



Banff International Research Station for Mathematical Innovation and Discovery



Annual Report

2012-2013



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

With two building at its disposal at The Banff Centre in the heart of the Albertan Rockies, BIRS operates 48 weeks per year, playing host to workshops and research groups granted access to the Station through a rigorous scientific review process. Overall it receives over 2000 visits per year from reserachers from around the world and has witnessed countless new breakthroughs as well as long-awaited conclusions in research.

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Vancouver office (office of the Scientific Director)

Banff International Research Station
 University of British Columbia
 4176-2207 Main Mall
 Vancouver BC V6T 1Z4
 Canada

Tel: 604-822-5213
 Fax: 604-822-0883

Banff office (research station)

Banff International Research Station
 c/o The Banff Centre
 Corbett Hall Suite 5110
 107 Tunnel Mountain Drive
 Box 1020 Stn 48
 Banff AB T1L 1H5
 Canada

Tel: 403-763-6999
 Fax: 403-763-6990

Scientific Director: Nassif Ghossoub, PhD
Administrator: Danny Fan (Vancouver)
Station Manager: Brenda Williams (Banff)

www.birs.ca

BIRS gratefully acknowledges the support of:



Partner universities:



Message *from the Chair and the Scientific Director*



Mr. Doug Mitchell
Chair, BIRS Board of Directors

While I have been involved over the years with community service, through various non-profit organizations and public companies, I have to admit that I was quite surprised and intrigued when Nassif, a fellow governor of The University of British Columbia, asked me whether I was willing to chair the Board of Directors of BIRS.

I have been proactive in my contributions to the Canadian sports and business communities, but advanced research in the mathematical sciences was far from my interests, expertise and experience, unless one classifies analytical thinking and the search for proofs and evidence in law and jurisprudence as another mathematical exercise. Yet, it didn't take long for me to agree to serve. After all, this remarkably lean enterprise plays a significant role in putting my province, Alberta, and my country, Canada, on the world's scientific map.

The concept of BIRS also meshes with one of my own life long interests, which is to create opportunities for international business executives, academics, government officials and other thought leaders to meet, discuss and debate crucial global economic issues. I founded and still co-chair the Global Business Forum, an independent, not-for-profit corporation that each year, provides an opportunity for 200 prominent personalities from all over the world to do just that. And what drives BIRS, but a very similar ethos of providing opportunities here in gorgeous Banff, to thousands of scientists from all over the world to discuss, debate and hopefully resolve complex and important problems of mathematical sciences, technology and innovation?

One of my first tasks at BIRS was to initiate an international review of the current director of BIRS. I was happy (and reassured) that all Canadian, US and Mexican scientists who were interviewed about Nassif's leadership enthusiastically recommended that the Board ask him to stay on as director for another term. BIRS is currently looking for ways to further expand opportunities for the mathematical sciences and we are extremely fortunate that Nassif has agreed to continue to lead us into this next phase.

In 2012, Karen Prentice completed a three-year term as chair of the Board of Directors of BIRS. During her tenure as chair, Karen supervised the incorporation of the research station, consolidated its governance structure and firmed up its legal framework. She successfully led the renewal of the Station's funding for five years from four partnering governments



Dr. Nassif Ghoussoub
BIRS Scientific Director

(Canada, Alberta, US and Mexico) and oversaw the transfer of its lecturing facilities to the beautiful Trans Canada Pipeline Pavilion at The Banff Centre. The thousands of scientists who participate in BIRS activities every year will always be grateful for her selfless service and many contributions to the promotion of the mathematical sciences and their applications.

Doug Mitchell, the new chair of the Board of Directors of BIRS, is committed to supporting and promoting Canadian mathematical sciences through BIRS. This is destined to be a tremendous boon to the world's scientific community. Doug is a pillar of both the Canadian sports and business communities and has spent many years supporting non-profit organizations and public companies lucky enough to have him. And BIRS is now one of them. Thank you Doug.

In 2012, BIRS launched its new live video streaming and high quality recordings in order to fully automate the production, broadcasting and distribution of its lectures (See Page 12). The reaction of the world's scientific community has been overwhelmingly enthusiastic about this new capacity for dissemination. The BIRS Technology Manager, Brent Kearney, who should take all the credit for envisioning and installing this pioneering system, has been busy lately trying to help many sister institutions, acquire and implement similar systems.

Last but not least, our Mexican colleagues have been working hard to develop another supporting facility for BIRS in the state of Oaxaca, Mexico (See Page 11). BIRS — and eventually the world's scientific community — will forever be grateful to Juan Ramón de la Fuente, Elias Micha, Alberto Sanchez Lopez, José Antonio De la Peña, Carlos Arámburo, Onesimo Hernandez-Lerma, Maria Emilia Caballero, Daniel Juan and Javier Bracho for their great efforts in making this exciting initiative a reality. We are hoping to host the first expanded BIRS program at both Banff and Oaxaca as soon as 2015.



The Review Process

Ensuring High-Calibre Research

The Scientific Advisory Board

BIRS Board of Directors

Chair: Doug Mitchell
Borden Ladner Gervais LLP

Alejandro Adem
Director, PIMS

Javier Bracho
Director, Instituto de Matemáticas, UNAM

Robert Bryant
Director, MSRI

Rita Colwell
Chairman, Canon US Life Sciences, Inc.

Nassif Ghoussoub
Scientific Director, BIRS

Arvind Gupta
Scientific Director, MITACS

Juan Ramón de la Fuente
President, International Association of Universities

Karen Prentice
Alberta Securities Commission

Jacklyn Sturm
VP Finance, Intel Corporation

Nassif Ghoussoub, CHAIR

Non-linear Analysis, Partial Differential Equations

Fred Adler University of Utah

Mathematical Biology

Jim Berger Duke University

Statistics

Robert Brandenberger McGill

Theoretical Cosmology

Alex Brudnyi University of Calgary

Applied Mathematics

Jennifer Bryan University of British Columbia

Applied Statistics

Charmaine Dean Simon Fraser University

Statistics

Steve Evans University of California, Berkeley

Probability

Stephen E Fienberg Carnegie Mellon University

Statistics

Peter Glynn Stanford University

Discrete and Stochastic Systems in Management Science and Engineering

Timothy Gowers Cambridge University

Combinatorics

Vivek Goyal Massachusetts Institute of Technology

Sampling, Quantization, Magnetic Resonance Imaging, and Optical Imaging

Andrew Granville Université de Montréal

Number Theory

Sheila Hemami Cornell University

Electrical Engineering

Bill Johnson Texas A&M University

Geometric Functional Analysis

Valentine Kabanets Simon Fraser University

Computational Complexity

Yael Karshon University of Toronto

Symplectic Geometry

Elon Lindenstrauss The Hebrew University of Jerusalem

Ergodic Theory

Sujatha Ramdorai University of British Columbia

Algebraic K-theory, Algebraic Number Theory, Motives, Iwasawa Theory

Zinovy Reichstein University of British Columbia

Algebraic Geometry and Lie Theory

Dominik Schoetzau University of British Columbia

Computational Mathematics, Scientific Computation

Jose Antonio Seade Universidad Nacional Autonoma de Mexico) -

Singularity theory and complex geometry

Gordon Semenov University of British Columbia

Particle & Nuclear Physics, Theoretical Physics

Nizar Touzi École Polytechnique

Financial Mathematics

Alberto Verjovsky UNAM Mexico

Dynamical systems, geometric topology, theory of real and complex foliations

Cédric Villani Institut Henri Poincaré

Partial Differential Equations

Michael Vogelius Rutgers University

Applied Mathematics

Michael Ward University of British Columbia

Applied Analysis, Mathematical Modeling and Scientific Computation

Shing-Tung Yau Harvard University

Differential Geometry





BIRS Programs

BIRS opens itself to **2-Day Workshops** a few weekends every year. Such workshops are ideal for shorter scientific meetings, professional development programs, and academic-industrial partnership events.

The **5-Day Workshop** is the main program format at BIRS. Workshops run Monday through Friday. In 5-day workshops, participants, who are experts, come together to exchange the latest developments and ideas in their areas. BIRS thus seeks to foster new collaborations and new interdisciplinary interactions, and to provide a forum for vigorous research oriented exchanges. Workshops include both formal talks and considerable amounts of time for discussions in smaller groups.

The **Focused Research Groups** program offers teams of up to 8 researchers the opportunity to live and work at the BIRS facility for periods of 1 to 2 weeks, in order to concentrate on their research, or to finish major projects.

The **Research in Teams** program offers similar opportunities to groups of 2 to 4 researchers.

Summer Schools and **Training Camps**, typically a week long, are pedagogical by definition. They may be aimed at any level, from school-level students and teachers, through to undergraduate and graduate levels, or can be in preparation for Institute thematic programmes.



BIRS Research and Collaborations

BIRS Activities, April 1 2012 - March 31 2013



2-Day Workshops

- Mar 30 North West Functional Analysis Seminar
- Apr 27 Ted Lewis Workshop on SNAP Math Fairs in 2012
- May 25 Workshop on Robust Optimization
- Jun 22 Differential Schemes and Differential Cohomology
- Jul 13 Women's Workshop on Communications and Signal Processing
- Jul 20 Inductive Constructions in Rigidity Theory
- Jul 27 Theoretical and Applied Aspects of Nonnegative Matrices
- Aug 3 Math Kangaroo Contest
- Oct 26 G4G, Gathering for Gardner, Puzzles in the Classroom
- Nov 23 Early Years Spatial Reasoning: Learning and Teaching

Research in Teams

- Apr 29 Dialgebras, Leibniz Algebras, and Quasi-Jordan Algebras
- May 13 Isomorphisms and isometries of spaces of continuous functions
- May 20 Toric Boij-Söderberg theory
- May 27 A New Implementation of Fletcher's Exact Merit Function for Nonlinear Optimization
- Jun 10 Strong asymptotics for Cauchy biorthogonal polynomials
- Jul 22 Renormalization Group Methods for Polymer and Last Passage Percolation Models
- Aug 05 Models for minimal Cantor Z^2 systems
- Aug 12 Moduli spaces in conformal field theory and Teichmüller theory
- Sep 09 Random gradient models with degenerate potential
- Sep 23 Positive Semidefinite Zero Forcing and Applications
- Nov 4 Sarason Conjecture and the Composition of Paraproducts

Focused Research Groups

- Apr 22 Novel approaches to the finite simple groups
- May 06 Geometrization of smooth characters
- Jul 29 The d -bar method: Inverse scattering, nonlinear waves, and random matrices
- Aug 19 The p -adic Langlands program for non-split groups
- Aug 26 A t -Pieri rule for Hall-Littlewood P -functions and $QS(t)$ -functions
- Sep 02 The advent of Quark-Novae: Modeling a new paradigm in Nuclear Astrophysics
- Sep 16 Generalized Gauss maps and Farey statistics
- Oct 07 Supercharacters and Hopf Monoids
- Oct 21 Animal movement and Memory
- Dec 02 Spectral and asymptotic stability in nonlinear Dirac equations

"I consider the workshop to be a great success. The quantity and quality of young researchers and speakers was exceptional. More than half of speakers were young researchers and graduate students. The enthusiasm of the participants was evidenced by the frequent discussions and many questions asked after each talk. I feel that the experience that participants gained during the workshop will prove to be very valuable in their research career and will undoubtedly have a positive impact on the research activity in the area. I think, the idea to bring together people from different areas (Lie algebras and Torsors) was very fruitful and has led to several interesting collaborations already. I expect that these will grow into joint research projects and publications."

Kirill Zainoulline, University of Ottawa

"I found the workshop extremely interesting and productive. During the week I was there I completed one research paper (joint with two other participants), made substantial progress in another existing project, and began two more completely afresh, neither of which would have happened if I had not attended the workshop. Altogether this week was one of the best mathematical conferences I have attended in my career so far."

David Loeffler, Warwick University

"I have nothing but admiration and the highest esteem for the organization, the concept, and the way everything is so efficiently run. Friendly staff, a stimulating natural and built environment do everything to inspire creativity, to use a tag line of the Banff Centre. The research interactions, formal and informal, will have a lasting impact on many people's scientific research, including mine. The Banff Centre, and BIRS as part of it, is the modern-day version of the most splendid concept of "desert" that scholars and monks alike sought in medieval times, and that can also be found in some traditional universities, such as Oxford and Cambridge. It reminded me of the "Chartreuse" in France, where the monks retreated in a superb natural environment to devote themselves to their most beloved activities."

Geert Molenberghs, Belgium

Mathematics of Planet Earth

BIRS' offered a wide range of workshops in 2012-2013 ranging from quantum technology, to the detection and attribution of climate change, to tissue growth and morphogenesis and first nations math education. However, as we entered into 2013, a more prominent theme emerged. BIRS is proudly participating in the Mathematics of Planet Earth, a global initiative by research institutes, universities, and scientific societies who have designated the year 2013 as a special year for the Mathematics of Planet Earth.

What's math got to do with planet earth? The applications of mathematics to MPE problems are essentially infinite. As for the long-term problems in which mathematics will play a role, we mention the challenges of quantifying uncertainty in climate change, of constructing more accurate predictions of natural disasters including earthquakes, volcanoes, and tsunamis, of trying to adapt ecosystems to climate change, of devising sustainable economic models, and of contributing to the preservation of biodiversity.

In the 2012-2013 year, BIRS hosted a number of workshops in that contributed to this important project including:

- New Perspectives on the N-body Problem
- Probabilistic Approaches to Data Assimilation for Earth Systems
- Non-Gaussian Multivariate Statistical Models and their Applications
- Impact of Climate Change on Biological Invasions and Population Distributions

and in the remainder of 2013 will host:

- Water Waves: Computational Approaches for Complex Problems
- Uncovering Transport Barriers in Geophysical Flows
- Mathematical Modeling of Indigenous Populations Health
- The Role of Oceans in Climate Uncertainty
- Managing fire on populated forest landscapes
- Current Challenges for Mathematical Modelling of Cyclic Populations.

5-Day Workshops

- Apr 01 Stochastic Analysis and Stochastic Partial Differential Equations
- Apr 08 Open Dynamical Systems: Ergodic Theory, Probabilistic Methods and Applications
- Apr 15 Geometric Structures on Manifolds
- Apr 22 Composite Likelihood Methods
- Apr 29 Manifolds with Special Holonomy and their Calibrated Submanifolds and Connections
- May 06 Linking representation theory, singularity theory and non-commutative algebraic geometry
- May 13 Connections Between Regularized and Large-Eddy Simulation Methods for Turbulence
- May 20 Optimal Transportation and Differential Geometry
- May 27 Frontiers in the Detection and Attribution of Climate Change
- Jun 03 Arithmetic geometry of orthogonal and unitary Shimura varieties
- Jun 17 Descriptive Set Theory and Functional Analysis
- Jun 24 Eigenvalues/singular values and fast PDE algorithms: acceleration, conditioning, and stability
- Jul 01 Torsion in the homology of arithmetic groups: geometry, arithmetic, and computation
- Jul 08 Interactions between continuous and discrete holomorphic dynamical systems
- Jul 15 Rigidity Theory: Progress, Applications and Key Open Problems
- Jul 22 Tissue Growth and Morphogenesis: from Genetics to Mechanics and Back
- Jul 29 Conformal and CR geometry
- Aug 05 Recent trends in geometric and nonlinear analysis
- Aug 12 Syzygies in Algebraic Geometry, with an exploration of a connection with String Theory
- Aug 19 New Trends and Directions in Combinatorics
- Aug 26 The Geometry of Scattering Amplitudes
- Sep 02 Groups and Geometries
- Sep 09 Evolution equations of physics, fluids, and geometry: asymptotics and singularities
- Sep 16 Model reduction in continuum thermodynamics: Modeling, analysis and computation
- Sep 23 Integrable systems, growth processes and KPZ universality
- Sep 30 Lie algebras, torsors and cohomological invariants
- Oct 07 Graph Searching
- Oct 14 Topological data analysis and machine learning theory
- Oct 21 Recent Advances in Transversal and Helly-type Theorems in Geometry, Combinatorics and Topology
- Oct 28 New Trends in Noncommutative Algebra and Algebraic Geometry
- Nov 04 Spectral Analysis, Stability and Bifurcation in Modern Nonlinear Physical Systems
- Nov 11 Nonequilibrium Statistical Mechanics: Mathematical Understanding and Numerical Simulation
- Nov 18 First Nations Math Education
- Nov 25 Cohomological methods in geometric group theory
- Dec 02 String Theory and Generalized Geometries
- Dec 09 Thin Liquid Films and Fluid Interfaces: Models, Experiments and Applications
- Jan 13 New Perspectives on the SNS -body Problem
- Jan 20 Selective transport through biological and bio-mimetic nano-channels: mathematical modeling meets experiments
- Jan 27 Algebraic Geometry and Geometric Modeling
- Feb 03 Topological Phenomena in Quantum Dynamics and Disordered Systems
- Feb 10 Holography and Applied String Theory
- Feb 17 Probabilistic Approaches to Data Assimilation for Earth Systems
- Feb 24 Asymptotics of Large-Scale Interacting Networks
- Mar 03 Applications of Iwasawa Algebras
- Mar 10 Interplay of convex geometry and Banach space theory
- Mar 17 CosmoStat2013: Statistical challenges from large data sets in cosmology and particle physics
- Mar 24 Interactions of gauge theory with contact and symplectic topology in dimensions 3 and 4
- Mar 31 Partial differential equations in the social and life science: emergent challenges in modeling, analysis, and computations

"Every time I come to this place I love it more! During this particular meeting I could present a part of my recent research, and it was a good occasion to exchange opinions, ideas and impressions with other participants who are working on the same, or on similar, topics, in particular Vitali Milman, Liran Rotem, Artem Zvavitch and Dima Ryabogin. This exchange will influence for sure my future directions of research. Moreover I had the opportunity to work with Monika Ludwig, a participant from Vienna, on the research subject that I am liking most in this period, i.e. classification of valuations on function spaces. We had several fruitful discussions which helped us to enter a bit more in this topic, which is still almost unexplored. BIRS represents for me a place where I can devote myself entirely (or almost entirely) to do research, forgetting the rest of the world for one week!"

Andrea Colesanti, University of Florence

2012-2013 Selected Highlights

First Nations Math Education

Almost every year, BIRS hosts a workshop that is totally dedicated to First Nations Math and Science Education, and 2012 was no exception. Organized by Melania Alvarez (PIMS' BC Education Coordinator), Genevieve Fox (Fox Consulting), Sharon Friesen (Vice Dean, Faculty of Education, University of Calgary) and Cynthia Nicol (University of British Columbia), this workshop brought together Elders, mathematicians, math educators and teachers. The ultimate objective was to find ways to improve mathematics education among aboriginals, while at the same time acknowledging the importance of and preserving traditional culture.

The workshop contributed to the creation of resources that are sound, interesting and mathematically challenging, with a factual and rich cultural context, as well as making these resources available to various venues of instruction in order to supply a more balanced curriculum where aboriginal culture can take its rightful place.

BIRS Hosts Canada's 2012 IMO Dream Team

Every year, BIRS hosts a training camp for the team representing Canada at the International Mathematical Olympiad (IMO). Strengthening the problem solving skills of these mathematical athletes in preparation for the competition is obviously the main objective of this exercise, but the BIRS camp also provides an indispensable opportunity for them to bond before the competition and allows the trainers to acquaint the members of the team with some of the essential competition rules.

And this year's results were stellar for Team Canada. At the IMO in Mar del Plata, Argentina, July 4 - 16, the team received an outstanding six medals (three gold, one silver and two bronze), an impressive overall standing of fifth place overall in the world and an unprecedented achievement for Canada.

The winning team consisted of: Matthew Brennan (Gold Medal) (Upper Canada College); Calvin Deng (Gold Medal) (NC School of Science and Math); James Rickards (Silver Medal) (Colonel By Secondary School Ottawa); Alex Song (Silver Medal) (Phillips Exeter Academy Waterloo); Daniel Spivak (Bronze Medal) (Bayview Secondary School); Kevin Sun (Kennedy Jr. High) and Kevin Zhou (Bronze Medal) (Woburn C.I. Markham). The camp at BIRS was organized by Gertrud Jeewanjee (Canadian Mathematical Society) and Robert Morewood (YWorld.com).

To view the full results visit: http://www.imo-official.org/team_r.aspx?code=CAN&year=2012.

Women's Workshop on Communications and Signal Processing

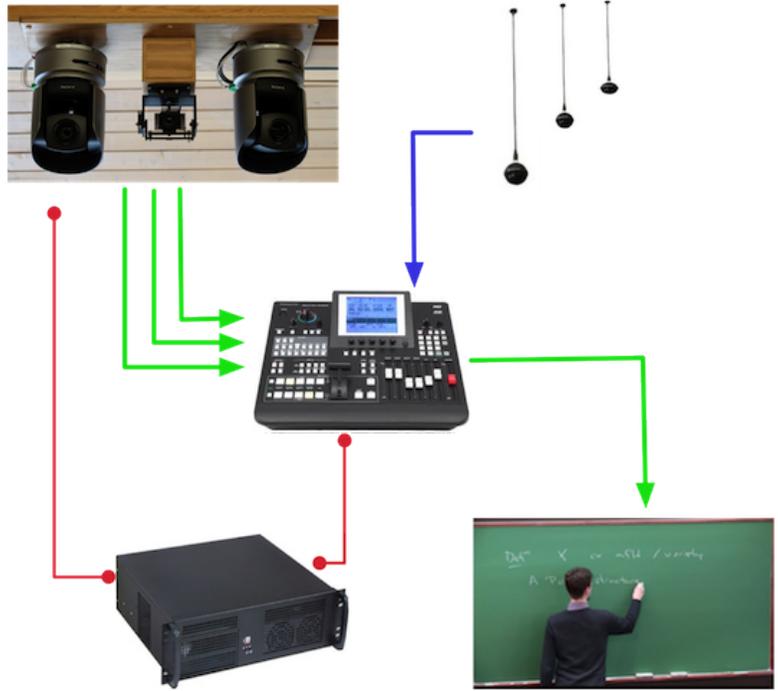
The BIRS mandate calls for addressing the need to increase diversity in the STEM (science, technology, engineering and math) fields. Every year, the Station sponsors several events in support of this effort. One of the 2012 events was a workshop developed, organized and attended by more than 25 women engineers. BIRS provided a venue for younger communications and signal processing engineers to meet female role models who are IEEE Fellows, full professors, Editors-in-Chief and active volunteers within their professional society and learn from them how to achieve their professional goals. Such workshops foster the mentoring and networking that can make a real difference in a career.

The two-day workshop included state-of-the-art technical seminars and career panel discussions by the senior participants, poster sessions for the more junior ones, and a final panel discussion led by the junior women to define their most pressing career issues. The meeting stimulated new research avenues for both senior and junior attendees and created new research networks among all participants. Several participants have identified paths for future joint research.

Technological Innovation at BIRS

In 2012, BIRS relocated its meeting space to the beautiful TransCanada Pipelines Pavilion, a building now used exclusively for BIRS scientific activities at The Banff Centre. BIRS then proceeded to make its new physical meeting space accessible to the scientific community in virtual space, via live video streaming and high quality video recordings, produced by a state-of-the-art automated video production system.

BIRS participants now have the ability to record and broadcast their lectures at the touch of a button, and we encourage all lecturers to make use of this opportunity to contribute their talk. We have been testing automated recording for the past few weeks, and the vast majority have opted in. You can watch their lectures live on the BIRS website, at: <http://www.birs.ca/live>. Recordings also appear on the BIRS home page a few minutes after the lecture ends.



The workshop was amazingly inspiring. This happened during the talks and the scientific questionings, but also all along during the discussions in the seminar and over the meals. The atmosphere and service that BIRS are providing are amazing, first rate for sure. I got fresh insights into an old problem (travelling salesperson on grids), due to the interaction with two other participants, one from Canada, one from Spain. It is this international collaboration from various perspectives that makes BIRS a uniquely fruitful place. A new research project may very well result from this interaction. The contact to the colleague from Canada would not have been possible otherwise, I believe.

Peter Widmayer, Eidgenössische Technische Hochschule

BIRS Live Stream

Through a system of cameras, microphones, and automation technology in BIRS' main lecture room, the production, recording, broadcasting and distribution of high-quality lecture videos have become fully automated.

Automated Lecture Capture

The main lecture room at BIRS is equipped with state of the art automated lecture capture (video recording) technology. We have made it extraordinarily simple for BIRS participants to record and publish their talks on the BIRS website. Additionally, recorded talks are streamed live, allowing researchers to watch lectures remotely, in real-time.

BIRS and our participants, in choosing to record and broadcast lectures online, are providing a valuable resource and contributing to educational and scientific progress.

Participation Statistics

BIRS provides equal access to the world's research community regardless of geographic origin or scientific expertise, as long as it is anchored on solid mathematical, statistical or computational grounds. Applications are selected on a competitive basis, using the criteria of excellence and relevance, by a scientific panel of experts drawn from across the entire breadth of the mathematical sciences and related areas.



The overwhelming response of the scientific community during the first years of operations led BIRS to expand the North American partnership by involving the Mexican mathematical community in its scientific management, and to increase BIRS opportunities by extending the program from 40 weeks in 2003, to 44 in 2006, to 48 in 2007, and to 49 weeks per year in 2011.



The station now receives over 2,000 visits by researchers every year from hundreds of institutions in more than 60 countries who participate in over 70 different programs spanning almost every aspect of pure, applied, computational and industrial mathematics, statistics, computer science, physics, biology, engineering, economics, finance, psychology and scientific writing.



The extraordinary reaction to the opportunities at BIRS has led to extremely high quality competitions, with over 170 proposed activities competing for the 48 available weeks.

Resident states of BIRS participants, 2010-2012



Statements of Financial Position
(Unaudited)
Year ended March 31, 2013

	March 31, 2013	March 31, 2012	March 31, 2011
ASSETS			
Current			
Cash – restricted			
Uncommitted (Note 4)	\$ 1,647,421	\$ 1,491,535	\$ 1,152,482
Committed to projects	742,194	763,532	128,357
	2,389,615	2,255,067	2,255,067
Accounts receivable	100,000	-	-
	2,489,615	2,255,067	1,280,839
LIABILITIES			
Current			
Accounts payable and accrued liabilities	5,000	5,000	5,000
Deferred receipts (Note 5)	742,194	763,532	128,357
	747,194	768,532	133,357
NET ASSETS	\$ 1,742,421	\$ 1,486,535	\$ 1,147,482

Statements of Operations and Changes in Net Assets

(Unaudited)

Year ended March 31, 2013

	2013	2012
RECEIPTS		
ASRA	\$ 719,402	\$ 763,876
CONACYT	50,000	50,000
Contributions	19,400	20,888
Mitacs Inc.	-	200,000
Mprime Network Inc.	200,000	41,050
NSERC	640,193	636,528
NSF	670,201	752,254
UBC	50,000	50,000
Other	3,717	4,518
	2,352,913	2,519,114
EXPENDITURES		
Conferences		
Equipment	7,063	127,418
Infrastructure support	5,988	7,840
Premises and accommodation	1,650,108	1,645,523
Scientific support	35,113	38,099
Administration		
Office and miscellaneous	33,278	5,868
Professional fees	2,585	2,585
Salaries and benefits	357,850	348,007
Travel	5,042	4,721
	2,097,027	2,180,061
EXCESS OF RECEIPTS OVER EXPENDITURES	255,886	339,053
NET ASSETS, BEGINNING OF YEAR	1,486,535	1,147,482
NET ASSETS	\$ 1,742,421	\$ 1,486,535

Statements of Financial Position

(Unaudited)

Year ended March 31, 2013

	2013	2012
Cash Provided by (Used in) Operating Activities		
Cash received from grants and other income	\$ 2,231,575	\$ 3,154,289
Cash disbursed for conferences	(1,698,272)	(1,833,132)
Cash disbursed for administration	(398,755)	(346,929)
INCREASE IN CASH	134,548	974,228
CASH, BEGINNING OF YEAR	2,255,067	1280839
CASH, END OF YEAR	\$ 2,389,615	\$ 2,255,067

3. SIGNIFICANT ACCOUNTING POLICIES

Accounting Estimates and Judgements

The preparation of these financial statements requires management to make estimates and judgments and to form assumptions that affect the reported amounts and other disclosures in these financial statements. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances. The results of these assumptions form the basis of making the judgments about carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions and conditions.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimate is revised if the revision affects only that period or in the period of the revision and further periods if the review affects both current and future periods.

Critical accounting estimates are estimates and assumptions made by management that may result in material adjustments to the carrying amount of assets and liabilities within the next financial year. Critical estimates used in the preparation of these financial statements include, among others, the recoverability of accounts receivable and estimation of accrued liabilities.

Cash and Cash Equivalents

Cash and cash equivalents comprise cash at banks and short-term deposits with an original maturity of three months or less which are readily convertible into a known amount of cash.

Financial Assets and Financial Liabilities

Financial instruments are composed of cash and cash equivalents, accounts receivable, accounts payable and accrued liabilities, and deferred receipts.

BIRS makes its fair value measurements based on a three-level hierarchy:

- Level 1 – inputs are unadjusted quoted prices in active markets for identical assets or liabilities;
- Level 2 – inputs other than quoted prices in Level 1 that are observable for the asset or liability, either directly or indirectly; and
- Level 3 – inputs for the asset or liability that are not based on observable market data.

Transaction costs directly attributable to the acquisition or issue of a financial asset or financial liability that will be measured subsequently at amortized cost are added to the carrying amount of the financial asset or financial liability.

Contributions from Funders

Contributions from funders are recorded as “receipts” at the time all criteria established between the organization and the funders are satisfied. The criteria for each grant or fund determines the appropriate disbursement of these contributions. Contributions received but not disbursed at the end of a fiscal period are recorded as “deferred” and are transferred to “receipts” when disbursed during a subsequent fiscal period.

Income Taxes

BIRS, as a non-profit organization, is not subject to Federal or Provincial income taxes.

4. RESTRICTED CASH

BIRS plans its program at least one year in advance, which may be before funding can be confirmed. The Board of Directors has authorized BIRS to build a reserve fund of up to \$2,000,000 from the uncommitted cash to meet its estimated operating commitments for one year.

5. DEFERRED RECEIPTS

Deferred receipts represent contributions received from funders but not disbursed at the end of the year, which are composed of:

	2013	2012
NSERC MFA	\$ -	\$ 1,629
ASRA (UA)	351,424	350,761
ASRA (UC)	390,770	411,142
	\$ 742,194	\$ 763,532

6. COMMITMENTS

BIRS is committed, under the terms of a five-year contract with the Banff Centre for Continuing Education for its conference facilities, to annual payments of approximately \$1,472,000 for the use of the facilities for 49 weeks in each of the first three years (2011, 2012 and 2013) of the contract. There will be a national CPI adjustment to the rates for years 2014 and 2015.

7. FINANCIAL RISK

BIRS's activities expose it to a variety of financial risks, which include credit risk and liquidity risk. BIRS's risk management program focuses on the unpredictability of financial markets and seeks to minimize the risk to its assets and its ability to meet its mandate.

(a) Credit risk

Credit risk is the risk of financial loss to the organization if a counterparty to a financial instrument fails to meet its contractual obligations, and arises mainly from its cash. BIRS limits its exposure to credit risk arising from these instruments by only depositing cash in major Canadian universities and financial institutions and holding only financial instruments of institutions with the highest credit rating.

(b) Liquidity risk

Liquidity risk is the risk that BIRS will not be able to meet obligations associated with financial liabilities and commitments as they come due. Accounts payable and accrued liabilities are due within the current operating period. BIRS manages this risk through its capital management programs (Note 8).



(c) Currency risk

Currency risk is the risk of a loss due to the fluctuation of foreign exchange rates and the effects of these fluctuations of foreign currency denominated monetary assets and liabilities. BIRS currently budgets expenditures based on commitments from granting agencies, one of which is in US dollars. Therefore, BIRS is affected by changes in exchange rates between the Canadian dollar and the US dollar.

A change in the value of the US dollar by 1% relative to the Canadian dollar would affect the US dollar amounts receivable from non-Canadian funders by approximately \$7,300. Should there be a reduction in the total amount of the grant on the conversion from US dollars, BIRS will request a corresponding increase in the grant. If the additional funding is not received, BIRS does not expect a significant impact on its operations.

8. CAPITAL MANAGEMENT

BIRS's capital management objectives are to meet the requirements of the funders providing grants and to safeguard its ability to continue as a going concern in order to pursue the advancement of its mandate.

BIRS considers its capital for these purposes to be its available received and committed grants, as disclosed on the statement of net assets. BIRS manages its capital by preparing annual expenditure budgets, which are revised periodically based on current commitments and available funds, and potential additional funding which it may be actively pursuing. Annual and materially updated budgets are approved by the Board of Directors.