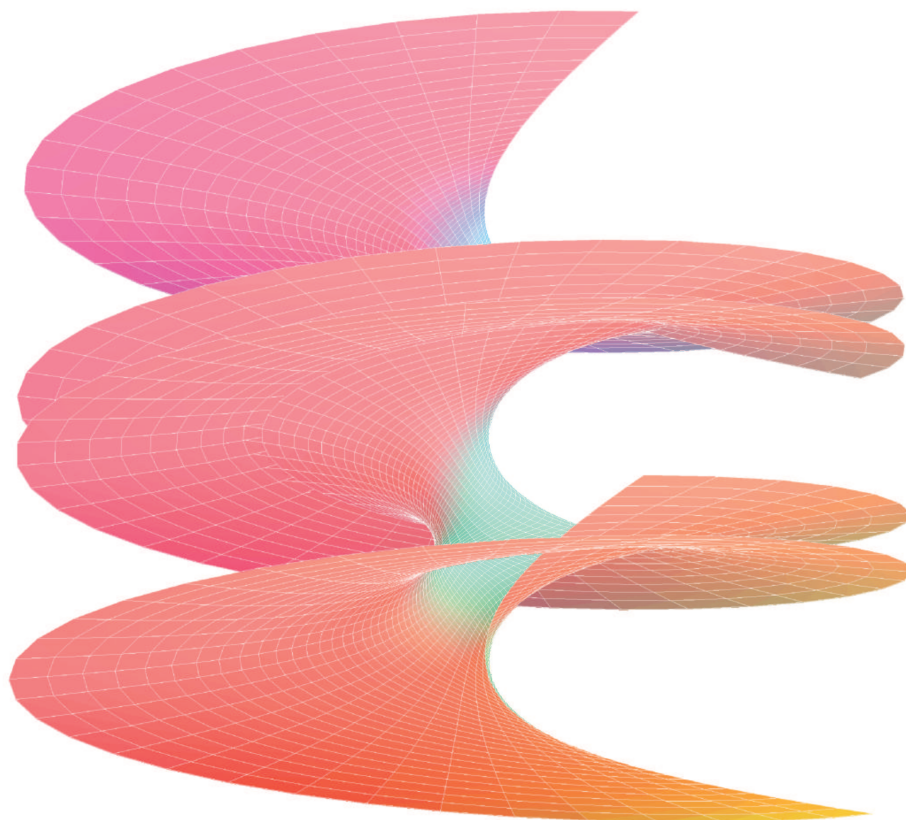


**The Pacific Institute for the  
Mathematical Sciences  
1996–2003**



**A glimpse at the first seven years**



PIMS at Simon Fraser University

The Pacific Institute for the Mathematical Sciences is dedicated to:

- Promoting innovation and excellence in research in all areas encompassed by the mathematical sciences
- Initiating collaborations and strengthening ties between the mathematical scientists in the academic community and those in the industrial, business and government sectors
- Training highly qualified personnel for academic and industrial employment and creating new opportunities for developing scientists
- Developing new technologies to support research, communication and training in the mathematical sciences

### The Pacific Institute for the Mathematical Sciences is sponsored by:

The Natural Sciences & Engineering Research Council of Canada  
The Alberta Ministry of Innovation & Science  
The British Columbia Ministry of Competition, Science & Enterprise  
Simon Fraser University  
University of Alberta  
University of British Columbia  
University of Calgary  
University of Victoria  
University of Washington  
University of Lethbridge  
University of Northern British Columbia



PIMS at the University of  
British Columbia

The surface on the cover is a heli-catenoid, which as a parametric surface of intersecting twisted minimal surfaces. The limits of the parameterisation are a helicoid and a catenoid of revolution. The surface shown is midway between these two limits.

Edited by Heather Jenkins (PIMS Communications Officer)

Date: June 24, 2003

# Foreword

The past seven years have witnessed a remarkable transformation of the mathematical sciences in Western Canada. This has been manifest in the creation of the Pacific Institute for the Mathematical Sciences (PIMS) with its world-class research programme, its innovative industrial outreach, and its educational outreach at all levels.

Remarkable events require remarkable leadership and this was no exception. Nassif Ghoussoub had a vision that transcended what many thought was possible. He saw that PIMS could be much more than other institutes. Its distributed structure allows for broad participation and its programmes impact a broad cross-section of the community. I believe that history will show that PIMS has set a new standard for institutes around the world.

But, Nassif's impact on the Canadian mathematical sciences community extends far beyond PIMS—he was also the leading force behind the recently opened Banff International Research Station (BIRS), and in the creation of MITACS—the Mathematics of Information Technology and Complex Systems NCE.

This retrospective is a glimpse of the fruits of his commitment, tenacity, and hard-work in building for the community.

Being associated with PIMS has been an exciting and rewarding experience. The energy and enthusiasm that Nassif puts into PIMS has continued to amaze me time and time again. It is hard to believe that his time as Director will soon be coming to an end! My warmest congratulations to Nassif Ghoussoub and to all mathematical scientists and staff of PIMS for their marvelous accomplishments during the 1996–2003 time period.

**Hugh Morris**  
Chair of the PIMS Board of Directors



*“I think that PIMS will become a very important institution, with an influence that extends far beyond the first-class mathematical research done by its members.*

*“Mathematics has been called the language of high technology. It is part of the mission of PIMS to extend literacy in that language to business and industry in all sectors of the economy, and in that way to help them use the most modern tools in solving their problems.*

*“The organizers of PIMS have received NSERC support to try doing this, and based on their success to date I think that PIMS has the potential to raise by a couple of notches the level of technical competence in all sectors of business and industry in western Canada.”*

***Tom Brzustowski, President, NSERC, April, 1998***

*“Evidence is growing that my expectations are being met.”*

***Tom Brzustowski, February, 2003***



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*“The reasonable man adapts himself to the world;  
the unreasonable one persists in trying to adapt the  
world to himself. Therefore all progress depends on  
the unreasonable man.”*

***George Bernard Shaw***

# Life Before PIMS

*"They can be meek that have no other cause."*

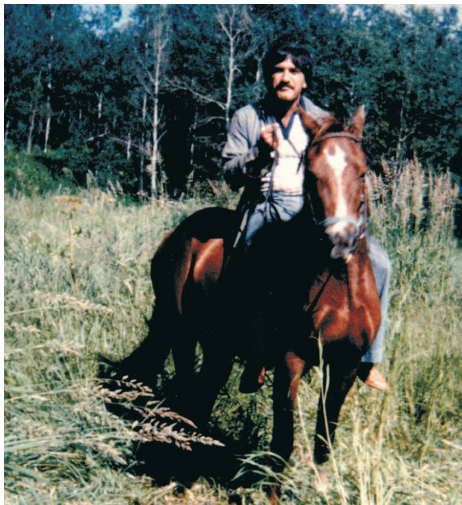
*William Shakespeare, "A Comedy of Errors" (Act II, Scene I)*



Out of Africa



The most delicious part of Nassif's thesis defense



Viva Zappata



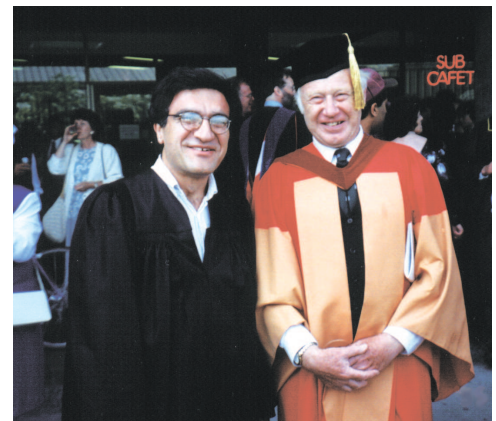
Nassif and Governor General Ramon John Hnatyshyn



Wishful thinking in Beijing



Nassif, Ivar Ekeland and Barry McBride



Nassif with one of his heroes, Nobel Laureate Michael Smith

# The Highlights: A timeline

*“First they ignore you, then they laugh at you, then they fight you, then you win.”*

*Mahatma Gandhi*

- September 1996:* **Nassif Ghoussoub** appointed first director of PIMS
- June 1997:* PIMS begins its annual **Postdoctoral Fellowship Programme** with 12 awards for the 1997–98 academic year
- July 1997:* The first **Frontiers of Mathematical Physics Workshop** takes place at UBC. Now a joint programme with APCTP and the Perimeter Institute.
- November 1997:* PIMS, CRM and Fields launch **MITACS**
- Summer 1997:* Over 100 scientists participate in the first **PIMS Thematic Programme: Probability Theory and its Applications**
- August 1997:* The first annual **PIMS Industrial Problem Solving Workshop** is held at UBC
- February 1998:* First annual **PIMS Graduate Information Weekend** takes place at SFU and UBC
- May 1998:* First **PIMS Graduate Industrial Math Modelling Workshop** takes place at SFU
- May 1998:* PIMS awards 20 Postdoctoral Fellowships for the 1998–99 academic year
- December 1998:* MITACS receives NCE funding of \$14.5 million for 1999–2003  
PIMS receives \$2.52 million for 1999–2003 from NSERC  
PIMS receives \$800 K from ASRA and over \$1.1 M from BC-ISTA for 1999–2003
- Spring 1999:* CRM-Fields-PIMS announce the **National Programme Committee**
- Spring 1999:* The **PIMS Distinguished Chair Programme** is started
- June 1999:* The first annual **PIMS Elementary Grades Mathematics Contest** takes place at UBC
- August 1999:* The first **Canada-China Congress** held in Beijing
- February 2000:* The **Mathematics is Everywhere** poster and web campaign for 2000 is launched
- June 2000:* The first issue of **Pi in the Sky** published
- September 2000:* The **University of Washington** joins PIMS
- December 2000:* The first annual **PIMS Prizes** are awarded
- December 2000:* **Hypatia’s Street Theatre** debuts in Vancouver
- February 2001:* The **Women and Mathematics** poster and web campaign for 2001 is started
- September 2001:* **BIRS** is launched
- July 2002:* NSERC funding for PIMS increased by 60%
- September 2002:* PIMS, Fields and CRM initiate support for the **Atlantic Association for Research in the Mathematical Sciences (AARMS)**
- March 2003:* BIRS opens its doors
- April 2003:* PIMS initiates its **Collaborative Research Groups**

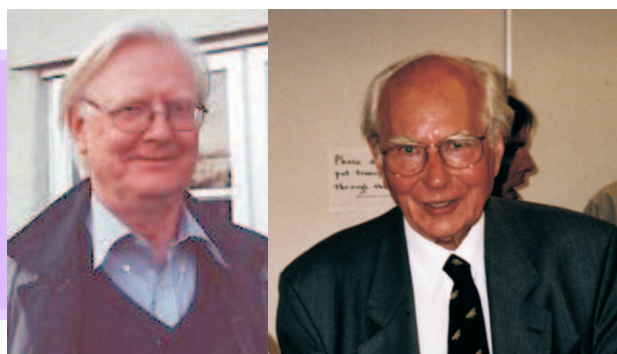


# Distinguished Visitors to PIMS

*“Mathematicians are like Frenchmen: whatever you say to them they translate into their own language and forthwith it is something entirely different.”*

*J. W. Goethe*

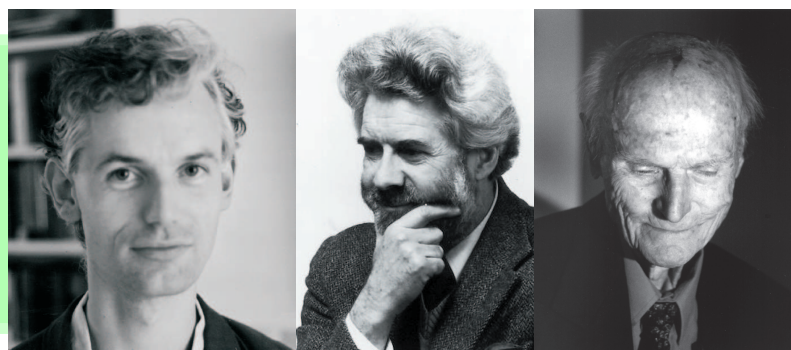
Nobel Prize Winner in economics, **James Mirrlees** (Cambridge University), was a keynote speaker at the PIMS Thematic Programme on Mathematical Economics and Finance in July 1998.



Two Nobel Laureates participated in the 1999 Mathematical Biology Thematic Programme, with Michael Smith (UBC) joining the Workshop on Mathematical Genetics and **Andrew Huxley** (Trinity College, Cambridge) speaking at the Workshop on Mathematical Cell Biology.

*Left:* Fields Medalist **Timothy Gowers** (Cambridge University) at the 1999 Miniprogramme on Geometric Functional Analysis.

*Centre:* Renowned British mathematician **Sir Christopher Zeeman** (University of Warwick) lectured at PIMS-University of Victoria in 2000.



**H. S. M. Coxeter** (University of Toronto) spoke at Changing the Culture 2000: Visualizing Mathematics. His talk was entitled *“The Mathematics in the Art of M. C. Escher.”*

In September 2000 **Beno Eckmann** (ETH Zürich) gave three talks on algebraic topology—with two at UBC and one at U. Calgary.



**Philippe Tondeur** (Director of the Mathematical Sciences Division, NSF) gave the keynote address at the PIMS Prizes Ceremony in December 2001.

Fields Medalist **Jean Bourgain** (IAS) at the PIMS Thematic Programme on Asymptotic Geometric Analysis in Summer 2002. He also visited PIMS in 1999 during the Miniprogramme on Geometric Functional Analysis.



Fields Medalist **Vaughan Jones** (UC, Berkeley) was a PIMS Distinguished Lecturer in November 2002 when he gave a talk on *“Skein Theory in Knot Theory and Beyond.”*

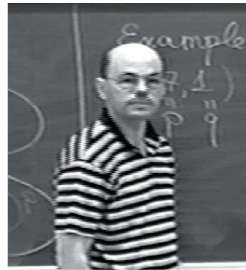
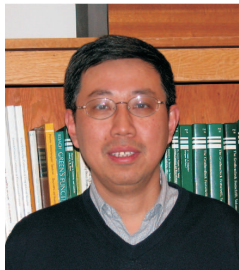
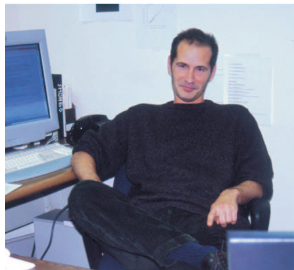
## PIMS Distinguished Chairs

The PIMS Distinguished Chair Programme hosts eminent researchers in the mathematical sciences for extended visits at the PIMS sites. The researchers have the opportunity to collaborate with colleagues at the PIMS universities and to give a series of lectures on their work.



**2000**

**David Brydges** (U. Virginia) at UBC, **Stephen Donkin** (Queen Mary, U. London) at U. Alberta, **Yuri Matiyasevich** (Steklov Institute of Mathematics) at U. Calgary, **Herbert S. Wilf** (U. Pennsylvania) at U. Victoria (*left-right*)

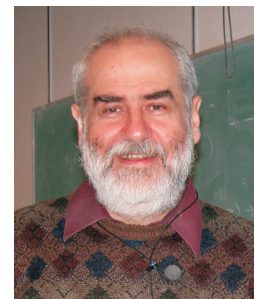
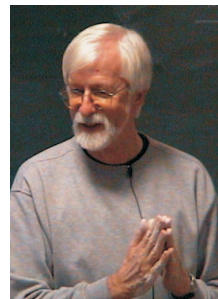


**2001**

**Michael Shelley** (Courant) at SFU, **Gang Tian** (MIT) at UBC, **Vladimir Turaev** (CNRS Strasbourg VI) at U. Calgary (*l-r*)

**2002**

**Donald G. Saari** (UC, Irvine) at U. Victoria, **Klaus Schmidt** (U. Vienna & Director Erwin Schrödinger Institute) at U. Victoria, **Gunther Uhlmann** (U. Washington) at UBC (*l-r*)



**2003**

**Bryan Grenfell** (U. Cambridge) at U. Alberta (*top left*), **Yuri Gurevich** (Microsoft Research) at SFU (*bottom left*), **Ashoke Sen** (Harish-Chandra Research Institute) at UBC (*top right*), **Jeffrey Vaaler** (U. Texas) at SFU (*bottom right*), **András Hajnal** (Rutgers) at U. Calgary, **Alexander Helemskii** (Moscow State U) at U. Alberta, **Sergei Konyagin** (Moscow State U) at UBC



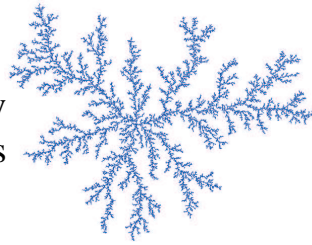


# PIMS Thematic Programmes

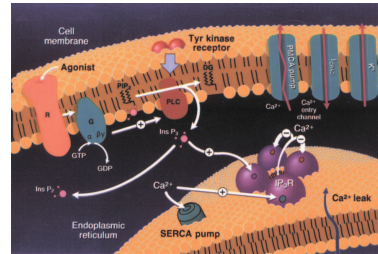
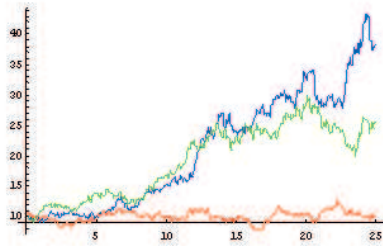
*"A candle loses nothing by lighting another candle."*

*Erin Majors*

1997: Probability Theory  
and its applications

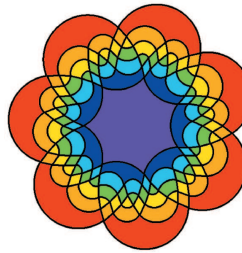
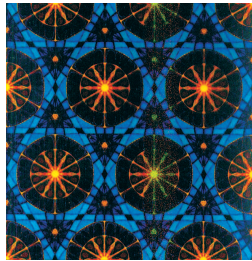


1998: Math  
Economics  
and Finance



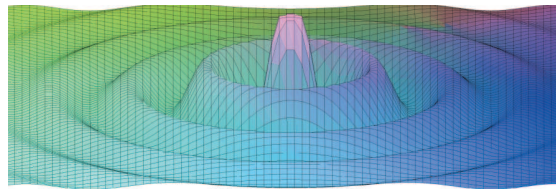
1999: Math  
Biology

2000: Algebra



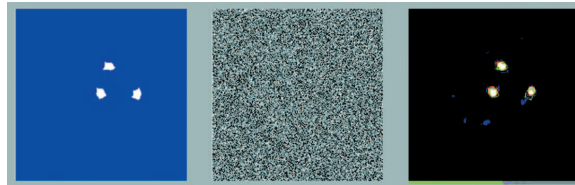
2000: Graph Theory and  
Combinatorial Optimization

2001: Nonlinear PDEs

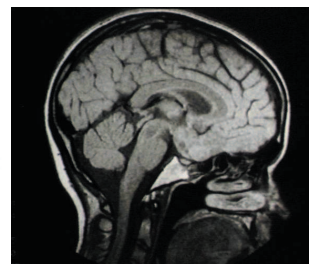
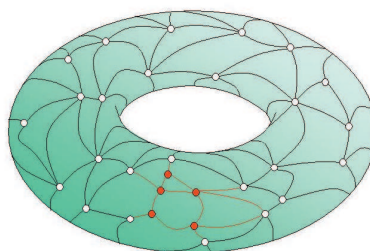


2001: Theoretical, Numerical  
and Industrial Fluid Dynamics

2002: Selected Topics in Mathematical  
and Industrial Statistics



2002: Asymptotic  
Geometric Analysis



2003: Inverse  
Problems and  
Applications

# Scientific Activities

“Something that’s never been done before, isn’t impossible.”  
*Grace Murray Hopper*



The **PIMS Mini-Programme in Geometric Functional Analysis** took place at UBC during the summer of 1999. A conference on **Convex Geometric Analysis** was associated with the mini-programme. It was held in honour of Vitali Milman’s 60<sup>th</sup> birthday. **Mikhael Gromov** (IHES & Courant Institute) was an organiser and speaker at this conference (*left*).

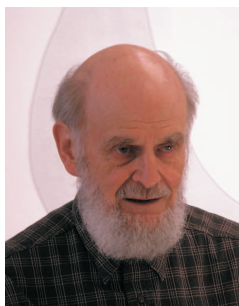
The annual **PIMS Frontiers in Mathematical Physics Conference** started in 1997. These highly-successful conferences are now cosponsored by the Asia Pacific Center for Theoretical Physics and the Perimeter Institute for Theoretical Physics with additional support provided by TRIUMF. In 2003 the format was further expanded and converted into a summer school.



The Second Canada-China Congress of Mathematical Sciences  
August 20-23, 2001, Vancouver, Canada

The first **Canada-China 3x3 Mathematics Congress** took place at Tsinghua University in August 1999. The congress established scientific collaborations between the two countries. The second Canada-China Congress was held in August 2001.

The **PIMS Pacific Northwest Seminar Series** are annual or semi-annual meetings that bring together various regional groups of mathematicians. These meetings began in 1997 and to date approximately 60 have taken place. **Martin T. Barlow** (UBC), **Scott Sheffield** (Microsoft Research) and **Hao Wang** (U. Oregon) were PNW Probability Seminar speakers in October 2002 (*left-right*).



In addition to the PIMS PNW Seminars and the PIMS Distinguished Chair Programme, PIMS has held many seminar series over the years. An example is the **PIMS PDE/Geometry Seminar** which is held at UBC. **Robert Finn** (Stanford) was a speaker in this series in 2003.



# Industrial Programme

*“Give me a lever long enough and a fulcrum on which to place it, and I shall move the world.”*

*Archimedes*

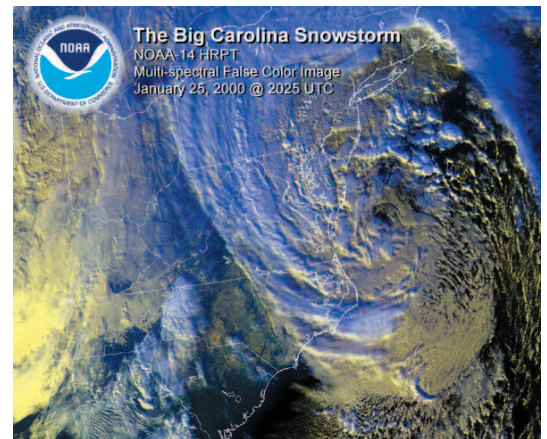


To date PIMS has held seven **Industrial Problem Solving Workshops (IPSWs)**. These workshops have successfully brought together over three dozen Canadian and American companies and hundreds of faculty, postdocs and graduate students from Canada, the United States and Europe. Problems investigated include cancer imaging, finger-print identification, log sawing, paper manufacturing, exploring seismology, acoustic emission, optimal excess capacity strategy, trip wire detection and automation of egg candling. A number of companies have established long term collaborative relationships with several research groups in PIMS' universities. PIMS also sponsors a **Graduate Industrial Mathematics Modelling Camp (GIMMC)** which is designed to give graduate students in the mathematical sciences an opportunity to learn techniques of mathematical modelling under the supervision and guidance of experts in the field.



Participants of the annual **PIMS Fluid Dynamics Summer School** attend a comprehensive series of lectures and are given hands-on experience performing and analyzing experiments in the Environmental and Industrial Fluid Dynamics Laboratory at the University of Alberta. The 1999 participants are shown.

The **IAM-CSC-PIMS Senior Undergraduate Math Modelling Workshop** is an annual workshop in industrial problem solving for the top undergraduate students in mathematics in Canada. It is cosponsored by the Institute for Applied Mathematics (IAM) at UBC and the PIMS Centre for Scientific Computing (CSC) at SFU. It provides the students with the opportunity to see firsthand how useful mathematics can be when applied to industrial problems. The image shown was produced by one of the projects at the 2001 workshop. It shows the cloud structure as the North Carolina Snowstorm in January 2000 progressed northward following the US eastern seaboard.



PIMS holds many industrial and applied math seminar series at its sites. One such series is the **PIMS-Shell Lunchbox Lecture Series** which is held in downtown Calgary and is attended by professional scientists, engineers and mathematicians that work in the downtown area.



# Education Activities

*“Don't judge each day by the harvest you reap, but by the seeds you plant.”*

*Robert Louis Stevenson*



PIMS has been sponsoring **Math Mania Nights** for elementary students in Victoria since 1997. Now approximately three such events take place each year. “Fun” methods involving games and art are used to teach math and computer science concepts to the children (and adults!). The “Bubbles” activity is shown.



The **PIMS Math Fair Programme** has many different components. In addition to supporting math fairs at regional high school science fairs, PIMS holds many other math fairs, for example elementary math fairs are held jointly with the University of Alberta. The photo shows a discussion at one of these fairs.



The annual **PIMS Elementary Grades Mathematics Contest (ELMACON)** is open to students in grades 5–7. It provides an opportunity for them to experience mathematics as an exciting sport. The 2003 top 3 winners in each of the three grades are shown.



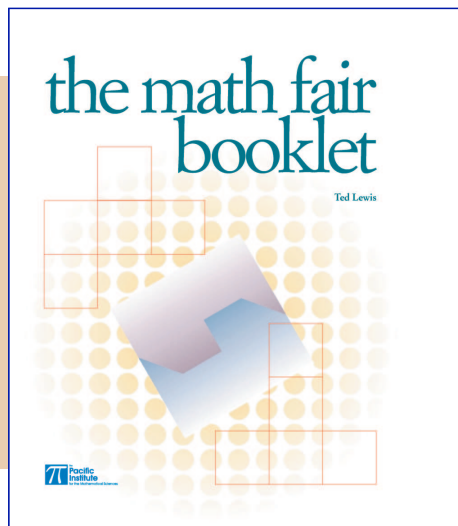
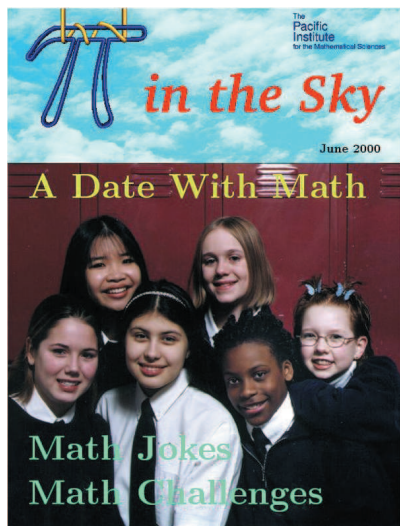
The **PIMS Graduate Studies Information Week** gives promising undergraduates a chance to learn more about mathematical sciences graduate programmes in Alberta and BC. This annual event started in 1998. The photo is from the 2003 event.



The **PIMS Changing the Culture Conference** started in 1998. It brings together mathematicians, mathematics educators and school teachers from all levels to work together towards narrowing the gap between mathematicians and teachers of mathematics, and between those who enjoy doing mathematics and those who don't believe they can do it. In 2002 the keynote speakers were (left–right) **Ed Barbeau** (Math, U. Toronto) and **Brent Davis** (Education, U. Alberta). The theme of the conference was “*Rigour and Intuition in Mathematics.*”

# Communication of the Mathematical Sciences

*“It is impossible to be a mathematician without having the soul of a poet.”*  
**Sofia Kovalevskaya**



**Pi in the Sky** is a mathematical magazine targeted at high school students and educators. This popular publication is distributed to high schools in BC, Alberta and Washington State as well as to mathematicians and interested individuals who have requested a copy. The first issue from June 2000 is shown (*above left*).

PIMS produced 2000 and 2001 wall calendars based on its poster campaigns mentioned below (*above centre*).

In 2002 PIMS published **the math fair booklet** by Ted Lewis (PIMS Education Coordinator U. Alberta). It is a resource for teachers and other people interested in math fairs for schools (*above right*).

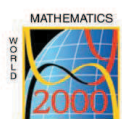


In December 2000 PIMS hosted the premier of the play **Hypatia's Street Theatre** which was written by playwright **Ted Galay** and PIMS Education Facilitator **Klaus Hoehmann** (*right*). It was directed by **Bryan Wade** (*left*).

In 2000 and 2001 PIMS ran monthly poster campaigns advertising web-based contests.

The 2001 **Women and Mathematics** campaign featured **Florence Nightingale** in July (*right*). She was influential in the application of statistics.

The first **Mathematics is Everywhere** poster from February 2000 was on “*The Sunflower Spiral Count*” (*below*).



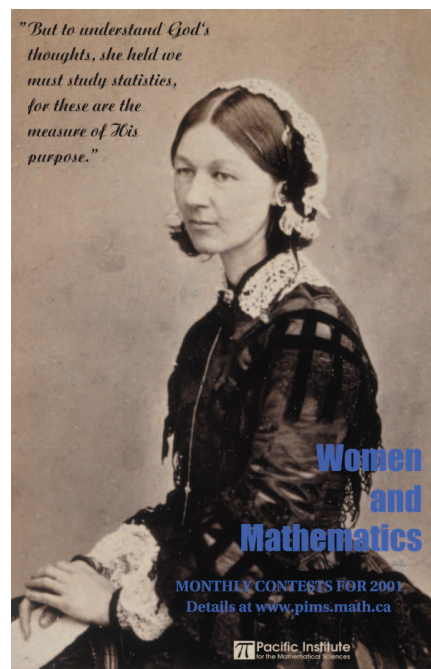
34 SPIRALS IN THE CLOCKWISE DIRECTION.  
 HOW MANY GO THE OTHER WAY?\*

\*A correct answer might win \$100. Details at:  
<http://www.pims.math.ca/sunflower>

**Mathematics is everywhere.**



**Think about it.**





# The Evolution of the PIMS Newsletter

Volume 1.1 was published in June 1997 and consisted of the 4-pages plus a 1-page insert. 400 copies were printed. Volume 7.1 came out in May 2003 and was 40-pages with a 4-page insert. 12000 copies were printed.

### A VISION OF PROPOSED INITIATIVE

#### Morning in the Life, 1999

at the Pacific Institute for the Mathematical Sciences

The proposed Pacific Institute for the Mathematical Sciences (PIMS) is a non-profit organization that will be established in 2000. Its primary purpose is to provide a national forum for the advancement of mathematical research and education in Canada and to foster international collaboration in the field of mathematics.

The Institute will be a unique blend of research, education, and public outreach. It will be a place where mathematicians from across Canada and from around the world can meet, work, and learn together. It will be a place where the best minds in the field can come together to discuss their work and to share their ideas. It will be a place where the next generation of mathematicians can be nurtured and where the public can learn about the beauty and power of mathematics.

The Institute will be a place where the best minds in the field can come together to discuss their work and to share their ideas. It will be a place where the next generation of mathematicians can be nurtured and where the public can learn about the beauty and power of mathematics.

### NSERC Supports PIMS Outreach Activities

June 1997  
Vol. 1 Issue 1

#### PIMS to gain access to NSERC's envelope for Math Institutes

The National Science and Engineering Research Council (NSERC) has announced that it will provide funding for the Pacific Institute for the Mathematical Sciences (PIMS) to support its outreach activities. This funding will be used to support a variety of programs, including the PIMS Summer Program, the PIMS Outreach Program, and the PIMS Outreach Fund.

#### PIMS Organizes Oxford Study Program

July 1-August 31, 1997

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a study program in Oxford, England, for the summer of 1997. The program is open to graduate students and postdoctoral fellows from across Canada and the United States. The program is designed to provide participants with a unique opportunity to work with leading mathematicians in the field of algebraic geometry.

### BC Government Supports PIMS Industry Liaison Programs

June 1997  
Vol. 1 Issue 1

#### The CRM, Fields and PIMS Launch MITACS: A Network of National Centers of Excellence

The Canadian Mathematical Society (CMS), the Fields Institute, and the Pacific Institute for the Mathematical Sciences (PIMS) have announced the launch of the MITACS (Mathematical Institute of the Americas) program. This program is a network of national centers of excellence in mathematics, designed to provide a forum for the advancement of mathematical research and education in the Americas.

#### PIMS forum on industrial mathematics, SFU/UBC

May 25-June 1, 1998

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a forum on industrial mathematics at Simon Fraser University (SFU) and the University of British Columbia (UBC). The forum is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

### PIMS, Fields and CRM invited to develop NCE in the mathematical sciences

June 1997  
Vol. 1 Issue 1

#### PIMS Graduate Work-end

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a work-end for its graduate students. The work-end is designed to provide a forum for the advancement of mathematical research and education in the field of graduate studies.

#### PIMS and CICS launch the Industrial Working Seminar Series

The Pacific Institute for the Mathematical Sciences (PIMS) and the Canadian Institute of Chemical Engineers (CICS) have announced the launch of the Industrial Working Seminar Series. This series is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

### Alberta Government Supports PIMS Industry and Educational Programs

June 1998  
Vol. 2 Issue 2

#### NSERC's President on "Mathematics and PIMS"

The President of the National Science and Engineering Research Council (NSERC), Dr. Robert W. Taylor, has written a letter to the Pacific Institute for the Mathematical Sciences (PIMS) expressing his support for the Institute's activities. He notes that PIMS is a unique and important organization that is making a significant contribution to the advancement of mathematical research and education in Canada.

#### BC Government Reviews Its Support for PIMS Industrial Program

The British Columbia Government has announced that it is reviewing its support for the Pacific Institute for the Mathematical Sciences (PIMS) Industrial Program. The review is designed to ensure that the program is providing the best possible support for the advancement of mathematical research and education in the field of industrial mathematics.

### PIMS 1999 Thematic Programs: Math Biology & Experimental Mathematics

June 1998  
Vol. 2 Issue 3

#### The PIMS Collaborative Industrial Program

The Pacific Institute for the Mathematical Sciences (PIMS) has announced the launch of its Collaborative Industrial Program. This program is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

#### NSERC Vain PIMS on September 14

The National Science and Engineering Research Council (NSERC) has announced that it will provide funding for the Pacific Institute for the Mathematical Sciences (PIMS) on September 14, 1998. This funding will be used to support a variety of programs, including the PIMS Summer Program, the PIMS Outreach Program, and the PIMS Outreach Fund.

### PIMS: Base Funding from NSERC For 1999-2003

December 1998  
Vol. 2 Issue 4

#### The 3rd Canada-China Mathematics Forum

The Pacific Institute for the Mathematical Sciences (PIMS) has organized the 3rd Canada-China Mathematics Forum. This forum is designed to provide a forum for the advancement of mathematical research and education in the field of Canada-China relations.

#### IC and Alberta math NSERC's support for PIMS

The International Centre for Mathematics in Science (ICMS) and the Government of Alberta have announced that they will provide funding for the Pacific Institute for the Mathematical Sciences (PIMS). This funding will be used to support a variety of programs, including the PIMS Summer Program, the PIMS Outreach Program, and the PIMS Outreach Fund.

### Alberta Science and Research Authority Awards \$800K to PIMS

March 1999  
Vol. 3 Issue 1

#### UBC and SFU Provide Research Support for PIMS and MITACS

The University of British Columbia (UBC) and Simon Fraser University (SFU) have announced that they will provide research support for the Pacific Institute for the Mathematical Sciences (PIMS) and the MITACS program. This support is designed to ensure that PIMS and MITACS are providing the best possible support for the advancement of mathematical research and education in the field of industrial mathematics.

#### MITACS Board Approves 21 Projects

The MITACS (Mathematical Institute of the Americas) board has approved 21 projects. These projects are designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

### NSERC's President Leads 60 Canadian Mathematicians to China

June 1999  
Vol. 3 Issue 2

#### Third Annual PIMS Industrial Problem Solving Workshop: A Continuing Success

The Pacific Institute for the Mathematical Sciences (PIMS) has organized the third annual Industrial Problem Solving Workshop. This workshop is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

#### CRM-Fields-PIMS Announce National Committee

The Canadian Mathematical Society (CMS), the Fields Institute, and the Pacific Institute for the Mathematical Sciences (PIMS) have announced the formation of a national committee. This committee is designed to provide a forum for the advancement of mathematical research and education in the field of Canada-China relations.

### Alberta Ministry of Innovation and Science Confirms Its Support of PIMS

June 1999  
Vol. 3 Issue 2

#### Nobel Laureates and Fields Medalists Participate in PIMS Summer Program

The Pacific Institute for the Mathematical Sciences (PIMS) has announced that several Nobel Laureates and Fields Medalists will be participating in the PIMS Summer Program. This program is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

#### The Canada-China Congress: A Successful First Step

The Canada-China Congress has been a successful first step in the advancement of mathematical research and education in the field of Canada-China relations. The congress was held in Beijing, China, and was attended by mathematicians from both countries.

### Robert V. Moody Appointed Officer of the Order of Canada

June 2000  
Vol. 4 Issue 1

#### New PIMS Facility at SFU

The Pacific Institute for the Mathematical Sciences (PIMS) has announced that it has moved to a new facility at Simon Fraser University (SFU). The new facility is a state-of-the-art building that provides a unique environment for the advancement of mathematical research and education.

#### NSERC Vain PIMS on September 14

The National Science and Engineering Research Council (NSERC) has announced that it will provide funding for the Pacific Institute for the Mathematical Sciences (PIMS) on September 14, 2000. This funding will be used to support a variety of programs, including the PIMS Summer Program, the PIMS Outreach Program, and the PIMS Outreach Fund.

### PIMS to Develop Overhead-Style Office in Canadian Rockies

June 2000  
Vol. 4 Issue 1

#### H. S. M. Center on Border at Changing the Culture III

The Pacific Institute for the Mathematical Sciences (PIMS) has organized the H. S. M. Center on Border at Changing the Culture III. This center is designed to provide a forum for the advancement of mathematical research and education in the field of Canada-China relations.

#### NSERC's support for PIMS

The National Science and Engineering Research Council (NSERC) has announced that it will provide funding for the Pacific Institute for the Mathematical Sciences (PIMS). This funding will be used to support a variety of programs, including the PIMS Summer Program, the PIMS Outreach Program, and the PIMS Outreach Fund.

### The University of Washington Joins PIMS

June 2000  
Vol. 4 Issue 1

#### Mathematics and Literature: Crossed by the Pacific

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a program on Mathematics and Literature: Crossed by the Pacific. This program is designed to provide a forum for the advancement of mathematical research and education in the field of Canada-China relations.

#### Colgate's Richard Chen Honored for PIMS

Colgate University's Richard Chen has been honored for his contributions to the Pacific Institute for the Mathematical Sciences (PIMS). His work has been instrumental in the advancement of mathematical research and education in the field of Canada-China relations.

### PIMS Awards Its Prizes for 2000

June 2000  
Vol. 4 Issue 1

#### Entering Industrial Sciences at the Graduate Level

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a program on Entering Industrial Sciences at the Graduate Level. This program is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

#### Mathematics and Literature: Crossed by the Pacific

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a program on Mathematics and Literature: Crossed by the Pacific. This program is designed to provide a forum for the advancement of mathematical research and education in the field of Canada-China relations.

### NSF and ASRA Join NSERC Site Visit for Banff Research Station

June 2000  
Vol. 4 Issue 1

#### Month of Industrial Math at PIMS: A Successful First Step

The Pacific Institute for the Mathematical Sciences (PIMS) has organized a month of industrial mathematics. This month is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

#### APFC's President and PIMS Collaborate on President's Mathematical Program

The American Physical Society (APS) and the Pacific Institute for the Mathematical Sciences (PIMS) have announced that they will collaborate on the President's Mathematical Program. This program is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

### PIMS - The Road Ahead

Winter 2002  
Vol. 6 Issue 1

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#### Complete Programme on page 3

Pacific Institute for the Mathematical Sciences

### Banff Station Launched

June 2002  
Vol. 6 Issue 1

#### NSERC's support for PIMS

The National Science and Engineering Research Council (NSERC) has announced that it will provide funding for the Pacific Institute for the Mathematical Sciences (PIMS). This funding will be used to support a variety of programs, including the PIMS Summer Program, the PIMS Outreach Program, and the PIMS Outreach Fund.

#### Banff Station Launched

The Pacific Institute for the Mathematical Sciences (PIMS) has announced the launch of the Banff Station. This station is designed to provide a forum for the advancement of mathematical research and education in the field of Canada-China relations.

### Chinese President Jiang Zemin Confers the (Canadian) Fields Medals in Beijing

June 2002  
Vol. 6 Issue 1

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#### NSERC Reallocation Results, PIMS: A model for the research institute of the 21<sup>st</sup> century

The National Science and Engineering Research Council (NSERC) has announced the results of its reallocation of funding to the Pacific Institute for the Mathematical Sciences (PIMS). This reallocation is a model for the research institute of the 21st century.

### BIRS Opens its Doors to the World

June 2002  
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#### BIRS Opens its Doors to the World

The Banff International Research Station (BIRS) has announced that it is opening its doors to the world. This station is designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.

### PIMS Initiates Its Collaborative Research Groups

June 2002  
Vol. 6 Issue 1

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#### PIMS Initiates Its Collaborative Research Groups

The Pacific Institute for the Mathematical Sciences (PIMS) has announced the formation of several collaborative research groups. These groups are designed to provide a forum for the advancement of mathematical research and education in the field of industrial mathematics.



# The PIMS Collaborative Research Groups

*“Life is like riding a bicycle. To keep your balance you must keep moving.”*

*Albert Einstein*

As part of its second phase of development, PIMS is embarking on a plan that will create and support collaborative multi-university teams of mathematical scientists. These **Collaborative Research Groups** (CRGs) will pool talent across universities to form world-class research groups that will generate and sustain the scientific programme of PIMS in the years to come. The research programmes of these groups will be supported through a new PIMS programme that supports concentrated activities in 5–8 research areas each year. This programme, run on a competitive basis, supports multi-site activities of selected CRGs over a 1–2 year period of concentration.

## Areas of Concentration: 2003-05



### Dynamics & Related Topics

Group leaders (*left–right*): **Ian Putnam** (U. Victoria) & **Douglas Lind** (U. Washington)



### Mathematical Ecology

Group leaders (*l–r*): **Michael Doebeli** (UBC) & **Mark Lewis** (U. Alberta)



### Number Theory

Group leaders (*l–r*): **Peter Borwein** (SFU) & **David Boyd** (UBC)



### Scientific Computing

Group leaders (*clockwise from top left*): **Steve Ruuth** (SFU), **Manfred Trummer** (SFU), **Elena Braverman** (U. Calgary), **Chen Grief** (UBC), **Randy Leveque** (U. Washington) and **Yanping Lin** (U. Alberta, *not shown*).



### String Theory

Group leaders (*l–r*): **Gordon Semenov** (UBC) & **Eric Woolgar** (U. Alberta)

## Upcoming Areas of Concentration: 2004-06

Probability and Statistical Mechanics

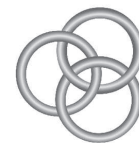
Topology and Knot Theory

# Mathematics of Information Technology and Complex Systems

*“Et harum scientiarum porta et clavis est Mathematica.”*

*“Mathematics is the gate and key of the sciences.”*

*Roger Bacon in Opus Majus*



**MITACS**

**Mathematics of Information Technology and Complex Systems (MITACS)** is one of three Networks of Centers of Excellence (NCE) created in 1998. The MITACS NCE is a joint venture of the three Canadian mathematical sciences institutes: PIMS, the Centre de Recherches Mathématiques, and the Fields Institute for Research in Mathematical Sciences. Its main goal is to coordinate and fund industrial mathematical research across the country. The MITACS network involves scientists and industrial partners from across the country bringing together over 230 researchers at 26 Canadian universities with more than 70 Canadian industrial, medical, and financial organizations.



**Arvind Gupta,**  
MITACS Programme  
Leader (*right*)



The founders of MITACS: **Don Dawson, Nassif Ghoussoub, Luc Vinet** (*left–right*), **Steve Halperin** (*inset*).

Each year MITACS holds an Annual General Meeting and Conference. These events have been designed with one common purpose—to bring together partner organizations in the academic, public, private and not-for-profit sectors with university researchers to generate solutions.



The plenary speakers at the 2002 MITACS AGM: **Ron Graham** (University of California, San Diego), **Anil Jain** (Michigan State University), **Gilbert Strang** (MIT).



# Banff International Research Station

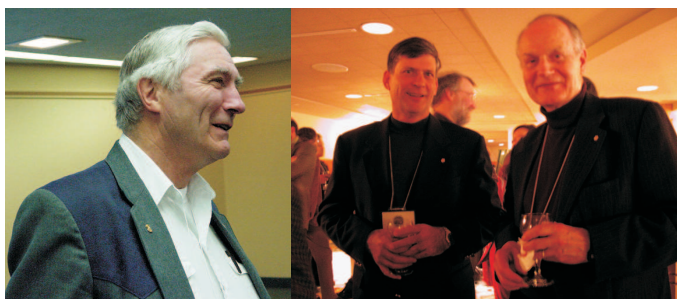


*“If you have an apple and I have an apple and we exchange apples then you and I will still each have one apple. But if you have an idea and I have an idea and we exchange these ideas, then each of us will have two ideas.”*

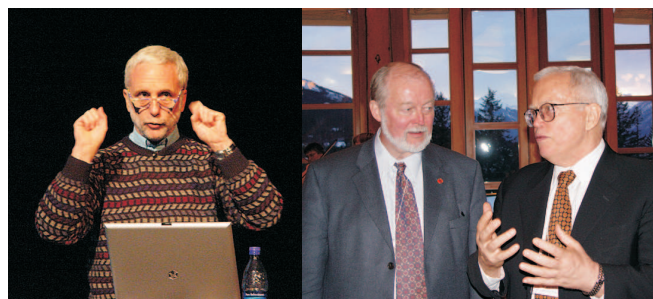
*George Bernard Shaw*



In March 2000, Nassif Ghoussoub started his campaign for the development of a North American answer to Oberwolfach in the Canadian Rockies. In September 2001, the governments of Alberta, Canada and the United States announced funding of \$5M for the **Banff International Research Station for Mathematical Innovation and Discovery (BIRS)**. The opening ceremony took place on February 28, 2003 and the workshops began on March 16.



The inaugural meetings for BIRS featured many distinguished guests. They included the Chair of ASRA **Bob Church** (left), the Director of the NCE Program **Jean-Claude Gavrel** (centre) and NSERC President **Tom Brzustowski** (right).



The speakers during the scientific programme of the BIRS inaugural meetings were renowned science broadcaster and writer **Jay Ingram** (left), distinguished mathematician **Donald Saari** (centre), and Nobel Laureate **James J. Heckman** (right).



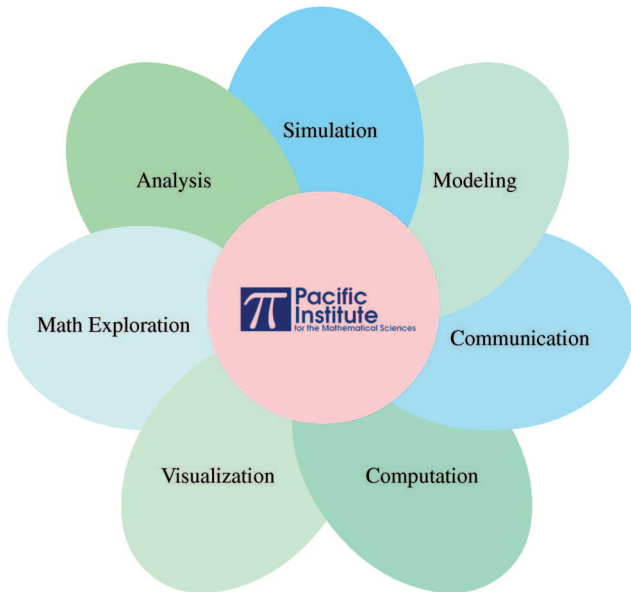
The BIRS Executive Committee (left–right): **David Eisenbud** (Director, MSRI), **Robert Moody** (Scientific Director, BIRS) and **Nassif Ghoussoub** (Director, PIMS).



BIRS hosts five-day workshops, two-day events, research in teams, focused research groups, summer schools and graduate training camps. The participants of the June 2003 five-day workshop on **Applicable Harmonic Analysis** are shown outside Corbett Hall.

# Future Ventures

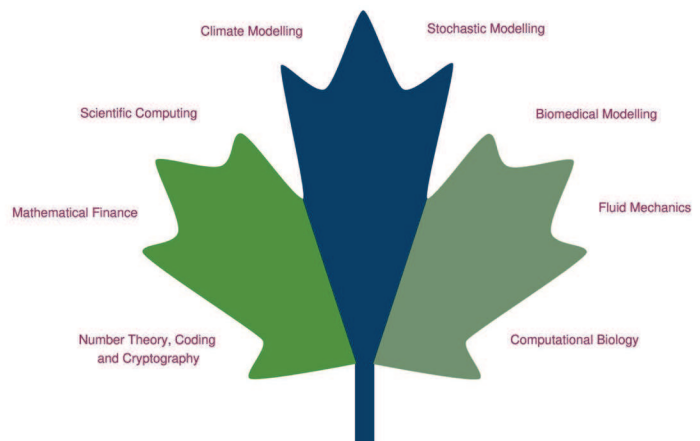
*“If you can look into the seeds of time,  
And say which grain will grow and which will not.”  
William Shakespeare, “Macbeth” Act i. Sc. 3.*



## The Centre for Mathematical Exploration and Visualization (MEV)



## The Canadian Initiative in Mathematical Science Research for Technology





# PIMS Management

## Board of Directors

### Present Members

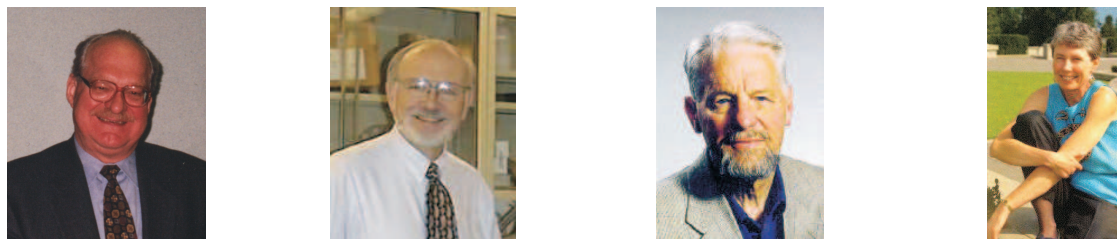


*Top row (left–right):* **Hugh Morris** (Chair, Mineral Industry Consultant): 1997–present, **Michael Boorman** (Dean of Science, U. Calgary): 1998–present, **Robert Chase** (President & CEO, Lexacal Investment Corp): 2002–present, **Bruce Clayman** (VP Research, Professor of Physics, SFU): 1996–present, and **James Delgrande** (Director & Professor of Computing Science, SFU): 1999–present.

*Middle row (left–right):* **Don W. Denney** (Manager, Advance Control Alliance, Syncrude Canada Ltd): 2000–present, **Kenneth Foxcroft** (Deputy Chairman and Chief Trading Officer, TD Securities Inc): 1997–present, **Nassif Ghossoub** (Director of PIMS, Professor of Mathematics, UBC): 1996–present, **Gary Kachanoski** (VP Research, Professor of Renewable Resources, U. Alberta): 2002–present, and **Prabha Kundur** (President & CEO, Powertech Labs Inc.): 1996–present.

*Bottom row (left–right):* **Barry McBride** (VP Academic & Provost, UBC): 1996–present, **Edwin Perkins** (Professor of Mathematics, UBC): 1997–present, **Dennis Salahub** (VP Research, U. Calgary): 2003–present, **Indira Samarasekera** (VP Research, Professor of Metals & Materials Engineering, UBC): 2002–present, and **Martin Taylor** (VP Research, Professor of Geography, U. Victoria): 1998–present.

### Past Members



Left–right: **Richard E. Peter** (Dean of Science, U. Alberta): 1996–2002, **Cooper H. Langford** (VP Research, U. Calgary): 1996–98, **Peter Lancaster** (Professor of Mathematics & Statistics, U. Calgary): 1997–2001, **Maria Klawe** (Dean of Science & Professor of Computer Science, UBC): 2000–2002, and **Alexander McAuley** (Associate VP Research, U. Victoria): 1996–98 (*not shown*).

# Scientific Review Panel

## Current Members



*Top row (left–right):* **David Brillinger** (Professor of Statistics, UC, Berkeley): 1999–present, **David Brydges** (Professor of Mathematics, UBC): 2002–present, **Randy Goebel** (Professor of Computer Science, U. Alberta): 2002–present, **Nassif Ghoussoub** (Director, PIMS): 1996–present, **Ronald Graham** (Professor of Computer Science & Engineering, UC, San Diego): 1996–present, and **Robert V. Moody** (Professor of Mathematics, U. Alberta): 1996–present.

*Bottom row (left–right):* **Ian F. Putnam** (Professor of Mathematics, U. Victoria): 1999–present, **Bob Russell** (Professor of Applied Mathematics, SFU): 2002–present, **Gang Tian** (Professor, MIT): 1996–present, **Elizabeth Thompson** (Professor of Statistics, U. Washington): 2002–present, **Gunther Uhlmann** (Professor of Mathematics, U. Washington): 2002–present, and **Hugh Williams** (Professor of Mathematics, U. Calgary): 2002–present.

## Past Members



*Left–right:* **David Boyd** (Professor of Mathematics, UBC): 1996–2001, **Richard Karp** (Professor of Computer Science, UC, Berkeley): 1996–2001, **Alistair Lachlan** (Professor of Mathematics, SFU): 1996–2001, **Bernard J. Matkowsky** (John Evans Chair in Applied Mathematics, Northwestern University): 1996–2001, **Nicholas Pippenger** (Professor of Computer Science, UBC): 1996–2001, and **Gordon Slade** (Professor of Mathematics, UBC): 1996–2001.



## Executive

### Simon Fraser University Site Directors

Arvind Gupta (Computer Science), 1996–99  
Peter Borwein (Mathematics), 1999–2000  
Bob Russell (Mathematics & Computer Science), 2000–01  
Manfred Trummer (Mathematics & Computer Science), 2001–present

### University of Alberta Site Directors

Nicole Tomczak-Jaegermann (Mathematical and Statistical Sciences), 1996–97  
Akbar Rhemtullah (Mathematical and Statistical Sciences), 1997–98  
T. Bryant Moodie (Mathematical and Statistical Sciences), 1998–2001  
James Muldowney (Mathematical and Statistical Sciences), 2001–present

### University of British Columbia Site Directors

Gordon Semenoff (Physics), 1996–97  
Dale Rolfsen (Mathematics), 1997–present

### University of Calgary Site Directors

Jedrzej Sniatycki (Mathematics and Statistics), 1996–97  
Claude Laflamme (Mathematics and Statistics), 1997–98  
Michael Lamoureux (Mathematics and Statistics), 1998–2001  
Gary Margrave (Geology and Geophysics), 2001–present

### University of Victoria Site Directors

Reinhard Illner (Mathematics and Statistics), 1996–97  
Ian Putnam (Mathematics and Statistics), 1997–98  
Frank Ruskey (Computer Science), 1998–99  
Florin Diacu (Mathematics and Statistics), 1999–present

### University of Washington Site Directors

Tatiana Toro (Mathematics), 2000–01  
James Morrow (Mathematics), 2001–02  
S. Paul Smith (Mathematics), 2002–present



Manfred Trummer



James Muldowney



Dale Rolfsen



Gary Margrave



Florin Diacu



S. Paul Smith



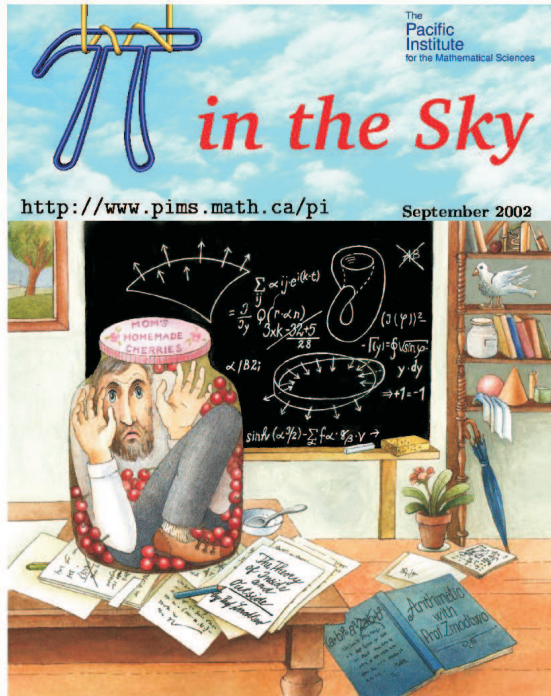
*“Now my charms are all o'erthrown,  
And what strength I have's mine own;  
Which is most faint; now 'tis true,  
I must be here confin'd by you,  
Or sent to Naples. Let me not,  
Since I have my dukedom got,  
And pardon'd the deceiver, dwell  
In this bare island by your spell:  
But release me from my bands  
With the help of your good hands.  
Gentle breath of yours my sails  
Must fill, or else my project fails,  
Which was to please. Now I want  
Spirits to enforce, art to enchant;  
And my ending is despair,  
Unless I be reliev'd by prayer,  
Which pierces so that it assaults  
Mercy itself, and frees all faults.  
As you from crimes would pardon'd be,  
Let your indulgence set me free.”*

*William Shakespeare*

*Epilogue spoken by Prospero in “The Tempest”*







While studying the work of Möbius, Prof. Zmodtwo discovers the importance of signs.

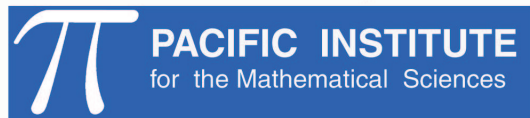


Photo courtesy of Candia Tavorna

TWO SLICES IN EACH OF FOUR STYLES -- NO SAME ONES ADJACENT. HOW MANY WAYS CAN YOU DO IT?\*

\*A correct answer might win \$100. Details at:  
<http://www.pims.math.ca/pizza>

Mathematics is everywhere.



Think about it.

## Women and Mathematics

MONTHLY CONTESTS FOR 2001  
 Details at [www.pims.math.ca](http://www.pims.math.ca)

*"Forget this world and all its troubles and if possible its multitudinous Charlatans - everything in short but the Enchantress of Numbers."*

