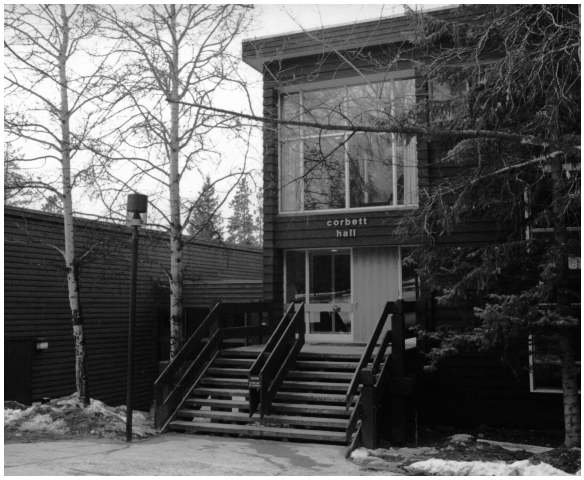
THE BANFF INTERNATIONAL RESEARCH STATION

BIRS Executive committee: David Eisenbud (Director, MSRI), Robert Moody (Scientific Director, BIRS) and Nassif Ghoussoub (Director, PIMS).



Participants will be accommodated in Corbett Hall.

Unique Canada-US Research Facility Launched in Banff, Alberta

New $5M research facility first of its kind in North America

Banff, Alberta - September 24, 2001 - The governments of Alberta, Canada and the United States today announced the establishment of a new international mathematical research facility in Banff, Alberta. The Banff International Research Station for Mathematical Innovation and Discovery (BIRS) will annually host thousands of top international scientists and researchers for intense workshops, collaborative research efforts, and training sessions across the entire spectrum of pure and applied mathematical sciences.

The joint venture is spearheaded in Canada by the Pacific Institute for the Mathematical Sciences (PIMS) and in the US by the Berkeley based Mathematical Sciences Research Institute (MSRI). The facility will also profit from the active participation of the Mathematics of Information Technology and Complex Systems Network of Centres of Excellence (MITACS).

At a ceremony held simultaneously in Washington DC and Banff, Rita Colwell, Director of the National Science Foundation of the United States announced an award of $1.95M, Robert Church, Chair of the Alberta Science Research Authority committed $1.7M and Tom Brzustowski, President of the Natural Sciences and Engineering Research Council of Canada announced an award of $1.5M towards the operation of BIRS from 2003 to 2005. The station will also be supported by the British Columbia Ministry of Competition, Science and Enterprise through its sponsorship of PIMS.

The facility will be housed at the well-known Banff Centre, which has already won acclaim for its programs in music, mountain culture, writing and publishing, visual arts, and its centre for management. BIRS is the first of its kind in North America. Modelled on two similar European facilities, BIRS is expected to enhance research capacity and help develop the careers of young researchers both in North America and around the world. This is the first time that Canada and the US have collaborated on this type of facility.

PIMS was commended by the funding agencies for seizing the opportunity to bring the facility here and for securing wide support for it. NSERC received almost 450 letters of support from researchers in Canada, the US and around the world.

Joint Press Conference for BIRS, Banff, AB and Arlington, VI, September 24, 2001

Remarks of Dr. Rita Colwell, Director US National Science Foundation

Good afternoon, everyone. I am Rita Colwell, director of the U.S. National Science Foundation, and it is a great pleasure to take part in this ceremony – really a "virtual ribbon-cutting" – today.

Our event connects two nations, the United States and Canada, exemplary neighbors who have always cherished peace between each other. In that tradition, today we inaugurate an enterprise that represents the best of the human spirit.

Following the tragic attacks on the United States two weeks ago, this event today lifts our spirits as it symbolizes our joint endeavor to push back the frontiers of knowledge. We have called today's event "Close Parallels"–a mathematical metaphor evoking the steadfast closeness of our nations.

The National Science Foundation supports cutting-edge science and engineering across the range of disciplines. We always strive to integrate research and education, really two faces of the same coin. We invest in the very best of the future, the fundamental research whose ultimate outcome no one can foresee. Mathematical research is an ideal example of such fertile ground for far-reaching investment.

Rita Colwell

Today NSF is very pleased to announce an award to the Mathematical Sciences Research Institute–MSRI. The award of $1.27 million over four years will support United States' participation at the Banff International Research Station for Mathematical Innovation and Discovery. The research station in the Canadian Rockies in Banff will provide a spectacular setting for intensive mathematical research, when it opens in 2003. The station is a project of both our nations, led by the Pacific Institute for the Mathematical Sciences in Vancouver, British Columbia, and MSRI, which I've already mentioned, located in Berkeley, California.

I cannot resist quoting the director of the Pacific Institute, Nassif Ghoussoub; he said that the Banff Centre will enable visitors to "live, eat and breathe mathematics." (I have to say that sounds like a very nourishing diet–talk about "brain food!")

Our NSF contribution joins Canadian support that will be described by our Canadian partners today. The NSF award will help support the travel and living expenses of participants in the research station's programs, especially those from the U.S. I should emphasize that our Canadian colleagues and funding agencies have taken the lead in bringing the Banff center into being. This activity underscores how international cooperation adds up to more than what any nation could accomplish alone.

Every important question of science and engineering is under study by researchers in nations around the world. The mathematical and statistical communities of the United States are at the forefront in engaging their counterparts abroad.

International connections in mathematics are important throughout a career in science. In June of this year, NSF helped to support the International Mathematical Olympiad, a competition that brought talented young people from more than eighty countries to Washington, D.C. for the annual event that was first held in Romania in 1959. It was a rare privilege for us to host the Olympiad in the U.S. However, every year, NSF hosts the U.S. Olympiad team in Washington to honor their achievements.

Our investment in the Banff Center is tangible proof of the vital and growing role of the mathematical sciences in all of science and engineering. I would like to show a few slides now, to illustrate this fundamental importance of mathematics.

E.O. Wilson writes that "...mathematics seems to point arrowlike toward the ultimate goal of objective truth." Indeed, mathematics is the ultimate cross-cutting discipline, the springboard for advances across the board. Mathematics is both a powerful tool for insight and a common language for science. A good example, pictured here, is the fractal, a famous illustration of how inner principles of mathematics enable us to model many natural structures. Cosmologists are beginning to draw an awesome portrait of the structure of the universe–using mathematics as the medium. On the other end of the scale, particle physicists sketch quantum phenomena, again with mathematics as their brush and palette. In the realm of climate, our ability to predict El Niño–the irregular shifts in ocean and atmospheric conditions–is a superb example of where mathematics and computing have brought us. The meeting of mathematics and medicine augurs well for discovery on many fronts. Mathematics and complexity theory, for instance, give insight into the human heart. The top pictures are computer simulations of the electrical activity in a normal heart. Below are abnormal patterns, or fibrillation. Mathematicians are investigating why some patterns of electrical stimulus are better at eliminating fibrillation. Mathematics and biology transform each other. The information science of life edges ever closer to electronic information science. Advances in understanding life may lead to new modes of computing, notably biological computing.

To strengthen the mathematical foundations of science and society, the National Science Foundation has proposed a new priority area. We seek to advance frontiers in three interlinked areas: fundamental mathematical and statistical sciences, interdisciplinary research involving the mathematical sciences, and mathematical sciences education.

I show this final slide as a mathematical metaphor. Fractal sets like we see here can be used to build computer models of clouds, plants, the surface of the sea, even networks of blood vessels. Yet, mathematics also transports us beyond the practical, into the realm of the imagination and art. A coming together of brilliant imaginations for a higher purpose will be a hallmark of the Banff Centre.

We look forward to an inspiring and long-lasting engagement among our mathematical scientists, our Canadian colleagues, and others from around the world, in a superb environment for communication and collaboration.

Remarks of Dr. Tom Brzustowski, President NSERC

Transcribed from the speech of Dr. Brzustowski at the Banff Centre.

Ladies and Gentlemen:

If I may begin, Rita, with a personal request to you. I would ask you on behalf of the entire staff of NSERC, the Natural Sciences and Engineering Research Council of Canada, to convey to our colleagues at the NSF, to the American mathematics community, and to the people of the United States our heartfelt regret and our profound outrage at the event of September 11.

I am very glad, as Nassif has already indicated that he is, that the event today was not postponed or cancelled, because to have postponed it or cancelled it would have given a victory to the terrorists. They might never have known of it, but we would have known.

Let me now move on to the most important thing that I have to do here. I have to read the magic words which make it official, and here they are. The Natural Sciences and Engineering Research Council of Canada is contributing $1.5 million towards the

Tom Brzustowski

operation of BIRS from the year 2003 to the year 2006.

Now, we are here to celebrate a hugely important event. It is hugely important not just for the participating organizations, but for our nations, and for mathematics in the world.

Let me begin by congratulating PIMS, MSRI, and MITACS. (I'll stick with the acronyms, as life is too short to spell them all out.) Let me congratulate these three organizations for their intellectual involvement and their promise to deliver the fruits of this superb international collaboration.

Let me also congratulate the funding partners. Let me congratulate the National Science Foundation of the United States. You heard in the remarks of Dr. Colwell the extensive understanding of the importance of mathematics which has driven their decision. And let me congratulate the Province of Alberta where BIRS is located. This is a province which, in my opinion, really does have its act together when it comes to science and engineering research, and BIRS is yet another illustration of that.

The hallmark of a good idea is that so many people find it obvious once it has been mentioned – obviously! Why not?! You know that Oberwolfach has succeeded for many years. Why not, by way of developing a partnership in research in mathematics in North America, set up something that would be at least as good, and maybe far better? And so it was done – on a fast track and with quick decisions. Something was done that would not have happened, could not have happened, without the vision, the energy, the tenacity, and the leadership of one person, and that of course is Nassif Ghoussoub.

When I think of the many contributions Nassif has made in mathematics, I know they include some quite decent papers on partial differential equations. (I do look at Nature Nassif. I've seen your stuff.) Quite apart from that, his contributions as a leader in organizing mathematical activity in Canada has been extraordinarily important. And now we see the leadership stretching to international collaboration, and we welcome that.

Now I should mention, perhaps for the benefit of our American colleagues rather more than the Canadian colleagues who are already convinced of this, just why this is such an important event. It is the next step in the emergence of Canadian mathematics into the prominence that it deserves. Canadian mathematicians have been good for a very long time. They have been very good, and we have many outstanding individuals, but Canadian mathematics in the corporate sense has been achieving the deserved prominence only very recently. The three institutes now active, CRM, Fields and PIMS, the Network of Centres of Excellence MITACS, are all contributing to that prominence. And today the international partnership that produced BIRS adds to it as well.

But BIRS is also important in another way. It puts the seal of recognition by the funding agencies on the way that mathematicians do research: the face to face contact, the debate of ideas, the closing of dead ends – perhaps in the presence of those who might have contributed to paving them in the first instance, the opportunity for people to change their minds, and the excitement of recognizing a really new development and the ability then to go off with colleagues and immediately talk about it some more. All these aspects of working together in a setting like BIRS are hugely important. Mathematicians assembled in an environment conducive to intellectual creativity will produce a great deal.

Let me finally come to something that I have been saying for quite a little while, and frequently – maybe even weekly. It is more of a matter for generalists thinking about mathematics than it is for mathematicians. I really do believe that mathematics has been the language of high technology. And I also believe that mathematics is becoming the eyes of science, helping scientists in all fields drink from a firehose of data. But for mathematics to function in this way, as the language and as the eyes, and as the many other things that mathematics is yet to become, there is need for continued effort to expand and strengthen the foundations of mathematics – the work of basic research in mathematics.

With that, let me conclude by congratulating one more person, as the focus now shifts from Nassif to Bob Moody. Let me congratulate Bob Moody on becoming the research director of BIRS. I think BIRS is very lucky to have Bob Moody; I think Bob Moody is very lucky to have BIRS. This is a hugely important international effort which will be important for Canadian mathematics, for mathematics in the United States, and ultimately for mathematics in the world. I congratulate all who participated in creating it. I thank our funding partners and I wish everybody success in the years to come.

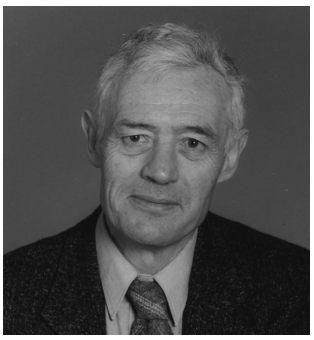
Thank you very much

Overview

The Banff International Research Station (BIRS) is a collaborative Canada-US venture to provide an environment that optimizes opportunities for creative interaction and the exchange of ideas, knowledge, and methods within the mathematical sciences and with related sciences and industry.

The US participation will be led by the Mathematical Sciences Research Institute (Berkeley, CA) while the Canadian effort will be coordinated by the Pacific Institute of the Mathematical Sciences (PIMS) with the participation of the Mathematics of Information Technology and Complex Systems Network of Centers of Excellence (MITACS). BIRS is a truly international venture.

Funding for BIRS has now been secured by the Natural Science and Engineering Research Council of Canada (NSERC), the US National Science Foundation (NSF) and the Alberta Science Research Authority (ASRA).



The first BIRS Scientific Director is **Robert V. Moody** from University of Alberta.

BIRS will pursue an extremely broad program. It will embrace all aspects of the mathematical and statistical sciences, from the most fundamental work on the great problems of algebra, number theory, geometry and analysis to modern pure and applied mathematics, theoretical and applied statistics, financial and industrial mathematics, the mathematics of information technology and computer science, and bio-mathematics.

The initial operation of BIRS will be for forty weeks a year beginning in the Spring of 2003. The main mode will be five-day workshops ("Oberwolfach-Luminy mode"), but there is also provision for two or three-day events suitable for promoting industry-academic collaborations, for "Research in Teams", and for focused research groups to live and to do research together ("Aspen mode") in a non-workshop/non-conference style setting at the BIRS Facility for periods of 2 to 4 weeks.

Applications will be selected on a competitive international basis, by a rotating Scientific Panel of experts from the breadth of the mathematical sciences.

A Long-desired Facility

One of the most successful mathematical institutes in the world is the Mathematisches Forschungsinstitut in Germany. Nestled in the small village of Oberwolfach in the Black Forest, the MFO holds weekly workshops year-round which attract the finest mathematical scientists in the world. France followed suit in the eighties by establishing a similar center at Luminy in southern France. Oberwolfach and Luminy are international treasures, but it is not hard to see that it is the European mathematical community that is the main beneficiary.

It has long been a dream to have a North American counterpart, worthy of the enormous strengths of the mathematical sciences on this continent. This is what the Banff Station will be. The research facilities that BIRS will offer, such as lecture rooms, break-out rooms, high-speed internet connectivity for effective communication and interaction, are also available at universities and institutes, but the Station offers several additional elements. The crucial features that will make the International Research Station a premier place for research and innovation are:

- The quality and timeliness of the programs, guaranteed by the high standard of the Scientific Advisory Board;
- The breadth of coverage of the mathematical sciences and their applications;
- The beautiful and secluded setting;
- The intensity of interaction provided by a facility in which all participants live, work, and eat together;

The Scientific Advisory Board

- Robert V. Moody (Chair), **Lie Theory and Mathematical Physics**, University of Alberta
- James Arthur, **Representation Theory**, University of Toronto
- Jennifer Chayes, **Complexity theory and Statistical Mechanics**, Microsoft Research
- Richard Cleve, **Quantum Computing**, University of Calgary
- Henri Darmon, **Number Theory**, McGill University
- Ken Davidson, **Operator Theory**, University of Waterloo
- David Gross, **Quantum Field Theory and String Theory**, University of California, Santa Barbara
- Peter Guttorp, **Environmental Statistics**, University of Washington
- Craig Huneke, **Algebra**, University of Kansas
- Jacques Hurtubise, **Geometry and Mathematical Physics**, McGill University
- Nancy Kopell, **PDE and Applied Mathematics**, Boston University
- Mark Lewis, **Mathematical Biology and Ecology**, University of Alberta
- László Lovász, **Combinatorial Optimization, algorithms and complexity**, Microsoft Research
- Jitendra Malik, **Computer Vision**, University of California, Berkeley
- Dusa McDuff, **Topology and Symplectic Geometry**, SUNY, Stony Brook
- David Mumford, **Machine and Natural Intelligence**, Brown University
- Robert Myers, **Superstring Theory and Quantum Gravity**, McGill University and Perimeter Institute
- Edwin Perkins, **Probability Theory**, University of British Columbia
- Nicholas Pippenger, **Computer Science**, University of British Columbia
- Ian Putnam, **Dynamics & Operator Algebras**, University of Victoria
- Nancy Reid, **Statistics**, University of Toronto
- Gang Tian, **Geometry**, Massachusetts Institute of Technology
- Robert Tibshirani, **Data Mining and Computational Statistics**, Stanford University
- Margaret Wright, **Algorithmic Optimization**, AT & T Bell labs
- David Eisenbud, Director, MSRI
- Nassif Ghoussoub, Director, PIMS
- Arvind Gupta, Program leader, MITACS

- The ready-made infrastructure which will make it easy to organize smoothly-running meetings and allow the scientific organizers to concentrate on the science.

Vision of the Station

BIRS is to be a center for scientific interaction, a place where promising ideas develop, where lines of thought that appear unrelated converge. The sources of inspiration should come from many sorts of mathematics (Pure, Applied, Computational and Conceptual), different motivations (Intellectually driven or industrially motivated). People interested in similar problems will unite their potentials and join their efforts in order to work on common research projects.

A Model that Complements Institutes' Activities

The new Research Station will complement, not compete with present institutes in Canada and the United States.

The primary mode of operation of these institutes is long (3, 6, or even 12 month) thematic programs with satellite conferences and workshops. This means in-depth years devoted to a relatively small set of topics. In this, they have been wonderfully successful, providing outstanding environments for extended research collaborations, and being the catalysts for major and sustained advances of the fields in question.

In contrast, the Banff Research Station will provide a setting for relatively short but intense, easily organized research and innovation meetings, each year covering a broad range of the mathematical sciences, and capable of responding quickly to new and exciting developments.

A Cost-Effective Research Facility

BIRS will provide a highly cost-effective means of supporting research and training in the mathematical sciences. By securing dedicated space for long term use, and putting into place a trained staff to organize such events, the partners can achieve an economy of scale of large magnitude.

This will allow BIRS to run events for considerably less cost than the typical "hotel plus per diem" costs elsewhere. Such savings and the resources obtained by pooling the resources of several organizations, 2 federal governments and 2 provincial governments (BC and Alberta), allow BIRS to greatly multiply the new opportunities for researchers.

A Place Where Mathematics Will Interact with Other Areas of Culture

The Banff Centre is internationally recognized as a place of high culture. Every year its programs in music and sound, the written, visual and performing arts, leadership and management, and mountain culture draw in many hundreds of artists, students, and intellectual leaders from around the world. The Centre already includes a full-scale television production facility and a unit that focuses on computers in art. The introduction of BIRS, with its stream of incredibly creative and imaginative people, into this rich and fertile environment will provide opportunities for unique synergies. Both the Banff Centre and the BIRS are excited about exploring the possibilities. It is easy to imagine activities around 3D-computer graphics, the mathematics involved in archiving art (the recent destruction in Afghanistan serve to highlight the importance of this), the use of fractals and other mathematical structures in virtual reality, the mathematics in the biology and ecosystems of mountain environments, the inclusion of parts of risk management and complexity in the connection with the management programs, or the study of mathematics in architecture. There are also possibilities for dissemination of mathematical culture to a wider community and the promotion of mathematical/scientific writing for the lay public, both of which are desperately needed to heal the widening gap between the practitioners and the users of modern science and technology.

A Highly Attractive Destination

As a World Heritage Site and a place of immense natural beauty, Banff will provide immediate recognition and high profile to the Research Station, ensuring that it will be an attractive destination for the best researchers from around the world.

Provincial and Industrial Support for Research

BIRS has secured a significant level of financial support from the government of the Province of Alberta, which stands to benefit directly from this new, high-profile research centre within its borders. This support will be both direct, in the forms of a grant for operating costs of the centre, as well as indirect, in the form of funds supplied to the Banff Centre for necessary renovations to accommodate the activities of BIRS. These, as well as the expected support from the industrial partners constitute new resources to support mathematical research and its applications.

Ensuring High Calibre Research

Every year, an international call for proposals will be made, soliciting applications for workshops and organizers from every field of the mathematical sciences and its applications. A call for proposals for the 2003 program year has been made in April 2001 with an October 30, 2001 deadline. The BIRS Scientific Advisory Board will meet early December 2001 to make the final recommendations for the 2003 cycle. Proposals will be accompanied by a summary of the important developments of the field in question and a preliminary list of possible participants.

A subset of some 10 members of the BIRS Scientific Advisory Board will serve as a *Steering Committee*. The Steering Committee is responsible for the Scientific Program of the Station. It will accept the recommendations of the Scientific Advisory Board and will schedule and coordinate the successful proposals.

Modes of Operation

Five-day Workshops

The fundamental mode of BIRS is the Five-day Workshop. These will run from Sunday A.M. through to Thursday P.M. with Saturday night arrival, in order to get a Saturday night stay over on airline flights. Each workshop is devoted to one specific area of high research interest. About 40 expert-participants from around the world are invited to attend. The objective is to exchange the latest advances in the field and to provide an environment which fosters new collaborations and new ideas, and which provides a forum for lively and vigorous discussion for the latest theories and proposals.

The five-day workshop mode will also include industrial case study and problem solving workshops, an extension of the highly successful PIMS events.

Each workshop will have at least two organizers, normally including at least one from a Canadian institution and one from an American institution. They should be internationally respected experts in the area of the workshop, with broad scientific culture and connections. Their job is to form the list of invitations, which must be approved by the Scientific Director, and to run the program during the workshop.

Within the five-day format, two half-workshops may also run side-by-side. This may be especially appropriate for newly emerging fields, for more narrowly focused groups, or to fit in an exciting development.

For workshops in some disciplines where participants cannot easily leave their jobs or laboratories for more than a few days, a two or three-day format will be more suitable.

Two-day Workshops

The normal scheduling of the five-day workshops will leave 2 day periods open (namely Friday and Saturday) that may be used for a variety of special events:

- Special workshops to respond to unexpected new developments or new opportunities.
- Industry/university round table workshops.
- Weekend seminars and mini-conferences.
- Special interactions with other cultural or intellectual activities of the Banff Centre.

Research in Teams

In addition to its on-going workshops, the Station may host teams of two to four researchers for periods of two to four weeks. This *Research in Teams* program will offer individuals from different institutions who are collaborating together, the location and freedom from distraction to concentrate on their research or to finish major projects.

BIRS plans to keep several of its rooms available for the accommodation and activities of such Research in Teams. The RIT program will accept proposals and make decisions on them on a competitive basis through its Scientific Board. We would hope to have 1 or 2 RIT groups working most of the time.

Focused Research Groups

There will be possibilities to have research collaborative groups in residence together for longer stays (Aspen mode) and some with other formats. A typical configuration might be groups of 10 to 15 mathematicians each, up to 8 of them being in residence at BIRS for 2 to 4 weeks. This would provide a good venue for collaborative work for teams of mathematical researchers like those identified and supported by NSF's Focused Research Groups program and NSERC's Collaborative Research Opportunities program.

Summer Schools

BIRS will run some longer events (10-12 days) in the form of (normally summer) schools.

Thematic Summer Schools: These summer schools will continue the tradition already established (at Banff) of starting an Institute's thematic program with a 2-week program at the

Banff Station. The goal is to prepare graduate students, postdoctoral fellows and non-experts for the high level material of the thematic programs.

Graduate Camps: The Station provides an ideal setting for graduate summer camps. These can be introductory to classical topics of mathematics like the upcoming Commutative Algebra program at MSRI or to emerging areas of the mathematical sciences and their applications like MSRI's summer graduate program on Signal Processing or PIMS annual graduate industrial modeling Camps.

Industrial Activities

The Industrial mathematics component will be initially coordinated by the director of the *Mathematics of Information Technology and Complex Systems Network of Centres of Excellence* (MITACS). MITACS is sponsored by a large consortium of companies interested in partnering with Universities and government, and its participation ensures a strong industrial and cross-disciplinary basis.

BIRS will provide the ideal setting for a myriad of industrial activities in the mathematical sciences. While these activities will often follow the same format as the other scientific activities, the focus will be on applied and industrial mathematics with participation from graduate students, postdocs, and academic and industrial scientists.

Training of Highly Qualified Personnel

The sustenance of science and technology depends on capturing the minds and enthusiasm of young people and offering them the training to become future researchers. Both PIMS and MSRI take these responsibilities seriously. For this reason the International Research Station will make opportunities for programs devoted to education in the mathematical sciences.

Summer Mathematics Camps

Both in Canada and the US there are summer mathematics camps for students of junior/senior high schools. Offering a mix of study, training, competition, recreation, and comradeship. These programs promote enthusiasm for the world of sciences and mathematics. BIRS is a good place for such activities (one or two weeks at a time) and the Station will endeavour to attract such events and similar ones from across North America and internationally too (e.g. the International Mathematical Olympiads, and the training camps for them).

Teacher Training

Beyond all else, the elementary school and high school teachers are the ones whom we must rely on for future researchers. The present environment is one in which mathematics/science teachers in the schools need all the help they can get, and professional mathematical scientists must make the effort to engage in the process. The Research Station will cooperate and expand upon the outreach efforts of the institutes and the professional societies towards mathematical education.

Graduate and Senior Undergraduate Summer Camps

There will be special emphasis on graduate and senior undergraduate summer schools. These can be introductory to emerging areas of the mathematical sciences and their applications, or in preparation for the institutes own thematic programs. The Station will offer an ideal setting for these events which are at the core of the mission of each of the partner institutes.

Communication and Dissemination

Not everyone who should be, or would like to be, at the BIRS workshops will be able to be there. In order to disseminate its activities to

the outside world, BIRS will videotape a number of the prominent seminars from each workshop and quickly prepare these materials for remote access via video streaming (accessible from the PIMS and MSRI webpages). A full time IT person, part of whose responsibilities is to manage the videos side of things, will be employed by the Station. In addition, BIRS will keep permanent record of its activities by requesting that each workshop provide a 10-15 page scientific paper that surveys the important developments in the field as represented by the activities and participants of the workshop. These will uniformly edited and appear as yearly bound volumes.

Management Structure of BIRS

The Banff International Research Station will have a **Scientific Director** who is appointed for a renewable 3 years term by the Board of directors of PIMS at the recommendation of the BIRS Executive Committee (see below) after consultation with the sitting members of the Scientific Advisory Board.

The Executive Committee of BIRS

This committee is responsible, and has the ultimate authority, for overseeing and coordinating the whole operation of the Station. It consists of the PIMS Director (Chair), the MSRI Director and the BIRS Scientific Director. The committee will report to the Boards of PIMS (resp., MSRI) through the director of PIMS (resp., MSRI). Its responsibilities are the overall planning of the activities and direction of BIRS, coordinating all aspects of the collaborative effort between the Canadian and US partners, maintaining and finding new funding opportunities for BIRS, as well as coordinating the process of selecting and recommending to the PIMS and MSRI Boards, the membership of the Scientific Advisory Board.

The Scientific Advisory Board and Its Steering Committee

The research and intellectual side of the BIRS program is handled by the **Scientific Advisory Board** of BIRS which is comprised of up to 26 members representing a broad and expert coverage of the Mathematical Sciences. The BIRS Scientific Advisory Board is chaired by the BIRS Scientific Director and will include the directors of PIMS, MSRI and MITACS. It will also have at least 8 members from Canadian institutions and another 8 from US institutions. Appointments are normally for a 3-year term. This board will be responsible for soliciting and ranking proposals for the Station.

The Scientific Advisory Board will have a **Steering Committee**, also chaired by the BIRS Scientific Director, which will make the final selection and schedule the conferences. It will consist of the BIRS Executive Committee as well as seven members of the Scientific Advisory Board. The membership will cover a broad range of expertise as well as the scientific interests of all major users.

Administrative Management of BIRS

The Pacific Institute of the Mathematical Sciences will assume the responsibility for the administrative management of BIRS, including the appointment of a managing director who will oversee day-to-day operation of the Station. The first Managing Director will be Professor Michael Lamoureux of the Department of Mathematics and Statistics at the University of Calgary.

Submissions to BIRS for 2003

118 proposals from all over the world were received by the BIRS Scientific Advisory Board as of October 30, 2001. Only forty of them will be selected for the inaugural year in 2003.

- **Conference on algebraic K-theory**
  Organizers: Eric Friedlander, Dan Grayson, Rick Jardine, Manfred Kolster

- **Noncommutative Geometry**
  Organizers: Joachim Cuntz, George Elliott, Masoud Khalkhali
- **The Geometry, Dynamics and Control of Nonholonomic Mechanics Systems**
  Organizers: Jerrold E. Marsden, Jedrzej Sniatycki
- **POLYTOPES: abstract, convex and computational**
  Organizers: T.Bisztriczky, D. Bremner, E.Schulte
- **Calabi–Yau Varieties and Mirror Symmetry**
  Organizers: Victor Batyrev, Shinobu Hosono, James D. Lewis, Bong H. Lian, S.-T. Yau, Noriko Yui, Don Zagier
- **Point processes–theory and applications**
  Organizers: Peter Guttorp, Bruce Smith
- **Mathematical Epidemiology**
  Organizers: Herbert Hethcote, Pauline van den Driessche
- **Challenges in Symbolic Mathematical Computation**
  Organizers: Wolfram Decker, Keith O. Geddes, Erich Kaltofen
- **Commutative Algebra and Geometry**
  Organizers: Mark Green, Jrgen Herzog, Bernd Sturmfels
- **Statistical mechanics of polymer models**
  Organizers: Christine E. Soteros, De Witt Sumners, Stuart G Whittington
- **Integration on arc spaces, elliptic genus and chiral de Rham complex**
  Organizers: Mikhail Kapranov, Anatoly Libgober, Francois Loeser
- **Functional Differential Equations**
  Organizers: John Mallet-Paret, Hans-Otto Walther, Jianhong Wu
- **Monge-Ampère type equations and applications**
  Organizers: Alice Chang, Pengfei Guan, Paul Yang
- **Topology in and around dimension three**
  Organizers: Steve Boyer, Martin Scharlemann, Abigail Thompson
- **Aperiodic Order: Dynamical Systems, Combinatorics, and Operators**
  Organizers: Michael Baake, David Damanik, Boris Solomyak
- **Stochastic processes in evolutionary and disease genetics**
  Organizers: Ellen Baake, Warren Ewens, Bruce Rannala
- **Applications of Differential Geometry and Group Theory to the Theory of Defective Material Bodies**
  Organizers: Marek Elzanowski, Marcelo Epstein
- **Conformal Geometry**
  Organizers: Thomas Branson , Michael Eastwood, McKenzie Wang
- **Free Probability Theory**
  Organizers: Alexandru Nica, Roland Speicher, Dan Voiculescu
- **Solitons II**
  Organizers: A. S. Goldhaber, R. B. MacKenzie , M. B. Paranjape
- **Stochastic Dynamics of Climate and Geophysical Flows**
  Organizers: Jinqiao Duan, Greg Holloway, Richard Kleeman, Adam Monahan
- **Galois Module Structure**
  Organizers: Ted Chinburg, Manfred Kolster, Alfred Weiss
- **Quadratic forms, algebraic groups, and Galois cohomology**
  Organizers: R.Elman, A.S.Merkurjev, J.Minac, C.Riehm
- **Geometric Evolution Equations**
  Organizers: Bennett Chow, Klaus Ecker, Pengfei Guan, Christine Guenther
- **Scattering and Inverse Scattering**
  Organizers: Richard Froese, Gunther Uhlmann
- **Recent developments in Superstring Theory**
  Organizers: Jim Bryan, Steve Giddings, Mikhail Kapranov, Andreas Karch, Amanda W. Peet, Moshe Rozali, Gordon W. Semenoff, Mark Van Raamsdonk, K. Viswanathan
- **Symmetry and Bifurcation in Biology**
  Organizers: Martin Golubitsky, William F. Langford, Ian Stewart
- **Compact Moduli Spaces**
  Organizers: James Carrell, Brendan Hassett, Sandor Kovacs
- **Interactions between model theory, diophantine geometry and real analytic geometry**
  Organizers: Zoe Chatzidakis, Bradd Hart, Deirdre Haskell, Anand Pillay, Alex Wilkie
- **Explicit Methods in Number Theory**
  Organizers: P. Borwein, H.W. Lenstra Jr., P. Stevenhagen, H. Williams
- **The many aspects of Mahler's measure**
  Organizers: David Boyd, Doug Lind, Fernando Rodriguez Villegas, Christopher Deninger
- **Nonlinear Transport PDEs with Multiple Scales**
  Organizers: Reinhard Illner, Shi Jin, Peter Markowich
- **Mathematics of Non-Relativistic Effective Theories**
  Organizers: A. Czarnecki, U. van Kolck, G. P. Lepage, K. Melnikov
- **Recent advances in algebraic and enumerative combinatorics**

Organizers: Sara Billey, Ian Goulden, Curtis Greene, David Jackson, Richard Stanley

- **Mathematical Biology: From molecules to ecosystems;The legacy of Lee Segel**
  Organizers: Leah Keshet, Simon A. Levin, Mark Lewis
- **Localization Behavior in Reaction-Diffusion Systems and Applications to the Natural Sciences**
  Organizers: A. Bernoff, P. Fife, T. Hillen, M. J. Ward, J. Wei
- **Stochastic partial differential equations**
  Organizers: Martin Barlow, Krzysztof Burdzy, Robert Dalang, Edwin Perkins
- **Current trends in arithmetic geometry and number theory**
  Organizers: Imin Chen, Brian Conrad, Eyal Goren, Adrian Iovita, Chris Skinner, Nike Vatsal
- **Number Theoretic Methods in Harmonic Analysis**
  Organizers: Alex Iosevich, Izabella Laba, Michael T. Lacey
- **Diophantine approximation and analytic number theory**
  Organizers: Michael Bennett, John Friedlander, Andrew Granville, Greg Martin, Cameron Stewart, Trevor Wooley
- **Interaction of Finite Dimensional Algebras with other areas of Mathematics**
  Organizers: Vlastimil Dlab, C.M. Ringel, L.L. Scott
- **Mathematical Models for Biological Invasions**
  Organizers: Mark Lewis, Mark Kot, Pauline van den Driessche
- **The interaction of finite type and Gromov-Witten invariants**
  Organizers: Jim Bryan, David Auckly
- **New Horizons in String Cosmology**
  Organizers: Robert Brandenberger, James Cline, Brian Greene, Paul Steinhardt
- **Perspectives in Differential Geometry**
  Organizers: Richard Schoen, Gang Tian, Jingyi Chen
- **Perspectives on variational methods and their applications**
  Organizers: Nassif Ghoussoub, Paul Rabinowitz
- **Computational Techniques for Moving Interfaces**
  Organizers: Randy LeVeque, Robert D. Russell, Steven Ruuth
- **Nonlinear Dynamics of Optical Communication**
  Organizers: Alan Champneys, Christopher Jones, J. Nathan Kutz, Keith Promislow
- **Computational Fuel Cell Dynamics-II**
  Organizers: John Kenna, Trung Van Nguyen, Keith Promislow, Brian Wetton
- **Matrix factorizations**
  Organizers: Charles R. Johnson, Steve Kirkland, Dale Olesky, Michael Tsatsomeros, Pauline van den Driessche
- **Workshop on Group theory and Numerical Analysis**
  Organizers: A. Iserles, D. Levi, P. Olver, R. Quispel, Pavel Winternitz
- **Valuation Theory and its Applications**
  Organizers: Steven Dale Cutkosky, Franz-Viktor Kuhlmann, Salma Kuhlmann
- **BANFF Credit Risk Conference 2003**
  Organizers: Tom Astebro, Peter Beling, David Hand, Robert Oliver, Lyn Thomas
- **Structural and Probabilistic Approaches to Graph Colouring**
  Organizers: Bruce Reed, Paul Seymour
- **Optimal Transportation and Nonlinear Dynamics**
  Organizers: L. Caffarelli, M.J.P. Cullen, L.C. Evans, M. Feldman, W. Gangbo
- **Combinatorial Hopf Algebras and Problems in Geometry, Representation Theory and Convex Polytopes**
  Organizers: Nantel Bergeron, Louis Billera, Frank Sottile
- **Regularization in Statistics**
  Organizers: Ivan Mizera, Roger Koenker
- **Workshop on Orientation and Shape Analysis**
  Organizers: Fred Bookstein, Theodore Chang, Duncan Murdoch, Christopher Small
- **Workshop on Complex Neumann Estimates and Complex and Cauchy-Riemann Geometries**
  Organizers: John Bland, Yum-Tong Siu
- **Convex Geometric Analysis**
  Organizers: Alexander Koldobsky, Vitali Milman, Nicole Tomczak-Jaegermann
- **A creative writing workshop at BIRS**
  Organizers: Marjorie Senechal, Chandler Davis
- **Functional Integro-Differential and Differential-Algebraic Equations: Numerical Analysis, Simulation and Applications**
  Organizers: H. Brunner, T.L. Herdman, J.A. Burns, E.M. Cliff, J.T. Borggaard, H.T. Banks, M.D. Gunzburger
- **Celestial Mechanics**
  Organizers: Florin Diacu
- **Locally Finite Lie Algebras and Related Topics**
  Organizers: Yuri Bahturin, Georgia Benkart, Ivan Penkov, Helmut Strade, Alexander Zalesskii
- **Applicable Harmonic Analysis**
  Organizers: Rong-Qing Jia, Sherman D. Riemen-

schneider, M. Victor Wickerhauser

- **Geometric Optimization Problems**
  Organizers: Stephanie B. Alexander, Maung Min-Oo, John M. Sullivan
- **Quantum Mechanics on the Large Scale**
  Organizers: P.C.E. Stamp, G.A. Sawatzky, A.J. Leggett, T. Havel, S.Popescu, R. Gill
- **Spectral Theory of Ordinary Differential Operators**
  Organizers: P.A. Binding, P. J. Browne, D.B. Hinton, I.W. Knowles
- **Syzygies and Hilbert Functions**
  Organizers: Irena Peeva, Mike Stillman
- **Structured matrices and Fast Algorithms in Mathematics, Computer Science and Engineering**
  Organizers: Peter Lancaster, Vadim Olshevsky, Paul Van Dooren
- **Theory and Numerics of Matrix Eigenvalue Problems**
  Organizers: J. W. Demmel, N. J. Higham, P. Lancaster
- **Resolution of singularities, factorization of Vibrational mappings, and toroidal geometry**
  Organizers: Dan Abramovich, Edward Bierstone, Steven Dale Cutkosky, Kenji Matsuki, Pierre Milman, Jarosław Włodarczyk
- **Analysis and Geometric Measure Theory**
  Organizers: Ana Granados, Herv Pajot, Tatiana Toro
- **Nonlinear dynamics of thin films and fluid interfaces**
  Organizers: A. L. Bertozzi, R. P. Behringer, T. P. Witelski, R. Almgren, M. C. Pugh, M. Shearer
- **Modeling Protein Flexibility and Folding with Rigidity**
  Organizers: Walter Whiteley, Michael F. Thorpe, Leslie A. Kuhn
- **Current trends in representation theory of finite groups**
  Organizers: Jonathan L. Alperin, Michel Broue, Gerald Cliff
- **Differential invariants and invariant differential equations**
  Organizers: Niky Kamran, Peter J. Olver
- **Model Reduction Problems and Matrix Methods**
  Organizers: Gene Golub, Anne Greenbaum, Jim Varah
- **Nonsmooth Analysis in Action - Theory, applications, and computation**
  Organizers: J.M. Borwein, A.S. Lewis, J.V. Burke, P.D. Loewen,
- **The third western Canada workshop on Designs, Codes and Cryptography**
  Organizers: Doug Stinson, Richard A. Mollin, Vladimir Tonchev, Hadi Kharaghani, Wolf Holzmann
- **The Present and Future of Computational Cosmology**
  Organizers: Arif Babul, Julio Navarro, Thomas R. Quinn, Neal Katz
- **The structure of amenable C*-algebras and dynamical systems**
  Organizers: George A. Elliott, Guihua Gong, Eberhard Kirchberg
- **Linbox Template Library Workshop: Exact Black Box Linear Algebra**
  Organizers: Wayne Eberly, B. David Saunders
- **p-adic variation of motives**
  Organizers: Kevin Buzzard, Robert Coleman, Matthew Emerton, Eyal Goren
- **Constraint programming, belief revision, and combinatorial optimization**
  Organizers: Randy Goebel
- **Order, Disorder, and Transport: Recent Advances in Schrodinger Operator Theory**
  Organizers: Richard G. Froese, Peter D. Hislop
- **Numerical Differential Equations: Their Past, Current and Future**
  Organizers: Zhangxin (John) Chen, Jim Douglas, Richard E. Ewing, Yanping Lin, Lawrence Shampine
- **Defects and their Dynamics**
  Organizers: Peter W. Bates, Lia Bronsard, Changfeng Gui
- **Pluripotential Theory, Polynomial Inequalities and Applications**
  Organizers: L. Bos, A. Brudnyi, B.A. Taylor
- **Orthogonal Polynomials; Interdisciplinary Aspects**
  Organizers: Lance Littlejohn, David Sattinger, Jacek Szmigielski
- **Coordinate methods in nonselfadjoint operator algebras**
  Organizers: Allan Donsig, Michael Lamoureux
- **Groupoids and Stacks in Physics and Geometry**
  Organizers: Kai Behrend, Ping Xu
- **Spectral methods and radial basis functions, computation and applications**
  Organizers: Bengt Fornberg, Bernie Shizgal, Manfred Trummer
- **Operator Algebras and Dynamical Systems**
  Organizers: Michael Boyle, Thierry Giordano, Ian Putnam
- **Grand Challenges for Automating Mathematics**
  Organizers: Simon Colton, Robert Holte, Toby Walsh, Hugh Williams
- **Searching with Mobile Agents**

Organizers: Evangelos Kranakis, Nicola Santoro, Danny Krizanc

- **Kaehler Geometry**
  Organizers: E. Calabi, Xiuxiong Chen, McKenzie Wang
- **Quantum Algorithms and Complexity Theory**
  Organizers: Richard Cleve, Umesh Vazirani, John Watrous
- **Galois groups and fundamental groups**
  Organizers: David Harbater, Ernst Kani, Jan Minac, Florian Pop
- **Physical Geometry**
  Organizers: Greg Galloway, Kristin Schleich, Donald M. Witt
- **Image and Video Coding**
  Organizers: Rabab Ward
- **Self-Stabilizing Distributed Systems**
  Organizers: Anish Arora, Faith Fich, Maurice Herlihy, Ted Herman, Lisa Higham
- **Symmetries, Conservation Laws, Integrability in Mathematical Physics**
  Organizers: George Bluman, Wen-Xiu Ma, Stephen C. Anco, Thomas Wolf
- **The Mathematical Foundations of Finance**
  Organizers: Paul Glasserman, Lane P. Hughston, T.R. Hurd, Thaleia Zariphopoulou
- **Topological aspects of real algebraic geometry**
  Organizers: S. Akbulut, G. Mikhalkin, B. Shapiro, F. Sottile, O. Viro
- **Fluid Motion Driven by Immersed Structures: Analysis, Computation, and Applications**
  Organizers: Ricardo Cortez, John Stockie
- **Joint Dynamics**
  Organizers: Douglas Lind, Daniel Rudolph, Klaus Schmidt, Boris Solomyak
- **Computation and dynamics in genetic and metabolic networks**
  Organizers: Leon Glass, John Reinitz, Erik Winfree
- **Problems in Discrete Probability**
  Organizers: Robin Pemantle, Yuval Peres, Peter Winkler
- **Regularity for hypergraphs**
  Organizers: P. Haxell, V. Rodl, J. Skokan, L. Thoma
- **Invariant Manifolds for Stochastic Partial Differential Equations**
  Organizers: Tomas Caraballo, Jinqiao Duan, Kening Lu, Bjorn Schmalfuss
- **Topological orbit equivalence for dynamical systems**
  Organizers: Thierry Giordano, Christian Skau, Ian Putnam
- **Variance of quasi-coherent torsion Cousin complexes**
  Organizers: Joseph Lipman, Suresh Nayak, Pramathanath Sastry
- **Representation theory of linearly compact Lie superalgebras and the Standard Model**
  Organizers: Victor Kac, Alexey Rudakov
- **Local uniformization and resolution of singularities**
  Organizers: Steven Dale Cutkosky, Franz-Viktor Kuhlmann
- **Arithmetic of fundamental groups**
  Organizers: David Harbater, Florian Pop
- **2003 Summer IMO Training Camp**
  Organizers: Bill Sands
- **Topology and Analysis: Complementary approaches to the Baum-Connes and Novikov conjectures**
  Organizers: Nigel Higson, Jerry Kaminker, Shmuel Weinberger

The NSERC site visit team (from left to right): Alan Mackworth (Director, Laboratory for Computational Intelligence, UBC), Arvind Gupta (Director, MITACS), Joe Buhler (Deputy Director, MSRI), Robert Moody (Scientific Director, BIRS), David Gross (Director, ITP), Nassif Ghoussoub (Director, PIMS) and David Eisenbud (Director, MSRI). Missing from photo: Michael Lamoureux (Managing Director, BIRS) and Steve Halperin (Dean of Science, Univ. of Maryland).