, University of Calgary.
14. Applied Mathematics Seminar, University of Saskatchewan.
15. PIMS-UBC-SFU Number Theory Seminar, Simon Fraser University and University of British Columbia.
16. Quantum Information Seminar Series, University of Calgary.
17. Seminar on Mathematical Modelling in Public Health, University of Alberta.
18. PIMS-UBC Distinguished Lecture Series, University of British Columbia.
19. PIMS Distinguished Lecture Series at the University of Regina, University of Regina.
20. PIMS/CSC Weekly Seminar Series, Simon Fraser University.
21. SCAIM Seminars, University of British Columbia.
22. Mathematical Biology Seminars, University of British Columbia.

International Graduate Training Centre in Mathematical Biology

1. Mathematical Biology Workshop and IGTC Summit, University of Victoria, July 14-16.

Industrial Activities

1. PIMS/Shell Lunchbox Lecture Series, Calgary.
2. Complex Fluids and Flows in Industry and Nature, University of British Columbia, July 13-16. †
3. Medical and Seismic Imaging, University of British Columbia, July 14-16. †

Other

1. PIMS Distinguished Lecturer (Noam Elkies - Harvard), University of Calgary, January.
2. Centennial Celebration at the U of A, University of Alberta, May 1, 2011-May 1, 2012.
3. PIMS/UBC Information Session on Grant Opportunities, Spring.
4. PIMS Postdoc Day, University of British Columbia, Fall.
5. PIMS Distinguished Lecturer (Thomas Erneux), University of British Columbia, July 10-31.

PIMS will also provide administrative, financial and/or travel support for a number of activities and organizations, including:

6. 15th Annual Symposium on Research in Computational Molecular Biology, Vancouver, March 28-31.
7. 35th Conference on Stochastic Processes and their Applications, Oaxaca, Mexico, June 19-24.
8. 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011), Vancouver, July 18-22.
9. AWM Embedded Meeting at ICIAM, Vancouver, July 18-22.
10. IEEE International Conference on Network Protocols, Vancouver, October 17-20.
11. AARMS.
12. American Women in Mathematics Mentor Network.
13. MSRI Math Institutes Reception.

* Starred events belong to the thematic program on Number Theory.

† Daggered events belong to the thematic program on Applied Mathematics Perspectives.

D. CRG Status Reports

PIMS had 8 active CRGs in 2010; below we briefly summarize current and upcoming activities and list their PDFs. In 2011 PIMS will inaugurate one new CRG, on Applied and Computational Harmonic Analysis.

CRG 14: Geometric Analysis (2007-2010)

Leaders: Jingyi Chen (UBC), Ailana Fraser (UBC).

2010 Activities:

1. PIMS Distinguished Chair: Richard Schoen (Stanford University), July 14–30.
2. PRIMA Conference on Geometric Analysis, University of British Columbia, July 20–30.
3. Visitors: Longzhi Lin (John's Hopkins U.), April 13-18; Peng Lu (U. Oregon), March 9-11.

2011 Activities: This CRG ended in 2010.

PDFs: Tobias Lamm (UBC)

Graduate Student: Chao Pang (UBC)

CRG 15: Environmetrics (2007-2010)

Leaders: Jim Zidek (UBC), Charmaine Dean (SFU), Sylvia Esterby (UBC-Okanagan), Peter Guttorp (UW).

2010 Activities:

1. Workshop on the Creation of a PIMS Environmetrics Research & Training Centre, SFU, April 10.

2011 Activities: This CRG ended in 2010.

PDFs: Yiping Dou (UBC), Reza Hosseini (UBC)

Graduate Student: Zhong Liu (UBC)

CRG 16: Climate Modelling (2007-2010)

Leaders: Boualem Khouider (UV), Adam Monahan (UV).

2010 Activities:

1. PIMS Distinguished Chair, July. Dr. George Kiladis (NOAA).
2011 Activities: This CRG ended in 2010.
PDFs: Ian Ross (UV).

CRG 18: Bayesian Modelling and Computation for Networks (2008–2011)

Leader: Kevin Murphy (UBC).

2010 Activities:

1. Modelling and Computation for Social Networks, Whistler, BC, June 21–25,
2. Social Networks Workshop, Whistler, BC, June 26-27.
3. Visitors: Francesca Dominici and Giovanni Parmigiani (Biostatistics, Harvard), April.

2011 Activities: This CRG ended in 2010; however, 1 PDF remains active.

PDFs: Ben Marlin, 2010- 2011.

Students: 3 graduate students (1 UBC, 2 SFU); 2 undergraduate students (UBC).

CRG 19: Partial Differential Equations (2008–2010)

Leader: Nassif Ghossoub (UBC).

2010 Activities: This CRG has ended; however several PDFs remain active.

PDFs: Yves Van Gennip (SFU), Mohammad El Smaily (UBC), Ian Zwiars (UBC), Vianny Combet (UBC).

CRG 20: Operator Algebras and Non-commutative Geometry (2009–2012)

Leaders: D. Farenick (UR), M. Laca (UV), A. Lau (UA), I. Putnam (UV).

2010 Activities:

1. Workshop on Non-commutative Dynamics and Quantum Probability, University of Regina, May 14-17.
2. Summer School on Operator Algebras and Non-commutative Geometry, University of Victoria, June 14-25.
3. Conference on Selected Topics in Non-commutative Geometry, University of Victoria, June 27- July 2.
4. Distinguished Chair: Joachim Cuntz (U. Munster).
5. Visitors: Astrid an Huef and Iain Raeburn (University of Otago, June 26 - July 9), Jerry Kaminker (Indiana U. - Purdue U. Indianapolis, June 26- July 9), Sergey Neshveyev (U. Oslo, June 17 - August 8).

2011 Activities:

1. Canadian Operator Symposium, May, Victoria.
2. Northwest Functional Analysis Symposium, BIRS, Fall.

PDFs: Antoine Julien (UV, 2010-2012), Bogdan Nica (UV, 2009-2011), Michael Yin Hei Cheng (UA, 2010).

Students: 16 PhD, 5 MSc, 1 USRA.

CRG 21: Number Theory (2010–2013)

Leaders: M. Greenberg (UC).

2010 Activities:

1. West End Number Theory Seminar
2. UBC-SFU Number Theory Seminar
3. PIMS Calgary CRG Launch 2010, University of Calgary, April 6.
4. Alberta Number Theory Days, April 30–May 2, Banff.
5. Visitors: Hugo Chapdelaine (U. Laval, December 14-19).

2011 Activities:

1. Alberta Number Theory Days, Banff, May 27-29.
2. Analytic Aspects of L-functions and Applications to Number Theory, University of Calgary, May 29–June 3.
3. Special Session in Number Theory, CMS Summer Meeting, University of Alberta, June 3–5.
4. L-packets, Banff, June 26–July 1.
5. Workshop on Cycles on Modular Varieties, Banff, October 30–November 4.
6. WIN 2: Women in Numbers, Banff, November 6–11.
7. Visitors: Noam Elkies (Harvard), David Roe (Harvard), Pierre Charollois (Jussieu), Cameron Franc (McGill), Paul Mezo (Ottawa), Hadi Salmasian (Ottawa), Pramod Achar (LSU), Samit Dasgupta (UCSC).

PDFs: Johnson Jia (UBC).

CRG 22: The Mathematics of Quantum Information (2010–2013)

Leaders: Barry Sanders (UC), Robert Raussendorf (UBC), Petr Lisonek (SFU), Dave Bacon (UW).

2010 Activities:

1. 10th Canadian Summer School on Quantum Information, University of British Columbia, July 17–31.
2. Workshop on quantum algorithms, computational models, and foundations of quantum mechanics, UBC, July 23–25.
3. Quantum Information Seminar Series.
4. Visitor: David Kribs (U. Guelph, December).

2011 Activities: Workshop on Quantum Methods Applied Outside of Quantum Information (UW, Summer).

Graduate Students: Saleh Rahimi Keshari (UC).

CRG 23: Applied and Computational Harmonic Analysis (2011-2014)

Leaders: Bin Han (UA), Rong-Qing Jia (UA), Elena Braverman (UC), Ozgur Yilmaz (UBC).

2010 Activities: This CRG begins in 2011.

2011 Activities (Planned):

1. International Conference on Applied Harmonic Analysis and Multiscale Computing, University of Alberta, July 25-28.
2. Computational Harmonic Analysis Summer School, University of Alberta, July 29-31.

E. International Graduate Training Centre (IGTC) in Mathematical Biology - Report

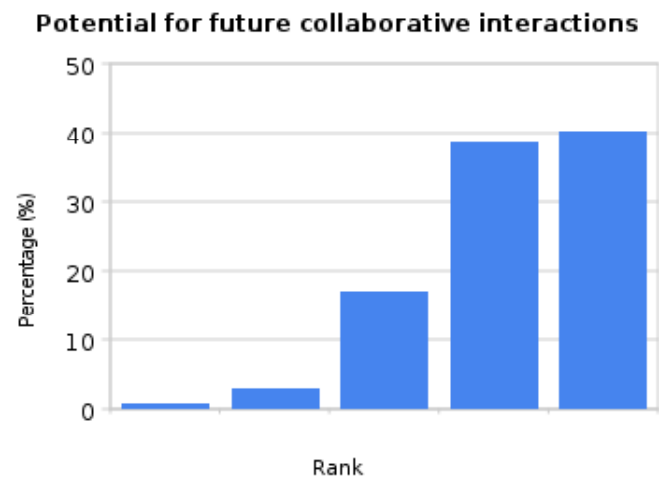
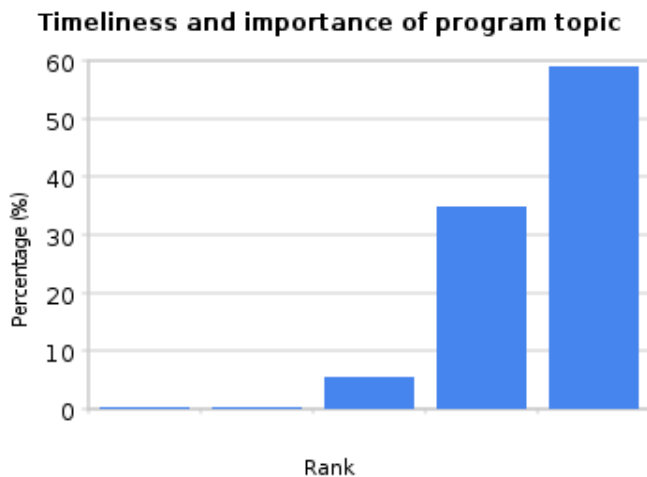
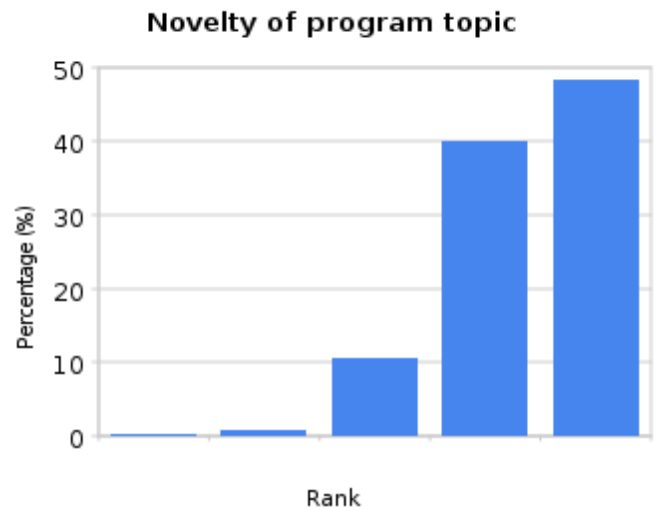
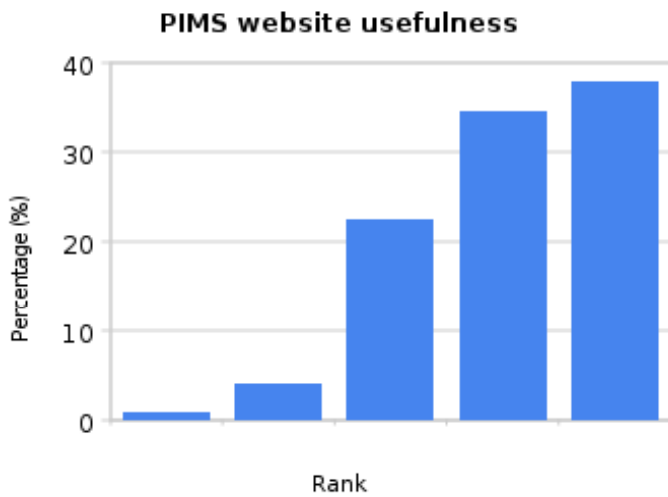
This IGTC is designed to develop distributed training by building, in particular, on graduate programs in mathematical biology at PIMS universities. The IGTC counts 26 faculty from SFU, UA, UBC, UBC-O, UC, UL, UR and UV, along with dozens of visitors every year.

The key component of the IGTC is its Fellowships, which are awarded to graduate students at Canadian PIMS member or affiliate universities. There were 7 Fellows in 2009-2010 and 9 in 2010-2011. In addition, the IGTC enrolled 2 non-fellowship students in 2009-2010 and 9 in 2010-2011. IGTC students were located at UA, UBC, UC, UV and SFU. This past year Shaun Strohm, one of our IGTC Fellows from UBC-O, won a prestigious NSERC Vanier Scholarship.

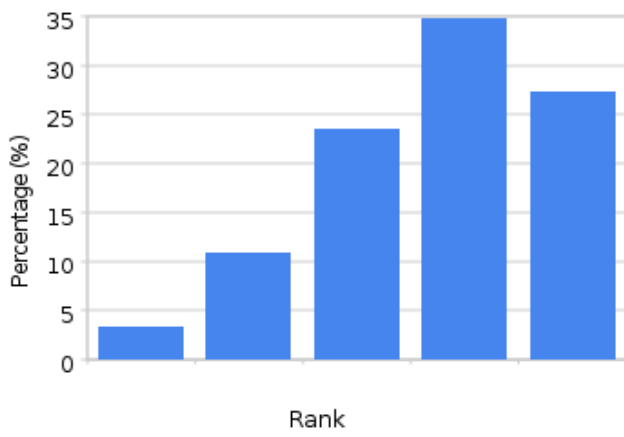
During 2010, the IGTC hosted three events: Mathematics for Biological Networks, I: Infectious Disease Networks during May 10-20, Mathematics for Biological Networks, II: Neuronal Networks during May 23–June 2, and the Fourth IGTC Summit and Workshop 2010 during October 1–3. The first two events were held at UV, while the last took place in Naramata, BC. In 2011 the Fifth Graduate Research Summit and Workshop will be held at the University of Victoria during July 14-16, as part of the Applied Mathematics Perspectives thematic program. For more information visit pims.math.ca/scientific/graduate-training-igtc

F. Evaluations

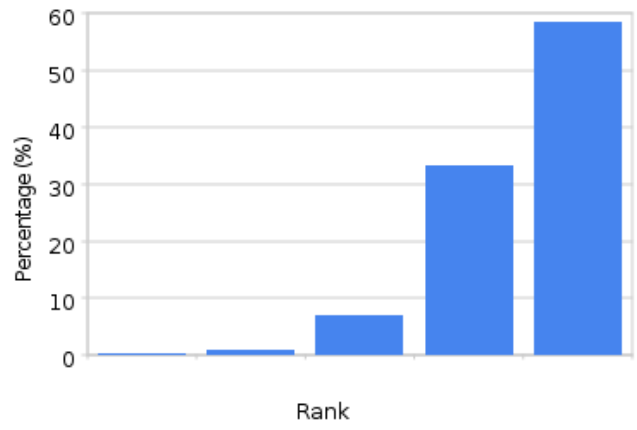
Last year PIMS began collecting evaluations of all its scientific events of at least three days duration. Participants were asked to fill in an online survey rating various aspects of their events; approximately 355 responded. The results were passed on to the event organizers and were also scrutinized at PIMS Central. Below are charts summarizing responses to questions of particular interest to PIMS; here “1” represents the worst score (very dissatisfied/low/poor) and “5” the best score (very satisfied/high/ excellent):



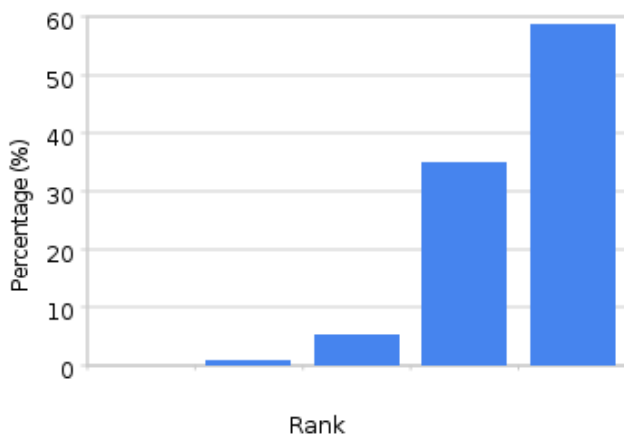
Potential for inter-disciplinary applications



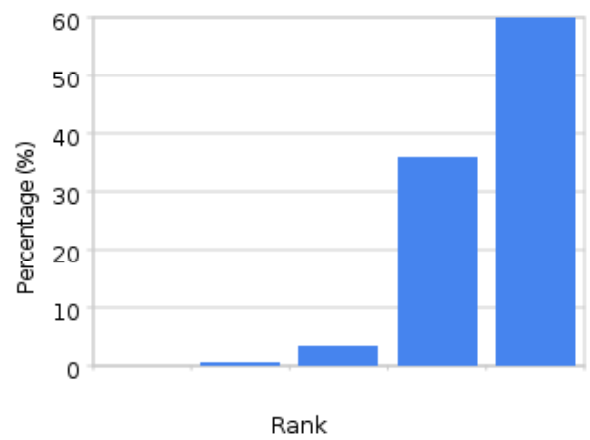
Event organization



Event Content



Overall satisfaction with the event



G. Demographics

Here we provide some demographics of participants in PIMS scientific events and programs.

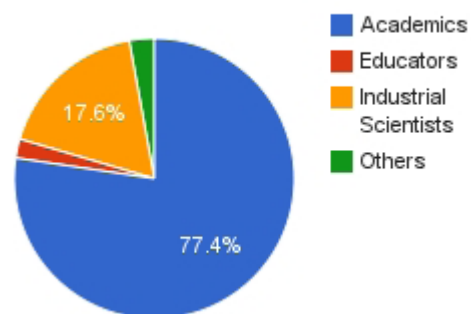
For all conferences/workshops, summer schools, IGTC, industrial and selected ‘other’ activities, we:

1. Summarize the total number of attendees and the number of attendee-days.
2. Sort the attendees into academics, educators, industrial scientists, and others. We further sort academics into professors, postdoctoral fellows, graduate students, undergraduate students and others.
3. List the number of males/females.
4. Classify the attendees as to whether they belong to Canadian institutions, other North American institutions, or institutions located elsewhere. As well, we break down the Canadian participants by province. In what follows, data from 2009 are placed in brackets.

During the 2010 [2009] reporting period, PIMS helped to support 61 [58] scientific activities of the types listed above. We have data on 52 activities. Of these,

- The total number of attendees: 2,702 [3,470]
- Attendee-days spent at PIMS activities: 12,823 [13,965]
- Average attendees/activity: 52 [67]
- Average attendee-days/activity: 247 [269]
- Average activity duration: 5.7 [4.2] days

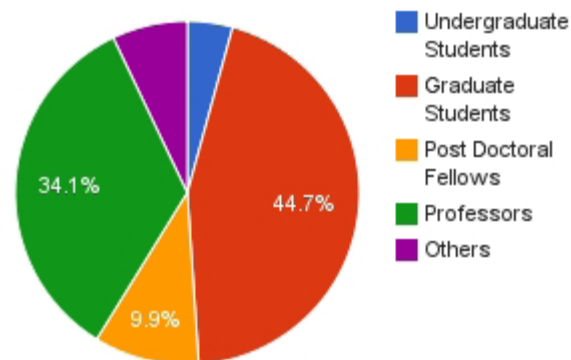
Attendee Demographic



Of these attendees, 1,694 were identified as academics (77.4% [83%] of all identifiable attendees), and of these:

- 34.1% [45%] were professors,
- 9.9% [13%] were PDFs,
- 44.7% [37%] were graduate students,
- 4.3% [3%] were undergraduate students, and
- 7.1% [2%] were other academics.
- 48 were identified as educators (2.2% [1%] of all identifiable attendees),
- 385 were identified as industrial scientists (17.6% [15%] of all identifiable attendees), and
- 63 were others (2.9% [1%] of all identifiable attendees).

Academic Attendee Demographics



Of those attendees who stated their gender,

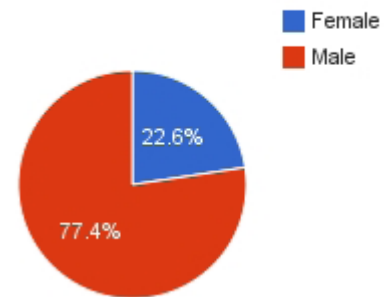
- 77.4% [75%] were male, and
- 22.6% [25%] were female.

Also,

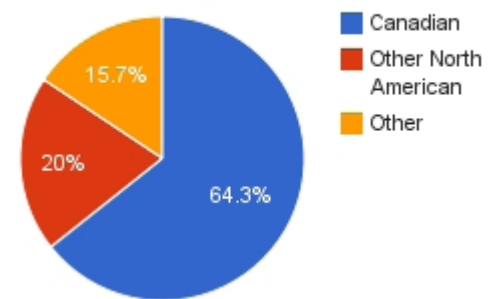
• 1,588 identified themselves as being from Canadian institutions (63.3% [61%] of all identifiable attendees), of which,

- 41.1% [38%] were from British Columbia,
- 43.4% [21%] were from Alberta,
- 1.8% [3%] were from Saskatchewan,
- 1.3% [3%] were from Manitoba,
- 8.9% [24%] were from Ontario,
- 2.1% [7%] were from Quebec,
- 1.3% [$< 4\%$] were from elsewhere in Canada (NB, NL, NS, PE & YT).
- 494 were from other North American institutions (20.0% [19%] of all identifiable attendees), and
- 387 from elsewhere (15.7% [20%] of all identifiable attendees).

Attendee Gender Demographics



Attendee Institutions



We have also computed the geographical distribution of PIMS events and programs, including Lecture and Seminar Series, during 2010. Of 85 [52] activities with well-defined geographic loci during that period, 69 [40] were held in Canada (81.2% [76.9%]), of which:

- 41 [22] were held in British Columbia (59.4% [60%]),
- 17 [12] were held in Alberta (24.6% [27%]),
- 6 [2] were held in Saskatchewan (8.7% [6%]),
- 1 [1] was held in each of Manitoba, New Brunswick and Newfoundland & Labrador (4.3% [4%]),
- 2 [1] were held in Quebec (2.9% [1%]),
- 12 were held in the United States (14.1% [8%]): 1 in California, 1 in New Jersey, 1 in Oregon and 9 in Washington.
- 4 were held overseas (4.7% [5%]): 1 in Benin, 1 in Japan and 2 in México.

Of course, some programs such as CRGs are spread over several provinces and states.

H. Selected Publications

Below we list selected publications from PIMS CRG activities, PDFs and CNRS Researchers. Only publications appearing (or accepted for publication) in 2010 are listed.

1. Adcock, B., "Gibbs phenomenon and its removal for a class of orthogonal expansions," to appear in BIT (2010).
2. Andronescu, M., Condon, A., Hoos, H., Murphy, K. and Mathews, D., "Computational approaches for RNA energy parameter estimation", to appear in RNA Journal (2010).
3. Argerami, M., Farenick, D. and Massey, P., "Injective envelopes and local multiplier algebras of some spatial continuous trace C^* -algebras," to appear in Quarterly J. of Math. (Oxford) (2010).
4. Bailey, R. and Cameron, P., "Base size, metric dimension and other invariants of groups and graphs," to appear in Bull. London Math. Soc. (2010).
5. Balazard, M. and de Roton, A., "Sur un critère de Bézout pour l'hypothèse de Riemann," Int. J. Number Theory 6 (2010), 883-903 (2010).
6. Baudry, J.P., Raftery, A.E., Celeux, G., Lo, K. and Gottardo, R., "Combining Mixture Components for Clustering", J. of Graphical and Computational Statistics, 19, 332-353 (2010).
7. Berenbrink, P., Cooper, C., Friedetzky, T., Friedrich T. and Sauerwald, T., "Randomized Diffusion for Indivisible Loads," to appear in Proc. of the 22nd ACM-SIAM Symposium on Discrete Algorithms (2010).
8. Berenbrink, P., Elsässer, R., and Sauerwald, T., "Randomised Broadcasting: Memory vs. Randomness," Proc. of the 9th Latin American Theoretical Informatics Symp. (2010).
9. Berenbrink, P., Elsaesser, R. and Sauerwald, T., "Communication complexity of quasirandom rumor spreading," European Symposium on Algorithms, 134-145 (2010).
10. Berenbrink, P., Hofer, M. and Sauerwald, T., "Distributed Selfish Load Balancing," to appear in Proc. of the 22nd ACM-SIAM Symposium on Discrete Algorithms (2010).
11. Binding P., Browne P. and Karabash I., "Sturm-Liouville problems for the p -Laplacian on a half-line," Proc. Roy. Soc. (Edinburgh) 53, 271-291 (2010).
12. Binding P. and Karabash I., "Absence of existence and uniqueness for forward-backward parabolic equations on a half-line," Operator Theory: Advances and Applications, 203, 89-98 (2010).
13. Braverman E. and Karabash I., "Bohl-Perron type stability theorems for linear difference equations with infinite delay," to appear in Difference Equations and Applications, arxiv.org/abs/1009.6163 (2010).
14. Brownlowe, N., an Huef, A., Laca, M. and Raeburn, I., "Boundary quotients of the Toeplitz algebra of the affine semigroup over the natural numbers," to appear in Ergodic Theory Dynam. Systems, preprint (2010).
15. Chang, S.-Y. A. and Yuan, Y., "A Liouville problem for the Sigma-2 equations," Discrete Contin. Dyn. Syst., 28, 659-664 (2010).
16. Chapuy, G., Fusy, É., Giménez, O. and Noy M., "On the diameter of random planar graphs," accepted to Analysis of Algorithms (2010).
17. Chau, A., Chen, J. and Yuan, Y., "Rigidity of entire self-shrinking solutions to curvature flows," to appear in J. Reine Angew. Math. (2010).
18. Chen, J. and Fraser, A., "On stable minimal disks in manifolds with nonnegative isotropic curvature," J. Reine Angew. Math. 643, 21-37 (2010).
19. Chen, J. and Fraser, A., "Holomorphic Variations of Minimal Disks with Boundary on a Lagrangian Surface," Canadian J. Math. 62, 1264-1275 (2010).
20. Chen, J. and He, W., "A note on singular time of mean curvature flow," Math. Z. (2010).
21. Choksi, R. and van Gennip, Y., "Deblurring of one dimensional bar codes via total variation energy minimisation," to be published in SIAM J. Imaging Sci. (2010).
22. Crutwell, G. and Shulman, M., "A unified framework for generalized multicategories," to be published in Theory and Applications of Categories (2010).
23. Dales, H.G., Lau, A.T.-M. and Strauss, D., "Banach algebras on semigroups and compactifications," Memoirs of Amer. Math. Soc. 205, 165 pp. (2010).
24. Dobra, A., Briollais, L., Jarjanazi, H., Ozcelik, H. and Massam, H., "Applications of the mode oriented stochastic search (MOSS) algorithm for discrete multi-way data to genomewide studies," to appear Bayesian Modelling in Bioinformatics, (D. Dey, S. Ghosh and B. Mallick, eds.), Taylor and Francis (2010).
25. Dobra, A., Eicher, T.S. and Lenkoski, A., "Modelling uncertainty in macroeconomic growth determinants using Gaussian graphical models," Statistical Methodology, 7, 292-306 (2010).
26. Dobra, A. and Fienberg, S.E., "The generalized shuttle algorithm," in Algebraic and Geometric Methods in Statistics (P. Gibilisco, E. Riccomagno, M.P. Rogantin and H.P. Wynn eds.), Cambridge University Press, 135-156 (2010).
27. Dobra, A. and Lenkoski, A., Copula Gaussian graphical models and their application to modelling functional disability data. Annals of Applied Statistics, accepted for publication (2010).
28. Dobra, A. and Massam, H., "The mode oriented stochastic search (MOSS) algorithm for log-linear models with conjugate priors," Statistical Methodology, 7, 240-253 (2010).

29. Dou, Y., Le, N.D. and Zidek, J.V., "Modelling hourly ozone concentration fields," *Annals of Applied Statistics*, 4, 1183-1213 (2010).
30. Dou, Y., Le, N.D. and Zidek, J.V., "Temporal forecasting with a Bayesian spatial predictor: Application to ozone," invited revision to *Applied Statistics* (2010).
31. Dou, Y., Le, N.D. and Zidek, J.V., "Temporal forecasting with a Bayesian spatial predictor: Application to ozone," invited revision to *Applied Statistics* (2010).
32. Droit, A., Cheung, C. and Gottardo, R., "rMAT an R/Bioconductor package for analyzing ChIP-chip experiments" *Bioinformatics*, 26, 678-679 (2010).
33. El Smaily, M., "Homogenization of pulsating traveling fronts," accepted to *SIAM J. for Mathematical Analysis* (2010).
34. El Smaily, M., "Min-Max formulas for the speeds of propagation in heterogeneous media," *Annali di Matematica Pura ed Applicata*, 189, 47-66 (2010).
35. El Smaily, M. and Kirsch, S., "Asymptotics of the KPP minimal speed within large drift," *Comptes Rendus Mathématique*, 348, 857-861 (2010).
36. El Smaily, M. and Kirsch, S., "The speed of propagation for KPP reaction-diffusion equations within large drift," *Advances in Differential Equations*, 16, 361-400 (2011).
37. Elsässer, R. and Sauerwald, T., "Discrete Load Balancing is (Almost) as Easy as Continuous Load Balancing," *Proc. of the 29th ACM SIGACT-SIGOPS Symposium on Principles of Distributed Computing* (2010).
38. Emerson, H., "Duality, correspondences and the Lefschetz map in equivariant KK theory: a survey," accepted by *Fields Institute Conference Proceedings* (2010).
39. Emerson, H. and Meyer, R., "Bivariant K-theory via correspondences," *Adv. Math.* 225, 2883-2919 (2010).
40. Emerson, H. and Meyer, R., "Dualities in equivariant Kasparov theory," accepted by *New York J. Math.* (2010).
41. Emerson, H. and Meyer, R., "Equivariant embedding theorems and topological index maps," *Adv. Math.* 225, 2840-2882 (2010).
42. Finak, G., Manuel-Perez, J. and Gottardo, R., "Automated transformations for flow cytometry," *BMC Bioinformatics*, 11, 546 (2010).
43. Fontein, F., "The infrastructure of a global field of arbitrary unit rank," accepted to *Mathematics of Computation* (2010).
44. Fraser, A. and Schoen, R., "The first Steklov eigenvalue, conformal geometry and minimal surfaces," to appear in *Adv. Math.* (2010).
45. Friedrich, T. and Sauerwald, T., "The cover time of deterministic random walks," to appear in the 17th Annual International Computing and Combinatorics Conf. (2010).
46. Garmaroudi, F., Marchant, D., Si, X., Khalili, A., Basha-shati, A., Wong, B., Tabet, A., Ng, R., Murphy, K., Luo, H., Janes, K. and McManus, B., "Pairwise network mechanisms in the host signaling response to coxsackievirus B3 infection," *Proc. Natl. Acad. Sciences*, 2010, 107, 17053-17058 (2010).
47. Ghosh, P., Muthukumarana, S., Gill, P.S. and Swartz, T.B., "A semiparametric Bayesian approach to network modeling using Dirichlet process priors," *Australian and New Zealand J. Statistics*, 52, 289-302 (2010).
48. Giordano, T., Matui, H., Putnam, I.F. and Skau, C.F., "Orbit equivalence for Cantor minimal Zd-systems," *Inventiones Mathematicae*, 179, 119-158 (2010).
49. Goya, R., Sun, M., Morin, R., Leung, G., Ha, G., Wieg, K., Senz, J., Crisan, A., Marra, M., Hirt, M., Huntsman, D., Murphy, K., Aparicio, S. and Shah, S., "SNVMix: predicting single nucleotide variants from next generation sequencing of tumors", to appear in *Bioinformatics* (2010).
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2. POSTDOCTORAL FELLOWS AND CNRS/PIMS SCIENTISTS

PIMS has created a large number of postdoctoral opportunities for young researchers in the mathematical sciences. The regular PIMS Postdoctoral Fellow (PDF) competition takes place each January. Postdoctoral candidates from institutions in France are eligible for CNRS/PIMS fellowships. In addition, there are several PIMS-supported PDFs that are associated with Collaborative Research Groups and/or Thematic Programs; these go through the same rigorous review process. Candidates must be nominated by a scientist or group of scientists affiliated with PIMS. The two-year fellowships are tenable at any of the member or affiliated universities.

In 2009 PIMS had 45 PDFs on its rolls, and 32 in 2010. Below we list the 2010 PDFs and their university affiliations:

Adcock, Benjamin (SFU)	Bailey, Robert (UR)	Bonner, Simon (UBC)
Carazzo, Guillaume (UBC)	Chapuy, Guillaume (SFU)	Combet, Vianney (UBC)
Cruttwell, Geoffrey (UC)	El Smaily, Mohammad (UBC)	Fontein, Felix (UC)
Fortescue, Benjamin (UC)	Hrubes, Pavel (UC)	Jia, Johnson (UBC)
Julien, Antoine (UV)	Karabash, Illia (UC)	Kunduri, Hari (UA)
Lamm, Tobias (UBC)	Ma, Xiaoguang (UA)	Marlin, Benjamin (UBC)
Meyerovich, Tom (UBC)	Nica, Bogdan (UV)	Ross, Ian (UV)
Sauerwald, Thomas (SFU)	Semukhin, Pavel (UR)	Seon, Thomas (UBC)
Sinha, Kaneenika (UA)	Stange, Katherine (SFU)	Tokman, Cecilia Gonzalez (UV)
Tvalavadze, Marina (US)	Valkenburg, Kirsten (US)	Van Gennip, Yves (SFU)
Yoneda, Tsuyoshi (UV)	Zwiers, Ian (UBC)	

PIMS PDFs are closely mentored by sponsoring faculty at PIMS host institutions. In the case of CRG and Thematic Program PDFs, they are inducted into appropriate research groups. PIMS Central also monitors PDF progress, and follows up on PDFs after their tenure has ended. All PDFs are given exit interviews and fill out anonymous surveys that are used to assess and improve programs. The average ratings terminal 2010 PDFs gave to selected questions are listed below (1 = worst score, 5 = best score):

PDF SURVEY		
1	How well were you mentored in your department?	4.4
2	How suited to your academic interests was your department?	4.0
3	How suited to your academic interests was your mentor?	4.2
4	Did you feel intellectually isolated in your department?	3.8
5	How well were you looked after (in a practical sense) in your department?	4.4
6	Were there opportunities for collaborative interactions?	3.8
7	Amount of travel support:	3.0
8	Do you feel that your PIMS PDF has prepared you for your professional career?	4.4
9	Overall satisfaction with your postdoctoral experience:	4.5

PDFs move on professionally to a range of positions and activities at top places, including: U. Paul Cézanne (Aix-Marseille, France), Champlain College (QC), UCLA, Max Planck Institute for Informatics (Saarbrücken, Germany), UW, Hong Kong U. of Science and Technology (China), US, U. do Algarve (Faro, Portugal), U. Waterloo, U. de Chile (Santiago, Chile), U. Massachusetts (Boston), Brno U. of Technology (Czech Republic), U. Manitoba, U. Blaise Pascal de Clermont-Ferrand (France), U. Ottawa, Harvard University, Indian Institute of Science Education and Research (Kolkata, India), McMaster U., U. of Frankfurt (Germany), Rice U., Laboratoire de Probabilité et Modèles Aléatoires (Paris, France), Columbia U., INRIA Bordeaux Sud Ouest (France), Princeton U., École normale supérieure (Paris, France), U. California (Berkeley), Univerzita Karlova v Praze (Prague, Czech Republic), U. of Kentucky, Laboratoire Écologie et Sciences Phytosanitaires (Renne, France), Victoria U. (Wellington, NZ), UA, U. Warsaw (Poland), LIX École Polytechnique (Palaiseau, France), U. London (UK), U. N. Carolina (Chapel Hill), Institut Joseph Fourier (Grenoble, France), Carnegie-Mellon U., Munich American Reassurance Company (WA), Institute for Advanced Study, UBC, Max Planck Institute for Mathematics (Bonn, Germany), U. Oregon and Moscow State U. (Russia).

At UBC, the PIMS Assistant Director is responsible for ensuring that the PIMS PDFs are looked after intellectually, professionally and socially. A PIMS Postdoctoral Colloquium Series runs monthly, in which PDFs hone speaking skills for professional presentations as well as job interviews. All PIMS/UBC PDFs are encouraged to participate and present talks. This series is also useful as a vehicle for PDFs to interact with each other and learn about others' research and share ideas. PIMS Central also holds one-day workshops twice a year on professional development topics such as *Information Session on Grant Opportunities* and *Postdoc/Grad Student Job Forum*. The Assistant Director also hosts various social activities so as to reduce postdoc isolation and promote formation of long-term friendships and contacts.

PIMS also hosts more senior researchers from France as part of its cooperative agreement with the CNRS. In 2010, the following scientists took part in this program:

Allali, Julien (SFU, Lab. Bordelais de Recherche en Informatique)
Chapuy, Guillaume (SFU, U. Paris Diderot)
de Roton, Anne (UBC, U. Nancy 1)
Ferraro, Pascal (UC, U. Bordeaux I)
Goddard, Emmanuel (SFU, U. Provence)
Guillot, Pierre (UBC, U. Strasbourg)
Munnier, Alexandre (UBC, U. Nancy 1)
Payan, Yohan (UBC, U. Joseph Fourier)
Rubenthaler, Sylvain (UBC, U. Nice - Sophia Antipolis)

In addition to PDFs and PIMS/CNRS scientists, PIMS sites host a large number of long- and short-term visitors: about 60 in 2010 alone.

3. EDUCATIONAL ACTIVITIES

A. For K-12:

PIMS is dedicated to increasing public awareness of the importance of mathematics in the world around us. PIMS encourages young people to see that mathematics is a subject that opens doors to more than just careers in science. Many different and exciting fields in industry are eager to recruit people that are well-prepared in this subject. From its inception, PIMS has supported a series of educational initiatives for the K-12 level, including:

- Organization of interesting, fun and challenging math events for children of all ages.
- Facilitation of access to information (newsletters, workshops, conferences, special publications, etc.) about math education matters to parents, teachers and university faculty.
- Coordination of workshops to create links of communication between parents, teachers, mathematicians and math educators.
- Publishing *Pi in the Sky*, a math magazine for high school students.
- Holding workshops to improve teachers' math and teaching skills.
- Hosting the annual *Changing the Culture* conferences for schoolteachers.
- Sponsoring regional and Canada-wide Science Fairs.

Programs:

- *Math Mania*: This is a popular alternative math education event that has been presented in elementary and (more recently) middle schools of greater Victoria and the Lower Mainland since 1997. All age levels are welcome, although it is particularly suited to students in grades 4-7. *Math Mania* presents a variety of interactive demonstrations, puzzles, games and art. These activities are designed to demonstrate to students – and their parents – fun ways of learning both math and computer science concepts. On average over two hundred students, parents and teachers participate in *Math Mania* events. This year 6 *Math Manias* were held in Burnaby, Victoria, Port Alberni and Surrey in British Columbia. Further details are available at pims.math.ca/educational/math-mania

- *SNAP Math Fairs*: PIMS sponsors these non-traditional Student-centered, Non-competitive, All-inclusive, and Problem-based math fairs based in Alberta. The purpose of a *SNAP* math fair is to provide a meaningful problem-solving experience for all students. A *SNAP* fair was held in Calgary in April, and there were about 10 math fairs held at various schools in the Lower Mainland. Visit mathfair.com for more information.

- *Changing the Culture*: This is a yearly one-day meeting organized and sponsored by PIMS, bringing together mathematicians, mathematics educators and school teachers from all levels to work together towards improving the teaching of mathematics. This year's conference attracted about 100 participants. It was linked with the 2010 *Canadian Mathematics Education Study Group* (CMESG) meeting and took place at SFU-Burnaby from May 21-25. CMESG is a group of mathematicians and mathematics educators from all over Canada who meet annually to discuss mathematics education issues at all levels of learning. PIMS is one of the main sponsors of this event.

- *ELMACON*: The Elementary Mathematics Contest is a yearly event held at UBC and is open to students in Grades 5 to 7 from Lower Mainland schools. *ELMACON* gives them the chance to experience mathematics as an exciting sport. This PIMS-sponsored event attracts close to 300 participants, and was held on April 29 in 2010.

- *UBC/PIMS Math Workshops*: These workshops in Lower Mainland schools aim to excite Grade 6-12 students about mathematics by exposing them to interesting and challenging problems and interesting mathematics personalities. In the case of Grade 12 students, careers and university programs in the mathematical sciences are also discussed. The workshops are conducted by faculty and student volunteers from the UBC Mathematics Department, and are coordinated by the PIMS-BC Education Coordinator. Over 80 workshops are conducted each year, all over the Vancouver metropolitan area.

- *Teacher Workshops*: A variety of workshops designed to help elementary school teachers build their math skills for the classroom are supported by our institution. Seven workshops to teach problem solving were held in Vancouver and Burnaby. Five workshops to support the teaching of JUMP math were held at PIMS-UBC.

- *Math On the Move*: This is a mobile version of the UR Math Camp that was initiated in 2003. With support from PIMS, two UR faculty and four math education students deliver inquiry-based mathematical activities to high school students in Saskatchewan.

- *Pi in the Sky*: The widely distributed (estimated circulation is 2,500) high school level periodical produced by PIMS for students in Canada and the United States, aims to establish direct contact with teachers and students, to involve high school students in mathematical activities, as well as to promote careers in mathematical sciences. Go to pims.math.ca/resources/publications/pi-sky for current and back issues.

- *Lesson Studies for Teachers*: Lesson Study is a form of professional development in which teachers jointly plan, implement, observe, analyze, and refine actual classroom lessons called “research lessons”, and then revise and report on the results so that other teachers can benefit. For the last three years PIMS has been offering series of workshops closely modelled on the highly successful Lesson Studies conducted by the Galileo Educational Network of Calgary. Teachers meet six Saturdays a year to develop lessons on a variety of mathematical concepts.

- *Who Wants to Be a Mathematician*: On October 21, 2010, the popular American Mathematical Society “game show” Who Wants to Be a Mathematician made its first visit outside the United States when it travelled to Vancouver in a PIMS-sponsored event. More than 200 students enjoyed the contest and math talk. For a recap visit: www.ams.org/programs/students/wwtbam/vancouver-2010 .

- In addition, PIMS supports the *Math Circles Coaching Program*, the *Vancouver Free Math Mentorship Program* and the *No Homework Club*, along with other local initiatives.

B. First Nations Educational Activities

PIMS has shown its leadership in bringing together various people, resources and institutions in working together towards the improvement of aboriginal mathematics education. In particular, under the auspices of the First Nations Education Steering Committee (FNESC), PIMS has developed a partnership with First Nations schools in British Columbia. Activities under this program include:

- Teacher training/math development sessions during the summer, where mathematicians and educators provide lessons for teachers to help them assimilate teaching material for their mathematics courses. Sessions have been held in Kamloops, Lytton, Barriere, Port Alberni, Vernon and Merritt. Partner schools in the interior of British Columbia include: Sk'elep School of Excellence in Kamloops, Lelawagila Primary School in Kingcome Inlet, Stein Valley Nlakapamux School in Lytton, Neqweyqwelsten School in Barriere, Bonaparte School north of Lytton, First Nations elementary and secondary schools in Bella Bella, First Nations elementary school in Port Alberni (Vancouver Island), Lower Nicola Band School in Merritt, Haisla Community School in Kitimat, Seabird Island Indian Band School in Agassiz, the Gitanyou, Kispiox, Holly Smith and Anspayaxw Schools in Smithers and Houston, the Wilpe School in Gitwangak and the Xit'olacw Community School in Mount Currie.
- A coordinated mentorship program where undergraduate students from universities work with local teachers and students to provide support in mathematics.
- Assistance in choosing and implementing mathematics curricula at First Nations Schools, where the PIMS BC Education Coordinator serves as a permanent resource for teachers and administrators. FNESC has commissioned an assessment tool from PIMS to evaluate third grade students in First Nation schools.
- Math summer camps, which PIMS has organized in Kamloops, Lytton, Merritt and Mount Currie for the past 4 years. More than 150 children have attended these camps. In 2010 PIMS supported an aboriginal camp for high school students at the Native Education College, and a math instructor was sponsored by our institution to support daily mathematics instruction at the CEDAR summer camp that is organized every year by the Long House at UBC.
- Providing in-depth assessment of the mathematical skills for students at our partner schools, measuring the impact of their programs and suggesting adjustments along the way. FNESC has recently commissioned an assessment tool from PIMS to evaluate third grade students in First Nation schools.
- School partnerships: During the last four years, PIMS has developed a partnership with the Britannia School in Vancouver, which has a large number of aboriginal students. In recent summers PIMS organized a math summer camp for a group of these students. Together with the mathematics department at UBC, PIMS has been coordinating mentorship programs at Britannia Secondary, Templeton Secondary, Windermere Secondary, Point Grey Secondary and MacDonald Elementary Schools. PIMS is also coordinating a scholarship program to support the neediest of their aboriginal students. This program has been funded by the federal government as well as private donors.

- Math Clubs: In March 2007 PIMS together with UBC organized a math club at the Musqueam Reserve. In January 2008 this program was expanded to include a math mentorship program and a math club that meets at the Vancouver Aboriginal Friendship Center; this program is led by faculty and students from SFU.

- The third *First Nations Math Education Workshop* co-sponsored by PIMS was held in Banff in November 2009. PIMS brought together a group of Elders, mathematicians, math educators and teachers, with the goal of improving mathematics education among aboriginals while at the same time acknowledging the importance of traditional culture. Throughout 2010, members of these groups worked together in creating resources to honor the spirit of each student as an individual and as part of a community. This way of thinking is an integral part of many aboriginal cultures as well as a successful way of learning mathematics in any culture.

- In Saskatchewan, PIMS supports the Aboriginal Perspectives web site AboriginalPerspectives.uregina.ca/, which was initiated in the summer of 2009 as a means for delivering lesson ideas with an Aboriginal focus to K-12 teachers. PIMS also partially funds the ongoing Aboriginal Perspectives Workshop.

c. Post-Secondary Educational Activities

Colleges and universities wishing to enjoy an affiliation with PIMS (but not otherwise eligible for regular PIMS membership) may engage as PIMS Education Associates. Membership is for a period of three years and is renewable. An annual membership fee of \$500 is paid by the college or university. Members are entitled to apply for PIMS funding to engage in appropriate education, outreach, and professional development activities in their region. Examples of approved activities are the support of a guest speaker, support for a regional math competition and for the purchase of mathematical models and demonstration materials for use in the classroom. To date, 6 other colleges in BC and 3 in Alberta have become PIMS Education Associates: Camosun College (BC), Vancouver Island University (BC), Okanagan College (BC), University of the Fraser Valley (BC), Langara College (BC), Red Deer College (AB), **Thompson Rivers University** (BC), Concordia University College (AB), **Douglas College** (BC), Grant McEwan University (AB), and Mount Royal University (AB). (The institutions in boldface joined PIMS this year). PIMS hopes to sign up more Education Associates in 2011.

PIMS held the Alberta Colleges Mathematics Conference at Grant McEwan University, AB during April 29-30. PIMS also sponsored a public lecture, Mathematics and Creative Writing at UV on February 25. PIMS also uses its facilities for teaching; in 2010 PIMS-UBC hosted four mathematics courses, and streamed one video-conferenced course from UL.

Every year the PIMS Education Prize is awarded to outstanding mathematical educators in Alberta, British Columbia, Saskatchewan or Washington State. A cash award is attached to the prize, which has considerable prestige, and receives widespread publicity in the mathematical community and beyond. See pims.math.ca/pims-glance/prizes-awards for details about past prizewinners.

III. MECHANISMS OF ACCESS TO PIMS

PIMS has developed several means of alerting current and potential users to its activities, including: the PIMS website, various publications, annual reports, conference proceedings, global advertizing, video streaming and video conferencing.

1. Website

The PIMS website (pims.math.ca), which is in the final stages of being re-organized and redesigned, divides the work at PIMS into three major categories: Scientific, Educational and Industrial. The website offers easy global access to information on all PIMS activities, recent news and resources.

2. Popular Publications

- PIMS Newsletter is produced twice yearly. In connecting the PIMS community, the newsletter contains: announcements of upcoming scientific; industrial and educational events; reports on the recent activities at PIMS; 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.
- 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 materials on any subject related to mathematics and its applications, including: articles, problems, cartoons, statements, jokes, etc. Pi in the Sky is mailed to various institutes and private subscriptions throughout Canada and the world, (estimated circulation is 2,500) and can be downloaded through the new PIMS website: pims.math.ca/resources/publications/pi-sky

3. Advertising

PIMS-funded events and opportunities are advertised both electronically and in print. We advertise through websites and publications at institutions such as MITACS, the Institute of Mathematical Statistics, the Canadian Mathematical Society, SIAM and the American Mathematical Society, and by offering custom-designed posters that are distributed to over 200 of the top scientific institutions worldwide.

4. Annual Reports

PIMS 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 (1997-2009) can be viewed at pims.math.ca/resources/publications/annual-reports. In 2010, PIMS inaugurated a new annual “Year in Review” booklet, designed to summarize the range of PIMS activities. The 2009 Year in Review can be downloaded from pims.math.ca/resources/publications/pims-year-review.

5. Conference Proceedings and Reports

Conference proceedings, abstracts, lecture notes, websites and final event reports are all made available for download from the PIMS website in .pdf or .html format. (See 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 is in the process of developing a dedicated site which will eventually archive all of PIMS written, video and audio media. We expect this will become an important resource for the scientific community.

6. Audio/Video Facilities

PIMS-funded event coordinators are offered a wide range of audio-visual services to facilitate the global nature of collaborative scientific work. PIMS current video-conferencing facilities underwent modernization this year as part of the WestGrid initiative that allows increased flexibility and offers full, high-definition service to users. These improvements tighten the integration between PIMS sites as well as foster the development of distance learning courses and remote collaborations. PIMS is building upon recent successful remote events such as an ongoing seminar series in number theory hosted jointly between UBC, SFU and UC, and a distance education course in Markov Decision Processes that was part of the NSERC CREATE program and included remote students in Vancouver, Edmonton and Montreal. Two PIMS-sponsored statistics graduate courses utilized these facilities in the summer of 2009, with live broadcasts between UBC, SFU and UW, and UL is currently using these facilities to broadcast a course in Modelling Biochemical Reaction Networks. As a functional access grid node, PIMS will also be participating in WestGrid seminar series training researchers in the use of the world-class computational and collaborative technologies offered by WestGrid.

There is also a growing catalog of over 200 multimedia recordings of PIMS events that help engage people in mathematical education and development (see pims.math.ca/resources/multimedia). Currently, a number of different avenues for dissemination of these media are under investigation including online video services and podcasting services such as Apple's iTunes U; see also point 5 above.

IV. ACTIVITIES TO KEEP ABREAST OF SCIENTIFIC ADVANCES

The *Scientific Review Panel* (SRP) is responsible for the scientific leadership at PIMS. Through their continuing efforts, PIMS keeps abreast of activities in the mathematical community and seeks to develop programs in new areas. The process that the SRP follows can be briefly described as follows:

1. Identify research topics,
2. Discuss at length the value, impact and feasibility of running scientific activities in these areas at the annual SRP meeting and through email discussion,
3. Serve as liaisons between experts in a particular area and the PIMS Director and Deputy Director thus providing crucial scientific expertise,
4. Once an important theme has been identified, the SRP will work with potential organizers to develop a proposal that encompasses the required depth and breadth to ensure a high quality event of international caliber.

Aside from the role played by the SRP, the PIMS Directors regularly attend research conferences and meetings of professional societies (such as the American Mathematical Society, the Canadian Mathematical Society and CAIMS), and consult with leading experts to obtain/solicit information on recent advances in the mathematical sciences. This also involves establishing regular channels of communication with the PIMS community and encouraging researchers to use PIMS as a platform for the development of their ideas. In addition, through a systematic scanning of web based literature (such as preprints on the arXiv) and announcements of scientific breakthroughs in bulletin boards and journals, PIMS maintains a pro-active involvement in learning about and enhancing the impact of new developments.

V. FINANCIAL REPORTS 2010

PIMS MRS NSERC Activity Report January 1 to December 31 2010

	Use of the resource (i.e. PIMS)		Planned use of MRS funds January 1 to March 31 2011	Planned use of MRS funds April 1 2011 - March 31 2012
	Paid from all revenue sources January 1 to December 31 2010			
Resource Expenditures				
1) Salaries & Benefits				
a) Students (includes IGTC, CRG & other students)	189,584		21,192.00	83,333.33
b) Postdoctoral Fellows	312,486		89,964.00	418,100.00
c) Technical/Professional Assistants (inc. Education)	79,669		0.00	0.00
d) Administrative Staff (includes Directors)	497,428		0.00	0.00
e) Scientific Support Personnel	125,346		35,930.00	142,319.21
2) Equipment or Facility				
a) Purchase or Rental	39,678		0.00	0.00
b) Operation and Maintenance Costs	57,559		0.00	0.00
3) Materials & Supplies				
a) Furniture	0		0.00	0.00
b) Meals/Refreshments	11,314		0.00	0.00
c) Office Supplies	13,692		0.00	0.00
4) Travel - by PIMS Staff				
a) PIMS Meetings (SRP, PDF, Board, Admin, Exec)	34,144		0.00	0.00
b) Grad Student and PDF Travel Support	8,731		0.00	0.00
c) Director Scientific Collaboration/Consultation	84,060		0.00	0.00
5) Dissemination Costs				
a) Publication Costs	6,732		0.00	0.00
b) Other activities	3,014		0.00	0.00
6) Other - Scientific Activities				
a) CRGs	220,846		0.00	207,000.00
b) IGTC	78,191		0.00	31,000.00
c) Conferences/Symposia	80,983		0.00	80,000.00
d) Summer Schools	100,388		0.00	25,000.00
e) Workshops/Seminars/Colloquia (inc. IPSW)	107,128		10,000.00	98,500.00
f) Distinguished Visitors/Chairs/Speakers	37,324		10,000.00	9,836.46
g) Education Initiatives	160,411		0.00	0.00
h) NICDS	20,156		0.00	4,911.00
i) Support for BIRS	1,012		0.00	0.00
j) CNRS/JUNAM/PRIMA Visitors	22,711		3,000.00	0.00
k) Thematic Programs	1,556		0.00	0.00
l) Other Support	57,796		45,000.00	0.00
TOTAL EXPENDITURES	2,351,937		215,086.00	1,100,000.00

Resource Revenues (collected during the period January 1 to December 31 2010)

a) User Fees (Registration Fees collected)	45,579
b) Contributions from Partner Universities	
UBC	527,258
Simon Fraser University	80,000
University of Alberta	77,700
University of Calgary	67,710
University of Victoria	67,200
University of Saskatchewan	50,000
University of Regina	35,000
University of Washington	11,202
University of Lethbridge	5,550
Portland State University	4,081
c) Contributions from MITACS	
Risk Management & Risk Sharing Summer School	34,653
Mathematics of Biological Networks	30,000
New Researchers Conference on Statistics	2,000
d) Private Donations	13,679
e) Contributions from Industry	
f) Other Contributions	
FNESEC re Math Assessment Project	33,635
U. Regina Math & Computer Science Depts	20,500
U. New South Wales re PRIMA Projects	19,730
CMS re CMS-SMM Meeting	19,047
UAS - Federal Interlocutor for Metis & Non-Status Indians	18,555
Other miscellaneous	11,221
UBC Math & Stats Depts	10,133
Texas A&M re SSCMGRA	10,077
U. Alberta Math Dept	7,739
Govt. of British Columbia re Year of Science	6,000
Education Associates	5,000
AMS re travel by Alejandro Adem for meetings	3,661
Microsoft re PINWNT	2,500
Nat. Inst. of Statistical Sciences re SSCMGRA	2,049
SFU Math Dept	1,000
Number Theory Foundation	500
Hugh C. Morris Endowment Interest	438
g) AAET Grant	400,074
h) NSERC Grant	1,100,000
i) Carried Forward from December 31 2009	511,508
TOTAL REVENUES (January 1 to December 31 2010)	3,234,980

VI. 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
CIMAT	Center for Mathematical Research
CIMPA	Centre International de Mathématiques Pures et Appliquées
CMS	Canadian Mathematical Society
CNRS	Centre National de la Recherche Scientifique
CRG	Collaborative Research Groups
CRM	Centre de Recherches Mathématiques
DIMACS	Centre for Discrete Mathematics and Theoretical Computer Science
GIMMC	Graduate Industrial Mathematics Modelling Camps
ICIAM	International Council for Industrial and Applied Mathematics
ICTP	International Centre for Theoretical Physics
IGTC	International Graduate Training Centre in Mathematical Biology
IHES	Institut des Hautes Études Scientifiques
IIMS	Institute of Industrial Mathematics
IMA	Institute for Mathematics and its Applications
IPAM	Institute for Pure and Applied Mathematics
IPSW	Industrial Problem Solving Workshop
IRMACS	Interdisciplinary Research in the Mathematical and Computational Sciences Centre
MITACS	Mathematics of Information Technology and Complex Systems
MSI	Mathematical Sciences Institute
MSRI	Mathematical Sciences Research Institute
NSERC	National Sciences and Engineering Research Council
PDF	Postdoctoral Fellows
PNRMS	Prairie Network for Research in the Mathematical Sciences
PRIMA	Pacific Rim Mathematical Association
PSU	Portland State University
SAMSI	Statistical and Applied Mathematical Sciences Institute
SFU	Simon Fraser University
SIAM	Society for Industrial and Applied Mathematics
SMB	Society for Mathematical Biology
SMM	Sociedad Matemática Mexicana
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
UR	University of Regina
US	University of Saskatchewan
UV	University of Victoria
UW	University of Washington