“The beauty of mathematics only shows itself to more patient followers.”

— Maryam Mirzakhani, Fields Medallist 2014
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Mathematics underlies many technological breakthroughs and activities of our modern society.

The Fields Institute is a centre for research in the mathematical sciences that serves as a focal point for Canadian researchers as well as a venue for communication with the global community.

Fields’ mission is to promote contact and collaboration between professional mathematicians and an increasing number of users of mathematics from all around the globe. Fields is committed to training the next generation of mathematicians in a supportive and stimulating environment.

At Fields we are developing the mathematics that will shape our future.
The 2016-17 year has been another exciting year here at the Fields Institute.

The Institute continues to make great strides in achieving its mandate by presenting interesting programs and activities which bring together mathematicians from Canada and abroad. These efforts have made Canada an important contributor to the development and exploration of mathematical science and its interfaces.

Fields has expanded its initiatives for working alongside mathematics in industry, formally announcing the Centre for Financial Industries on June 30, 2016. This Centre was spearheaded by former Deputy Director, Dr. Matheus Grasselli (McMaster University), to bridge the gap between mathematics in academia and in industry. The collaborations between our corporate partners and the Fields Institute have prospered and grown in this first year of operation.

2017 marks Fields 25th anniversary, and as part of that celebration, we have published an e-book, The Fields Institute Turns Twenty Five, edited by Elaine McKinnon Riehm. This collection of stories from those who helped the Fields Institute develop during the past 25 years is available online, free of charge, at our website.

We also welcomed Ryerson University as a Principal Sponsoring University, bringing that number to nine Ontario universities. Additionally, the Fields Institute was selected by the Province of Ontario to host the Mathematics Knowledge Network, supporting Ontario’s renewed Mathematics Strategy, and continuing our Centre for Mathematics Education’s strong tradition of support for mathematics education and mathematics teachers in our schools.

I would like to thank the leadership of the Fields Institute, both for their hard work and for their vision. These are Director Dr. Ian Hambleton (McMaster University), Deputy Director Dr. Huaxiong Huang (York University), Associate Director of Industry Liaison Dr. Tom Salisbury (York University), and Assistant Director of Industry Liaison Dr. Pawel Pralat (Ryerson University). All except Dr. Hambleton are in the first year of their roles; despite this challenge, the team gelled immediately and not a beat was missed. The excellence of our programs could not have been achieved without the guidance of the Scientific Advisory Panel, who ensure the quality of the Institute’s science. I would also like to thank the members of our Board of Directors, who are ultimately responsible for governing and overseeing the Institute, our sponsoring Universities, NSERC, and the Ontario Ministry of Research, Innovation & Science.

Finally, I would like to take this opportunity to thank all those staff who run the day to day operations at the Institute, as their work remains central to the successes Fields has enjoyed. A special thanks to our recently retired Comptroller, Uma Gupta, for her years of service and close attention to detail. I look forward to working with you all in the year ahead.

Dr. Sheila Embleton
October 2017
MESSAGE FROM THE DIRECTOR

This year, the Fields Institute is celebrating its 25th birthday. I am thrilled to look back on all that we have accomplished. The Institute continues to be a supportive and collaborative environment for the world’s top mathematics researchers as well as a hub for mathematics education. This year, in addition to an exciting scientific program, we had the pleasure of organizing and participating in many public outreach and industry-centred events.

All this would not be possible without ongoing support from the Province of Ontario, through the Ministry of Research, Innovation and Science, and the Government of Canada, through the Natural Sciences and Engineering Research Council. In addition, our scientific activities are sustained and enhanced by our Principal Sponsoring Universities, our corporate sponsors, and the National Science Foundation (US).

Scientific Activities
The scientific program is the foundation of our Institute and includes long-term activities like our thematic and focus programs as well as shorter workshops, seminars, and events. These activities are designed to support and enhance mathematical research and education in the widest sense, whether pure or applied, within Canada or internationally. Below, I highlight a few of the most memorable activities from the past year, but a full account of the 2016-2017 activities at Fields is contained in this Annual Report and lists of events can be found on our web page.

Thematic and Focus Programs
The 2016-2017 year began with a major thematic program on Combinatorial Algebraic Geometry with organizers from Queen’s University, McMaster University, Stanford University, the University of Warwick, and Amherst College. This semester-long program focused on the topics in algebraic geometry with deep combinatorial connections.

Our second major thematic program of the year was focused on Unlikely Intersections, Heights, and Efficient Congruencing organized by researchers from the University of Toronto, University of Waterloo, Oxford University, and the University of Bristol. In addition to our signature thematic programs, we hosted two shorter, focus programs. The first, on Topology, Stratified Spaces and Particle Physics, was jointly organized by the University of Toronto, New York University, the University of Wisconsin-Madison, and the Universität Heidelberg in Germany. The study of topological properties of algebraic varieties has recently witnessed a flurry of activity, and we were excited to be part of that. The second focus program on Random Graphs and Applications to Complex Networks was organized by the University of Toronto, Ryerson University, Carnegie Mellon University, and the University of California, San Diego. Analyzing data as graphs has become a major industrial effort and this program aimed to stimulate further theoretical and practical developments on graph algorithms.

Fields Medal Symposium
One of the principal events during the fall was the fifth Fields Medal Symposium, Patterns in Numbers and Nature, November 1-4, 2016, hosted at the Fields Institute.
in cooperation with the International Mathematical Union. The Symposium was centred on the work of Manjul Bhargava (Fields Medal 2014). The Opening Public Lecture by Professor Bhargava was enjoyed by a large audience at the Isabel Bader Theatre on Victoria College campus. Bhargava was an animated and engaging speaker that left the audience with lots to think about. High school and undergraduate students enjoyed a special lecture followed by networking with Professor Bhargava at our student night. Bhargava wowed the students with the mathematics of magic tricks. The following scientific program at the Fields Institute was aimed at a wide audience and brought together researchers, students, and the public in a highly successful 4 day event. I am especially grateful to our Gold Level sponsors Elsevier, Great-West Life, Canada Life, and London Life, and to all our other sponsors and private donors for making this symposium series possible. We are almost ready for the Fall 2017 Symposium, October 16-19, 2017, celebrating the work of Martin Hairer (University of Warwick).

**Centre for Financial Industries**

Through a continuing and mutually beneficial connection with the financial industry, the Fields institute has acquired leadership in the area of quantitative finance. Founded in 2015, the Centre for Financial Industries (CFI) is our focal point for these activities. One of CFI’s major events this year was the conference on “New Challenges for Big Data in Economics and Finance”. This two-day event featured speakers from around the globe discussing the new structural economic models and statistical tools that will be required for increasingly large data sets in economics and finance. CFI is also committed to student development and entrepreneurship. This year we held a quantitative finance career day that included a panel of financial engineers and a networking reception with financial recruiters. We also hosted the Fields-MaRS Innovation Day where students and researchers in the mathematical sciences learned about the resources and pathways available to entrepreneurs.

**Centre for Mathematics Education**

Last year, the Fields Institute announced the creation of a new centre for the promotion of transformative research in mathematics education. This year, the Fields CME was chosen to host the newly established KNAER (Knowledge Network for Applied Education Research) Mathematics Knowledge Network, supporting Ontario’s renewed Mathematics Strategy. The Network will work with mathematics education stakeholders across Ontario to create Communities of Practice and to provide opportunities for linking research and professional practice.

**CRM-Fields-PIMS prize**

The CRM-Fields-PIMS prize is the premier Canadian award for research achievements in the mathematical sciences. This year, the prize went to Henri Darmon from McGill University for his extraordinary record of deep and highly influential contributions to the arithmetic theory of elliptic curves. We are looking forward to Henri’s special lecture at the Fields Institute later in 2017.

**Public Lectures**

In addition to the distinguished lecture series included in our thematic and focus programs, the Institute also hosts and sponsors a number of public lectures. This year Dr. Curtis McMullen from Harvard spoke about “A skeptical history of numbers” for the 22nd Annual R. A. Blyth Lecture in Mathematics, Jean-Marie De Koninck from Université Laval taught us “The Human Part of the Equation” in the Margaret Sinclair Memorial Award Lecture, and Noreen Goldman, Professor at the Woodrow Wilson School of Public and International Affairs at Princeton, gave us “Insights into Human Survival” at the Keyfitz Lecture in Mathematics and Social Sciences, to name a few.

**Partnerships**

Ryerson University has become our newest Principal Sponsoring University. We look forward to increasing our collaborations with such a close neighbour.

**New Appointments**

On behalf of the whole Fields community, I would like to welcome Melanie Langemeyer, our new contact with the Mathematics Knowledge Network. I would also like to welcome Malgosia Ip, our new Communications and Development Officer, and Jim Rahaman, our new Business Manager and Financial Controller. Welcome to the Fields Team!

**Future Plans**

I would to express my personal appreciation to the staff for all of their help during this past year. As always, we are striving to improve our service to the mathematical community. Several thematic and focus programs for 2018 and 2019 are already approved, and we are actively encouraging new proposals for the future. This summer, our Undergraduate Summer Research Program promises to be larger than ever, and we look forward to inspiring these bright new minds in mathematical research. Additionally, we are planning many exciting events related to our 25th anniversary, including the recently published book full stories from past fellows, visitors, and staff, which is available online. We hope you join us in celebrating!

Dr. Ian Hambleton
October 2017
FIELDS BY THE NUMBERS

- THEMATIC AND FOCUS PROGRAMS: 53
- WORKSHOPS AND CONFERENCES: 4
- PARTICIPANTS*: 3488
- LONG-TERM VISITORS: 263

PARTICIPANTS*:
- 832 females
- 2540 males
- 1570 Canadians
- 790 Americans
- 1076 international
- 1282 researchers
- 377 post-docs
- 1410 graduate/undergraduate students

PUBLIC LECTURES:
Including the 2016 Fields Medal Symposium public opening

*Does not include unregistered participants and events for which Fields did not collect registration information
CENTRES

- Centre for Math Medicine
- Centre for Financial Industries
- Centre for Mathematics Education

PRINCIPAL SPONSORING UNIVERSITIES

- Carleton University
- Ottawa University
- Queen’s University
- University of Toronto
- York University
- Ryerson University
- McMaster University
- Western University
- University of Waterloo

AFFILIATE UNIVERSITIES

- Brock University
- University of Guelph
- Iowa State University
- Université Lille 1
- University of Manitoba
- Nipissing University
- UOIT
- RMC
- University of Saskatchewan
- Wilfrid Laurier University
- University of Windsor
This Thematic Program aimed to:

1. Introduce the study of "combinatorial varieties" to the mathematical community as a thematically unified whole;
2. Refine the techniques used within algebraic geometry to study combinatorial varieties; and
3. Enlarge the class of algebraic spaces which have a recognized combinatorial structure.

The interaction between combinatorics and algebraic geometry has experienced a renaissance in the past few decades. A disproportionately large number of the algebraic varieties arising in algebraic geometry, commutative algebra, representation theory, mathematical physics, and other fields have an explicit combinatorial structure. These include Hilbert schemes, moduli spaces, Okounkov bodies, Schubert varieties, toric varieties, and tropical geometry.

By defining combinatorial algebraic geometry as a field, the program facilitated interactions between relatively independent subfields and promoted new and sometimes unexpected research collaborations.

The program also emphasized training and professional development for junior researchers including a panel discussion during the summer school, a poster session at the introductory workshop, personalized feedback on talks for the postdoctoral fellows, and sessions on grant writing and writing referee reports.

Other highlights of the program were two semester-long graduate courses – one joint with the University of Toronto and the other consisting of "tapas style" short courses taught by long-term participants from the US and Canada; a series of Coxeter Lectures by the Fields medallist Andrei Okounkov; and a large number of informal and ongoing weekly seminars and working groups, which demonstrated the successful formation of new partnerships.
INTENSE TRAINING

A unique feature of this program were the Apprenticeship Weeks supported in part by the Clay Mathematics Institute and led by Bernd Sturmfels (UC Berkeley).

Over two weeks, Sturmfels worked intensively with a group of junior researchers to mentor, teach new skills of the trade, promote networking with peers, and facilitate practice of their craft. The great success of this program has led to a book project with 16 papers currently in revision, which will appear in the Fields Institute Communications series.

Madeline Brandt, a graduate student at the University of California at Berkeley, participated in the Apprenticeship Weeks and said they proved to be both educational and productive.

"Many of the projects will likely continue beyond these papers, and the knowledge and experience gained by everyone involved will inform our future mathematical studies."
In recent years there has been a great deal of success in applying methods of analytic number theory to questions of arithmetic geometry. This thematic program focussed on three topics: o-minimality, heights, and “efficient congruencing” and featured two graduate courses, a mini-course, three workshops, and a post-doctoral seminar.

The first two topics have been very useful in attacking conjectures regarding “special” points such as the Andre-Oort conjecture, or more generally the Zilber-Pink conjecture, while the third establishes the Hasse principle for certain varieties associated with translation-dilation invariant systems at the threshold of the convexity barrier.

One enticing feature about this theme is that it brings together several different fields; the first graduate course taught by Jacob Tsimerman was designed to acquaint everyone with the background they may have been missing.

As part of the program, Professor Umberto Zannier from the Scuola Normale Superiore in Pisa presented a Distinguished Lecture Series exploring the concept of (Weil) height of algebraic numbers, starting with a general perspective accessible to mathematicians outside of number theory and finishing with specialized topics and recent research.

The 2017 Littlewood Lecture series was given by Professor Robert Vaughan, FRS on the Hardy-Littlewood method. Vaughan masterfully described the method from every perspective - how it was viewed historically, the various advances which were brought to bear for Vinogradov’s theorem and Waring’s Problems, among others, leading up to the most recent work on the subject. His talks were extremely clear while maintaining an impressively high level of technical precision.
EXPANDING HORIZONS

As part of this program, there were six post-doctoral fellows who were at Fields for the semester and ran a weekly postdoctoral learning seminar. This was especially nice as they were experts in a variety of subjects (logic, Hodge theory, analytic number theory, rigid spaces,...) leading to significant comfort zone expansion both for the students and attending faculty.

“What I was working on while [at Fields] was quite different than what I was working on previously,” said Simon Myerson, a post-doc from University College London. “I collaborated with several of the other post-docs on a couple of projects. One of them was actually something that I was curious about for a while, and it turned out that my office mate at Fields had worked in that area.”

Simon came to Fields hoping to broaden out from what he worked on in his PhD and found that the atmosphere of the Fields Institute was naturally conducive to collaboration.

FIELDS RESEARCH FELLOWSHIP

The Fields Research Fellowship program is a new initiative launched in 2017. The Fellowship provides an opportunity for a Faculty member from one of Fields’ PSUs to have a period of full-time “research in residence” at Fields. PSU Faculty may also nominate a mathematical scientist from another institute to come to Fields for the purpose of collaborative research. There were two Fields Research Fellows during the 2016-17 year.

1. Shige Peng (Shandong University) - April 25-May 31, 2017
2. Jiarui Fei (National Center for Theoretical Sciences) - June 2-28, 2017

Shige Peng from Shandong University teaches his short course on Quantifying Uncertainty. Dr. Peng was also a Fields Research Fellow in 2017.
FOCUS PROGRAM
Topology, Stratified Spaces and Particle Physics, August 8 – 26, 2016

Stratified spaces play an important role as a cycle reservoir for geometric descriptions of generalized homology theories. Furthermore, stratified spaces appear in applied areas, such as topological data analysis, or the study of configuration spaces for robot motion planning.

Examples of stratified spaces include orbit spaces of smooth group actions, compactifications, PL spaces, and algebraic varieties. In recent decades, techniques involved in the study of stratified spaces have branched out in many directions; these were reflected in the broad expertise and interests of the participants in the month-long Focus Program on Topology, Stratified Spaces and Particle Physics.

Objectives of the program were to:

1. Provide opportunities for experts in the various related specializations;
2. Interact and cross-pollinate; and
3. Provide opportunities for junior researchers and graduate students to make connections and form research relationships with each other and with senior experts in related fields with whom they might otherwise have little contact.

The program focussed on recent advances in stratified spaces and emerging ties to mathematical physics. Topics included intersection co-homology, intersection spaces and their applications, characteristic classes, singularity theory, and global analytical methods.

This Focus Program also had a significant educational component in the form of a Summer School that featured five introductory but in-depth mini-courses of five lectures each. The mini-courses strengthened connections among the research groups represented and provided access points for younger researchers and students. The entire program presented a great opportunity for junior researchers, postdocs, and graduate students to broaden their perspectives, and to create new research ties.

ORGANIZING COMMITTEE
Markus Banagl
Universität Heidelberg
Edward Bierstone
University of Toronto
Sylvain Cappell
New York University
Laurentiu Maxim
University of Wisconsin-Madison
Timo Weigand
Institut für Theoretische Physik der Universität Heidelberg

10 PUBLICATIONS
23 NEW COLLABORATIONS
The theory of random graphs was founded by Erdős and Rényi in 1959 after Erdős discovered that the probabilistic method is useful in attacking problems of extremal graph theory. Shortly afterwards, Gilbert introduced the random model of the Gilbert disc, nowadays known as random geometric graphs. Both models are simple, but they do not address all the characteristics of complex networks.

For example, the famous chain experiment by Milgram showed that there are at most six degrees of separation between any two people in the world. This phenomenon of small diameter is nowadays reflected in online social networks such as Facebook, and none of the classical models reflect this appropriately. More recently, new random graph models, such as the Preferential Attachment Model or the Spatial Preferential Attachment Model, have been designed. These models have been used to give theoretical insight into the propagation of epidemics, the activity of neurons in neural networks, and the connections in protein-protein interaction networks, to mention a few.

Thanks to the availability of more and more data in bigger networks and because of their relevance to a multitude of applications, these models have been the subject of sustained research effort over the past five decades.

This particular Focus Program included a Summer School on Random Graphs and Probabilistic Methods (May 29 to June 9, 2017) with more than 80 participants and 4 invited experts in the field; the 14th Workshop on Algorithms and Models for the Web Graph, WAW2017 (June 15 - 16, 2017); a panel on complex networks in industry and academia (June 16, 2017); and a Workshop on Random Geometric Graphs and Their Applications to Complex Networks (June 19 - 23, 2017).

A highlight of the program was the panel discussion featuring four experts (Jeannette Janssen, Jure Leskovec, Yuval Peres, Andrei Raigorodskii) who gave a personal view of career options, challenges, and opportunities in both academia and industry for professors and students. Following the panel discussion, attendees had an opportunity to meet and network with the panelists over a casual lunch sponsored by an NSERC Connect grant.

ORGANIZING COMMITTEE
Alan Frieze
Carnegie Mellon University
Fan Chung Graham
University of California, San Diego
Mike Molloy
University of Toronto
Pawel Pralat
Ryerson University
GENERAL
SCIENTIFIC ACTIVITY
Workshops and Conferences

In addition to long-term programs, the Fields Institute also supports shorter workshops and conferences on a broad range of topics related to the mathematical sciences. These events can occur at Fields or at any educational institution around the world, promoting mathematics on a global scale.

Workshop on Redesigning the High School Math Curriculum
Jul 4-14, 2016
Queen’s University

16th Canadian Conference on General Relativity and Relativistic Astrophysics
Jul 6-8, 2016
Simon Fraser University

Directed Graphs Conference
Jul 7-8, 2016
Waterloo

Pre World Congress Meeting of New Researchers in Statistics and Probability
Jul 7-8, 2016
Fields Institute

Conference on Group Actions and Algebraic Combinatorics
Jul 11-15, 2016
Herstmonceux Castle

World Congress in Probability and Statistics
Jul 11-15, 2016
Fields Institute

Workshop on Milestones in Computer Algebra
Jul 16-18, 2016
Waterloo

Conference on Geometry, Representation Theory, And The Baum-Connes Conjecture
Jul 18-22, 2016
Fields Institute

International Symposium on Symbolic and Algebraic Computation ISSAC 2016
Jul 19-22, 2016
Wilfrid Laurier University

Workshop on Interactions between Model Theory and Arithmetic Dynamics
Jul 25-29, 2016
Fields Institute

New Trends in Approximation Theory
Jul 25-28, 2016
Fields Institute

Twenty Years of Lambert W: A Celebratory Workshop
Jul 25-28, 2016
Western University

Workshop on Model Theory: From Fields to Hardy Fields
Aug 2-6, 2016
Fields Institute

Canadian Conference on Computational Geometry 2016
Aug 3-5, 2016
Simon Fraser University

Workshop on Ordered Data and their Application in Reliability Survival Analysis
Aug 7-10, 2016
McMaster University

Theoretical Foundations of SAT Solving Workshop
Aug 15-19, 2016
Fields Institute

Two Weeks in Vancouver - A Summer School for Women in Math
Aug 15-26, 2016
UBC
The University of Toronto’s Entrepreneurship Hatchery hosted their annual Accelerator Weekend at the Fields Institute with the goal of providing students with a true entrepreneurial experience.
The Workshop on the Mathematics of Hearing brought together 40 researchers from all over the world and from a variety of disciplines (e.g., mathematics, physics, psychology, neuroscience) to discuss the auditory system from a variety of perspectives.

International Workshop on OpenCL (IWOCL 2017)
May 16-18, 2017
University of Toronto

13th Guelph Annual Biomathematics and Biostatistics Symposium
May 17, 2017
University of Guelph

9th International Conference on Inverse Problems in Engineering (ICIPE17)
May 23-26, 2017
University of Waterloo

Theory Canada 12 Conference
May 25-27, 2017
York University

COSy 2017 | 45th Canadian Annual Symposium on Operator Algebras and Operator Theory
May 29-Jun 2, 2017
Lakehead University

41st Annual Meeting of the Canadian Mathematics Education Study Group (CMESG)
Jun 2-6, 2017
McGill University

Conférence de Propriétés Géométriques et Probabilistes des Groupes Infinis
Jun 5-9, 2017
Universite Lille 1

Spring School on Statistical Inference for Survey Data with Missing Observations
Jun 6-9, 2017
Fields Institute

5th Annual Canadian Statistics Student Conference
Jun 10, 2017
University of Manitoba

24th Ontario Combinatorics Workshop
Jun 10-11, 2017
University of Guelph

CIMPA Research School on Combinatorial and Computational Algebraic Geometry
Jun 11-24, 2017
University of Ibadan

Conference on Means, Methods and Results in the Statistical Mechanics of Polymeric Systems II
Jun 12-14, 2017
Fields Institute

6th Biennial Canadian Discrete and Algorithmic Mathematics Conference (CanaDAM)
Jun 12-15, 2017
Ryerson University

Workshop on the Mathematics of Hearing
Jun 16, 2017
Fields Institute

Ottawa Mathematics Conference 2017
Jun 16-19, 2017
University of Ottawa

2017 Mechanics of Hearing Workshops
Jun 19-24, 2017
Fields Institute

11th International Workshop on Neutrino-Nucleus Scattering in the Few-GeV Region (NuInt 2017)
Jun 25-30, 2017
Fields Institute

Conference on Integer Programming and Combinatorial Optimization (IPCO’17)
Jun 26-28, 2017
University of Waterloo
The Fields Institute supports a large number of ongoing seminar series, some dating back more than twenty years. Seminars provide local mathematicians with exposure to leading international experts in a particular field.

**SEMINAR SERIES**

Algebraic Combinatorics Seminar  
Applied Mathematics Colloquium  
ArtSci Salon  
Centre for Mathematical Medicine Seminar  
Fields Cognitive Science Network  
Geometric Analysis Colloquium  
Geometric Representation Theory Seminar  
Geometric Structures Laboratory  
Geometry and Model Theory Seminar  
Geometry and Topology Seminar  
Inverse Problems and Image Analysis Seminar  
Machine Learning Advances and Applications Seminar  
MESH Consultants Inc. Presentation  
Operator Algebra Seminar  
Physics/Fields Colloquium  
Quantitative Finance Seminar  
Quantum Information Seminar  
Set Theory Seminar  
Toronto Probability Seminar  
Working Lunch Seminar

**GRADUATE COURSES**

Training the next generation of mathematical scientists is a major part of the Fields mandate. Full or mini-courses provide students with the unique opportunity of studying specialized topics taught by the leaders in the field.

**Short Course on Quantifying Uncertainty: Shige Peng**  
*May 15 - 19, 2017*

**Graduate Mini-Course on Efficient Congruencing**  
*February 28 to March 9, 2017*

**Graduate Course on Diophantine Problems in Number Theory**  
*January 18 to April 12, 2017*

**Introduction to Arithmetic Dynamics Course**  
*January 10 to April 4, 2017*

**Graduate Course II on Combinatorial Algebraic Geometry**  
*September 12 to December 2, 2016*

**Graduate Course I on Combinatorial Algebraic Geometry**  
*August 23 to December 1, 2016*

Christina Sormani from CUNY grad center and Lehman College teaches a lecture at the Geometric Analysis Summer School.
SPECIAL LECTURE SERIES

Special lecture series provide the opportunity for distinguished speakers to come to the Fields Institute. These are often public events, sharing the power and importance of mathematics with the community.

Fields-Carleton Distinguished Lecture Series
July 1, 2016 to June 30, 2017

Fields-Brock Transdisciplinary Distinguished Lecture Series 2016:
Dr. Fabrizio Ruggeri
April 7, 2017 2017 October 24, 2016

CRM-Fields-PIMS Prize Lecture: Daniel Wise
November 7, 2016 2016

Coxeter Lecture Series: Andrei Okounkov
November 14 - 16, 2016

Distinguished Lecture Series in Statistical Sciences: Donald Rubin
November 30 to December 9, 2016

20 Years of Lambert W Lecture Series
November 23 - 24, 2016

22nd Annual R.A. Blyth Lectures in Mathematics
January 16 - 18, 2017

Distinguished Lecture Series: Umberto Zannier
February 21 - 23, 2017

Littlewood Lecture Series: Robert Vaughan
March 7 - 9, 2017

2016-2017 Fields-Carleton Distinguished Lecture Series:
William J. Cook
April 6 - 7, 2017

Avner Magen Memorial Lecture: Tselil Schramm
April 7, 2017

Margaret Sinclair Memorial Award Lecture: Jean-Marie De Koninck
April 19, 2017

Keyfitz Lecture in Mathematics and the Social Sciences: Noreen Goldman
May 25, 2017

This year’s Keyfitz Lecture in Mathematics and the Social Sciences was given by Dr. Noreen Goldman from Princeton (middle), pictured here with Ian Hambleton, current Fields Institute Director, and Barbara Keyfitz, daughter of the lecture’s namesake and former Fields Director.
The Fields Medal Symposium took place from November 1 to 4, 2016 and honoured the work of Manjul Barghava (Princeton University). The public opening night featured welcome speeches from Ian Hambleton (Director of Fields Institute), Vivek Goel (Vice President, Research and Innovation, University of Toronto), the Honourable Kirsty Duncan (Minister of Science), the Honourable Reza Moridi (Minister of Research, Innovation and Science), and Vaughan Jones (Vice-President of the International Mathematical Union).

These were followed by a public lecture from Manjul Barghava entitled Patterns in Numbers and Nature. To introduce Barghava, Benedict Gross (Harvard) spoke about Bhargava’s research and how Bhargava’s ideas have transformed mathematics, the study of numbers, and number theory.

In addition to the public opening, the symposium also featured an exciting scientific program with leading international experts in number theory. Barghava also hosted a student night geared towards high school and undergraduate students where he gave a lecture entitled The Mathematics of Magic Tricks and Games. Students were able to chat directly with the Fields Medal winner over pizza.

The next Symposium is scheduled for October 2017 and will feature the work of Martin Hairer.
COMMERCIAL AND INDUSTRIAL MATHEMATICS

The focus of the CIM Program is to cooperate with business, enabling technology transfer between mathematical scientists and the information society. Mathematics tools are increasingly important in our data-driven society. By creating connections between mathematicians and industry, the Fields CIM Program is supporting technological advancement and innovation.

The program supports several seminar series, workshops, courses, special lectures, and the Fields Industrial Problem-Solving Workshop (IPSW), which takes place at Fields in even-numbered years.

Software For Big Data: Hands-On SAS Workshop
Jul 28-29, 2016

2016 Industrial Problem Solving Workshop
Aug 15-19, 2016

Quantitative Finance Career Day - How I became Quant Panel
Oct 26, 2016

Fields-MaRS Innovation Day
Nov 10, 2016

Software for Data Science (SAS)
Feb 4-5, 2017

Software for Data Scientists: Maple
Feb 23-24, 2017

Software for Data Science Workshop: Julia
Mar 20, 2017

Expert Panel on Blockchain Technology
Mar 21, 2017

Software for Data Scientists: R and Julia
Mar 22, 2017

Maplesoft Student Workshop
Mar 25, 2017

Software For Data Scientists: RTDS
Apr 22-23, 2017

Big Data for Quants Boot Camp
May 1-4, 2017

Fields-China Joint Industrial Problem Solving Workshop in Finance
May 8-12, 2017

Augmented Reality/Virtual Reality (AR/VR) Networking Event
Jun 21, 2017

Fields-China Joint Industrial Problem Solving Workshop in Finance
Established in 2015, the Centre for Financial Industries is a focal point for Fields activities in the area of quantitative finance, providing visibility for the expertise of its members, facilitating corporate collaboration, and enabling rapid mobilization of resources.

The individual membership is drawn from a vibrant community of faculty and postdoctoral fellows from the Institute’s Principal Sponsoring Universities, practitioners from the local financial industry, as well as Canadian and international scientists with close ties to the Institute.

**MACHINE LEARNING ADVANCES AND APPLICATIONS**

Machine learning/deep learning and AI are transforming the industry by improving outcomes, and changing the way doctors, mathematicians, physicists, or engineers work, think, and process information.

The Fields Machine Learning Seminar is the first formal gathering of academic and industrial data scientists across the Greater Toronto Area (GTA) to discuss advanced topics in machine learning. The seminar met every other Thursday starting September 29, 2016 with the goal of building a stronger machine learning community in Toronto. The series was intended for university faculty and graduate students in machine learning across computer science, ECE, statistics, mathematics, linguistics, and medicine, as well as PhD-level data scientists doing interesting applied research in the GTA.

The lecture hall was standing room only for presentations from Amir Ban (Tel-Aviv University), Geoffrey Hinton, (U of T), Hugo Larochelle (Google Brain), David Blei (Columbia University), Alex Graves (DeepMind), and David Sontag (MIT), to name a few.
An organization unique within Canada, the Centre for Mathematical Medicine is a nidus for researchers from medicine and mathematics and provides critical mass for interdisciplinary ventures and initiatives. In addition to collaborative research, the Centre focuses on teaching at both undergraduate and graduate levels to stimulate and engage a new generation of graduate students and young researchers to work on problems arising in medicine.

COMPUTATIONAL MODELS FOR NEURODEGENERATION, FEB 24, 2017

 Neurodegenerative diseases such as Alzheimer’s and Parkinson’s disease are a global health, economic, and social emergency. More than 40 million people worldwide are estimated to suffer from Alzheimer’s disease and related disorders, and predictions suggest this number may double by 2050. Although the scientific community has achieved notable progress in deciphering the areas of cancer, cardiovascular, and metabolic diseases, neurodegenerative diseases have proved to be more complex and very challenging. Afflicted neurons in most neurodegenerative diseases display, in general, complicated and dissimilar pathological features before the catastrophic incidence of vast neuronal loss at the late stages of the diseases.

Since the decoding of the Human Genome in 2003, bioinformatics, data mining, and machine learning techniques have been involved in uncovering patterns in data produced by profiling technologies applied to clinical samples, animal models, and cellular systems.

The Computational Models for Neurodegeneration workshop brought together experts from the mathematical, computational, and medical communities to survey the state-of-the-art in modeling, mathematical analysis, and computational practice in the field of neurodegenerative diseases. The workshop also served as a platform for the exchange of ideas and promoting new collaborations.
The Centre for Mathematics Education (CME) is devoted to a transformative research in mathematics education and, by extension, STEM education. There is no better way to raise future mathematicians and scientists than through a modern, creative, and interdisciplinary education with mathematics at its core.

The CME facilitates communication and collaboration between mathematics educators and institutes both within Canada and globally through the promotion and organization of public and outreach events, education programs, and various scientific activities such as conferences, workshops, and seminars.

Membership is composed of international faculty and researchers (including those from the Institute's Principal Sponsoring Universities), teachers and school board members, representatives from the Ministry of Education, industry, media, and the general public.

- MathEd Forum
- Fields Cognitive Science Network
- Math Circles

Giant mathematical sculpture put together by the participants of a MathEd Forum on March, 25, 2017. Elisabeth Heathfield and George Hart used the activity to demonstrate how hand-on activities can make math visible in the classroom.

MATHEMATICS KNOWLEDGE NETWORK

In early 2017, The Fields Institute was selected by Ontario as the host for the province’s new Knowledge Network for Applied Education Research (KNAER) Mathematics Knowledge Network. The Network will work with mathematics education stakeholders across Ontario to create Communities of Practice and to provide opportunities for linking research and professional practice, with the goal of supporting Ontario's Renewed Math Strategy. As the Mathematics Knowledge Network host, Fields CME is responsible for coordinating the collaborative activities of the network partners.
OUTREACH

At Fields, we believe that mathematics is for everyone. By supporting outreach activities, we bring mathematical inspiration to people of all ages and situations.

**Math + Coding Sessions for Young Children**  
Apr 1, 2016-Mar 31, 2017

**2016 Canadian Undergraduate Mathematics Conference**  
Jul 13-17, 2016

**Fields-York Math Circles**  
Sep 1, 2016-Jun 30, 2017

**52nd Annual Canadian Undergraduate Physics Conference (CUPC)**  
Oct 13-16, 2016

**International Mathematical Modeling Challenge (IM2C)**  
March 13, 2017-April 26, 2017

**Fields Thesis Competition**  
April 18, 2017

**Community Math Visits and Fairs, Fields Institute**  
Various dates

**Caribou Mathematics Competition**  
Various dates

---

Kids from the Fields Math Circles preparing for the Annual American Regions Mathematics League (ARML) competition.

Student organizers and participants in the Canadian Undergraduate Physics Conference.
FIELDS UNDERGRADUATE SUMMER RESEARCH PROGRAM

From July to August, 2016, 17 undergraduate students from around the world participated in three research projects led by faculty from our Principal Sponsoring or Affiliate Universities. Project topics included matrix geometry, hyperbolic geometry, and the mathematics of glass. Students presented their results at a one-day mini-conference at the end of the program. In addition to providing students with an immersive research experience, the Program also serves to recruit the brightest undergraduate students to graduate programs at Fields partner universities.

Project 1: Random Matrix Geometry
Supervisor: Masoud Khalkhali (Western University)

Project 2: Convexity in Teichmüller space
Supervisor: Maxime Fortier Bourque (University of Toronto)

Project 3: The Mathematics of Glass
Supervisor: C. Sean Bohun (UOIT)
FIELDS INSTITUTE FELLows 2017

Fields Institute Fellows are individuals who have made outstanding contributions to the Fields Institute and to the Canadian mathematical community. Congratulations to the 2017 inductees!

Henri Rene Darmon  
*McGill University*

Nassif Ghoussoub  
*University of British Columbia*

Matheus Grasselli  
*McMaster University*

Donna Kotsopoulos  
*Wilfred Laurier University*

Robert Prichard  
*Torys LLP, Bank of Montreal, Metrolinx*

For a full listing of all Fields Institute Fellows, visit our website: http://www.fields.utoronto.ca/honours-and-fellowships/fields-institute-fellows

Donna Kotsopoulos (centre) receives her Fields Institute Fellows plaque at the Annual General Meeting from Fields Deputy Director, Huaxiong Huang (left), and Fields Director, Ian Hambleton (right).

Matheus Grasselli (centre) receives his Fields Institute Fellows plaque at the Annual General Meeting from Fields Director, Ian Hambleton (left), and Fields Deputy Director, Huaxiong Huang (right).
OPEN ACCESS ELECTRONIC JOURNALS

The Fields Institute publishes two open access journals through SpringerOpen.

1. Mathematics-in-Industry Case Studies Journal: MICS provides a venue for sharing ideas among academic and industrial researchers and a learning opportunity for newcomers and students, in particular in connection with the Institute’s Industrial Problem Solving Workshops.

2. Fields Mathematics Education Journal: This international peer-reviewed online journal aims to provide open access to the range of themes that attract attention of the mathematics education community internationally.

FIELDS NOTES

The Fields Institute publishes its newsletter, Fields Notes, three times a year. Approximately 1000 copies of each issue are distributed free of charge in mailings to a wide range of universities throughout Canada, the United States, Europe, Asia and Australia.

Managing Editor: Peter Herriman

MONOGRAPH SERIES

The Fields Institute Monographs Series (Series Code: FIM) features high-quality research monographs growing out of various activities at the Fields Institute, including graduate course lectures and seminars. Volumes 1 to 28 are available for purchase from the American Mathematical Society Online Bookstore, and later volumes (29 to 35) are available on the Springer website. The Institute also has a limited number available at our front desk.

2016–2017 Publications


COMMUNICATIONS SERIES

The Fields Institute Communications Series features proceedings and lecture notes growing out of the various activities at The Fields Institute for Research in Mathematical Sciences. Many of the publications evolve from each year’s main thematic programs. Interdisciplinary titles also emerge from programs and workshops focusing on applications of mathematics in science, engineering, industry, and business. Volumes 1 to 62 are available for purchase from the American Mathematical Society Online Bookstore, and volumes 63 to 80 are available on the Springer website. The Institute also has a limited number available at our front desk.

2016–2017 Publications


THANK YOU TO OUR DONORS

The Fields Institute conducts an annual giving campaign each year to raise funds in support of our scientific and educational programs. The management and Board of Directors of the Institute wish to express their profound thanks to the following people, whose generous donations in the period of April 2016 to March 2017 are helping to support the work of the Institute.

ANNUAL GIVING CAMPAIGN

Up to $199
Professor Stephen Berman
Peter Fillmore
Professor Ian Goulden
Professor Michele Mosca
Mr. Alexander Rudner (acknowledging Professor Valter Rudner)
Dr. Mary Salisbury
Anonymous (acknowledging Israel Michael Sigal)
Anonymous

$200 to $499
Professor Matt Davison
Dr. Sheila Embleton
Ilias Kotsireas (in honour of Jonathan Borwein)
Mr. John Schoales
Mrs. Mary E. Thompson
Vladimir Vinogradov
Anonymous

$500 to $999
Mr. Ian Ainsworth
Professor Kenneth R. Davidson
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The Estate of James Stewart

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FIELDS MEDAL SYMPOSIUM

Up to $199
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Professor Tom Salisbury

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* Over several years
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Neeti Agnihotri
Accounting Assistant

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Director of Computing Services
Richard Michael
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# GOVERNANCE
2016 - 2017

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<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheila Embleton</td>
<td>York University</td>
</tr>
<tr>
<td>Philip Siller</td>
<td>BroadRiver Asset, Hexagram</td>
</tr>
<tr>
<td>Ian Hambleton</td>
<td>Fields Institute</td>
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<td>University of Toronto</td>
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<td>New York University</td>
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<td>Faisal Habib</td>
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<td>Sandra Crocker</td>
<td>Carleton University</td>
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<td>Xin Gao</td>
<td>York University</td>
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<td>Eric Ruppert</td>
<td>York University</td>
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<td>Juris Steprans</td>
<td>York University</td>
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## Directorate Members

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
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<tbody>
<tr>
<td>Ian Hambleton</td>
<td>Fields Institute Director</td>
</tr>
<tr>
<td>Huaxiong Huang</td>
<td>Fields Institute Deputy Director</td>
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<td>S&amp;P Capital IQ</td>
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<td>David Rudd</td>
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<td>Waterfront International, Ltd.</td>
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<td>Dejan Delic</td>
<td>Ryerson University</td>
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<td>Thomas Duever</td>
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<td>Alain Gosselin</td>
<td>Royal Military College</td>
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<td>University of Guelph</td>
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<td>Raj Srinivasan</td>
<td>University of Saskatchewan</td>
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<tr>
<td>Tzvetan Vassilev</td>
<td>Nipissing University</td>
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<tr>
<td>Lennaert van Veen</td>
<td>UOIT</td>
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## Members at Large

<table>
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<tbody>
<tr>
<td>Ian Ainsworth</td>
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<td>UBC</td>
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<td>Ted Hsu</td>
<td>Physicist</td>
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<td>William Janeway</td>
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<td>Niky Kamran</td>
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<td>Siobhan Roberts</td>
<td>Author</td>
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## Mathematical Sciences Societies Members

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<tr>
<td>Dionne Aleman</td>
<td>University of Toronto, CORS</td>
</tr>
<tr>
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<td>UBC, CMS</td>
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<tr>
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<td>Statistics Canada, SSC</td>
</tr>
<tr>
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<td>UOIT, CACS</td>
</tr>
<tr>
<td>Raymond Spiteri</td>
<td>University of Saskatchewan &amp; CAIMS</td>
</tr>
</tbody>
</table>
Financial statements

The Fields Institute for Research in Mathematical Sciences
March 31, 2017
Independent auditors’ report

To the Board of Directors of
The Fields Institute for Research in Mathematical Sciences

Report on the financial statements

We have audited the accompanying financial statements of The Fields Institute for Research in Mathematical Sciences, which comprise the balance sheet as at March 31, 2017, and the statements of operations, changes in net assets and cash flows for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management’s responsibility for the financial statements

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

Auditors’ responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditors’ judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditors consider internal control relevant to the entity’s preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity’s internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the financial statements present fairly, in all material respects, the financial position of The Fields Institute for Research in Mathematical Sciences as at March 31, 2017, and the results of its operations and its cash flows for the year then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Report on other legal and regulatory requirements

As required by the Corporations Act (Ontario), we report that, in our opinion, Canadian accounting standards for not-for-profit organizations have been applied on a basis consistent with that of the preceding year.

Toronto, Canada
June 26, 2017

Ernst & Young LLP
Chartered Professional Accountants
Licensed Public Accountants

A member firm of Ernst & Young Global Limited
Balance sheet

March 31, 2017

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
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<td>[restated – note 13]</td>
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<tr>
<td><strong>Assets</strong></td>
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<tr>
<td><strong>Current</strong></td>
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<tr>
<td>Cash held by the University of Toronto [note 8]</td>
<td>1,729,384</td>
<td>1,960,379</td>
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<tr>
<td>Cash</td>
<td>603,421</td>
<td>3,503</td>
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<td>Accounts receivable</td>
<td>379,906</td>
<td>403,803</td>
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<td>Harmonized Sales Tax recoverable</td>
<td>88,801</td>
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<td>Prepaid expenses</td>
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<td>15,952</td>
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<td><strong>Total current assets</strong></td>
<td>2,802,857</td>
<td>2,509,050</td>
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<tr>
<td>Investments [note 3]</td>
<td>248,307</td>
<td>220,795</td>
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<td>Capital assets, net [note 4]</td>
<td>173,305</td>
<td>68,786</td>
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<td><strong>Total assets</strong></td>
<td>3,224,469</td>
<td>2,798,631</td>
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<td><strong>Liabilities and net assets</strong></td>
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<td><strong>Current</strong></td>
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<td>Accounts payable and accrued liabilities</td>
<td>627,435</td>
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<td>Deferred revenue</td>
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<td>102,932</td>
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<td>Deferred contributions [note 5]</td>
<td>417,768</td>
<td>484,149</td>
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<tr>
<td><strong>Total current liabilities</strong></td>
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<td>1,081,890</td>
</tr>
<tr>
<td>Commitments [note 11]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Net assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unrestricted surplus</td>
<td>1,082,135</td>
<td>1,495,946</td>
</tr>
<tr>
<td>Internally restricted [note 6]</td>
<td>783,000</td>
<td>—</td>
</tr>
<tr>
<td><strong>Total net assets</strong></td>
<td>2,113,442</td>
<td>1,716,741</td>
</tr>
<tr>
<td></td>
<td>3,224,469</td>
<td>2,798,631</td>
</tr>
</tbody>
</table>

See accompanying notes
The Fields Institute for Research in Mathematical Sciences

Statement of operations

March 31, 2017

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ontario Ministry of Training, Colleges and Universities grant / Ministry of Research and Innovation</td>
<td>$2,040,004</td>
<td>$3,185,726</td>
</tr>
<tr>
<td>Natural Sciences and Engineering Research Council of Canada grants</td>
<td>$1,335,091</td>
<td>$1,169,300</td>
</tr>
<tr>
<td>Operations</td>
<td>440,909</td>
<td>8,026</td>
</tr>
<tr>
<td>Indirect costs</td>
<td>136,462</td>
<td>93,902</td>
</tr>
<tr>
<td>Institute Innovation Platform</td>
<td>848,720</td>
<td>738,841</td>
</tr>
<tr>
<td>Sponsoring</td>
<td>602,884</td>
<td>254,873</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>395,887</td>
<td>120,792</td>
</tr>
<tr>
<td>Registration fees</td>
<td>282,323</td>
<td>144,764</td>
</tr>
<tr>
<td>Other scientific program grants</td>
<td>183,789</td>
<td>113,832</td>
</tr>
<tr>
<td>Math education grants</td>
<td>27,229</td>
<td>3,700</td>
</tr>
<tr>
<td>Investment income [notes 7 and 8]</td>
<td>16,422</td>
<td>17,242</td>
</tr>
<tr>
<td>Publications</td>
<td>11,991</td>
<td>43,111</td>
</tr>
<tr>
<td>Donations [note 7]</td>
<td>52,697</td>
<td>28,219</td>
</tr>
<tr>
<td>Miscellaneous [note 10]</td>
<td>6,005,219</td>
<td>5,039,917</td>
</tr>
<tr>
<td>Net operating surplus for the year</td>
<td>369,189</td>
<td>882,411</td>
</tr>
</tbody>
</table>

See accompanying notes
The Fields Institute for Research in Mathematical Sciences

**Statement of changes in net assets**

March 31, 2017

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unrestricted</td>
<td>Internally</td>
<td>Endowment</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>surplus $</td>
<td>restricted $</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>Balance, beginning of year</td>
<td>1,495,946</td>
<td>—</td>
<td>220,795</td>
<td>1,716,741</td>
</tr>
<tr>
<td>Net operating surplus for the year</td>
<td>369,189</td>
<td>—</td>
<td>—</td>
<td>369,189</td>
</tr>
<tr>
<td>Investment income earned on investments held for endowments in excess of the amount available for spending [note 7]</td>
<td>—</td>
<td>—</td>
<td>27,512</td>
<td>27,512</td>
</tr>
<tr>
<td>Interfund transfers [note 6]</td>
<td>(783,000)</td>
<td>783,000</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Balance, end of year</td>
<td>1,082,135</td>
<td>783,000</td>
<td>248,307</td>
<td>2,113,442</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unrestricted</td>
<td>Internally</td>
<td>Endowment</td>
<td>Total</td>
</tr>
<tr>
<td></td>
<td>surplus $</td>
<td>restricted $</td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td></td>
<td>[restated – note 13]</td>
<td>[note 6]</td>
<td>[note 7]</td>
<td>[restated – note 13]</td>
</tr>
<tr>
<td>Balance, beginning of year</td>
<td>613,535</td>
<td>—</td>
<td>230,549</td>
<td>844,084</td>
</tr>
<tr>
<td>Net operating surplus for the year</td>
<td>882,411</td>
<td>—</td>
<td>—</td>
<td>882,411</td>
</tr>
<tr>
<td>Shortfall of investment income earned on investments held for endowments to the amount available for spending [note 7]</td>
<td>—</td>
<td>—</td>
<td>(9,754)</td>
<td>(9,754)</td>
</tr>
<tr>
<td>Balance, end of year</td>
<td>1,495,946</td>
<td>—</td>
<td>220,795</td>
<td>1,716,741</td>
</tr>
</tbody>
</table>

See accompanying notes
The Fields Institute for Research in Mathematical Sciences

Statement of cash flows

March 31, 2017

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$</td>
<td>$</td>
</tr>
<tr>
<td>[restated – note 13]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net operating surplus for the year</td>
<td>369,189</td>
<td>882,411</td>
</tr>
<tr>
<td>Add item not involving cash</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amortization of capital assets</td>
<td>49,550</td>
<td>37,841</td>
</tr>
<tr>
<td>Changes in non-cash working capital balances related to operations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts receivable</td>
<td>23,897</td>
<td>(40,939)</td>
</tr>
<tr>
<td>Harmonized Sales Tax recoverable</td>
<td>36,612</td>
<td>(1,555)</td>
</tr>
<tr>
<td>Prepaid expenses</td>
<td>14,607</td>
<td>(7,520)</td>
</tr>
<tr>
<td>Accounts payable and accrued liabilities</td>
<td>132,626</td>
<td>(23,413)</td>
</tr>
<tr>
<td>Deferred revenue</td>
<td>(37,108)</td>
<td>53,916</td>
</tr>
<tr>
<td>Deferred contributions</td>
<td>(66,381)</td>
<td>(944,163)</td>
</tr>
<tr>
<td><strong>Cash provided by (used in) operating activities</strong></td>
<td><strong>522,992</strong></td>
<td><strong>(43,422)</strong></td>
</tr>
<tr>
<td>Investing activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase of capital assets</td>
<td>(154,069)</td>
<td>(37,474)</td>
</tr>
<tr>
<td><strong>Cash used in investing activities</strong></td>
<td><strong>(154,069)</strong></td>
<td><strong>(37,474)</strong></td>
</tr>
<tr>
<td><strong>Net increase (decrease) in cash during the year</strong></td>
<td><strong>368,923</strong></td>
<td><strong>(80,896)</strong></td>
</tr>
<tr>
<td>Cash, beginning of year</td>
<td>1,963,882</td>
<td>2,044,778</td>
</tr>
<tr>
<td><strong>Cash, end of year</strong></td>
<td>2,332,805</td>
<td>1,963,882</td>
</tr>
</tbody>
</table>

Cash consists of:

Cash held by the University of Toronto | 1,729,384 | 1,960,379 |
Cash | 603,421 | 3,503 |

**Cash, end of year** | **2,332,805** | **1,963,882**

See accompanying notes
1. Purpose of the organization

The Fields Institute for Research in Mathematical Sciences [the “Institute”] was founded in 1991 with federal and provincial funding. The Institute was incorporated as a corporation without share capital under the Corporations Act (Ontario) by Letters Patent dated September 28, 1994. The Institute is a centre for research in the mathematical sciences. The Institute’s mandate includes programs devoted to leading-edge research in the mathematical sciences; advancement in mathematics education; enhanced graduate and post-doctoral training opportunities; and developing partnerships with industry to encourage technology transfer.

The Institute is a charitable organization under the Income Tax Act (Canada) and, as such, is exempt from income taxes.

2. Summary of significant accounting policies

These financial statements are prepared in accordance with Part III of the CPA Canada Handbook – Accounting, which sets out generally accepted accounting principles for not-for-profit organizations in Canada, and includes the significant accounting policies summarized below.

Revenue recognition

The Institute follows the deferral method of accounting for contributions, which include grants, bequests and other donations. Grants and bequests are recorded when received or receivable if the amount to be received can be reasonably estimated and collection is reasonably assured. Other donations are recorded when received since pledges are not legally enforceable claims. Unrestricted contributions are recognized as revenue when initially recorded in the accounts. Externally restricted contributions, except endowment contributions, are deferred when initially recorded in the accounts and recognized as revenue in the year in which the related expenses are recognized. Externally restricted endowment contributions are recognized as direct increases in net assets when recorded in the accounts.

Sponsoring revenue, which represents membership fees by universities and corporations, is recognized over the period covered by the payment. Conference registration fees are recognized as revenue when the event is held.

Investment income, which consists of interest, dividends, income distributions from the University of Toronto’s [the “University”] Long-Term Capital Appreciation Pool, and realized and unrealized gains and losses, is recorded as revenue in the statement of operations to the extent that the income is made available for spending. Investment income (loss) earned on the Endowment Fund in excess of the amount made available for spending is recorded as a direct increase (decrease) to the Endowment Fund.
The Fields Institute for Research in Mathematical Sciences

Notes to financial statements

March 31, 2017

Capital assets
Purchased tangible capital assets are recorded at cost. Contributed tangible capital assets are recorded at market value at the date of contribution. Amortization is provided on a straight-line basis over the estimated useful lives of the assets as follows:

<table>
<thead>
<tr>
<th>Asset</th>
<th>Useful Life</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture</td>
<td>5 years</td>
</tr>
<tr>
<td>Computer equipment</td>
<td>3 years</td>
</tr>
<tr>
<td>Other equipment</td>
<td>3 years</td>
</tr>
</tbody>
</table>

Expenditures in connection with internally generated intangible capital assets are expensed when incurred.

Financial instruments
Investments in the University's Long-Term Capital Appreciation Pool are recorded at fair value, which is based on reported unit values. Short-term securities are valued based on cost plus accrued income. Transactions are recorded on a trade date basis.

Other financial instruments, including accounts receivable and accounts payable and accrued liabilities, are initially recorded at fair value and subsequently measured at cost, net of any provision for impairment.

Foreign currency translation
Transactions in foreign currencies are translated into Canadian dollars at rates of exchange in effect at the time of the transaction. Monetary assets and liabilities denominated in foreign currencies are translated at the year-end rate. Foreign exchange gains and losses are included in the statement of operations.

Contributed materials and services
The value of contributed materials and services is not reflected in these financial statements.
3. Investments

Investments represent funds held for endowment net assets [note 6]. The funds are invested by the University. As at March 31, the funds were invested in the Long-Term Capital Appreciation Pool managed by the University, which includes investments with the following mix:

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term investments</td>
<td>1.4</td>
<td>0.8</td>
</tr>
<tr>
<td>Government and corporate bonds</td>
<td>29.4</td>
<td>31.9</td>
</tr>
<tr>
<td>Canadian equities</td>
<td>9.7</td>
<td>15.4</td>
</tr>
<tr>
<td>United States equities</td>
<td>19.9</td>
<td>16.9</td>
</tr>
<tr>
<td>International equities</td>
<td>15.2</td>
<td>15.4</td>
</tr>
<tr>
<td>Emerging market equities</td>
<td>10.1</td>
<td>9.4</td>
</tr>
<tr>
<td>Global equities</td>
<td>5.0</td>
<td>10.2</td>
</tr>
<tr>
<td>Other</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100.0</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

Subsequent to year-end, the University has transferred these investments to the Institute.

4. Capital assets

Capital assets consist of the following:

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost</td>
<td>Accumulated amortization</td>
</tr>
<tr>
<td>Furniture</td>
<td>$244,620</td>
<td>$92,324</td>
</tr>
<tr>
<td>Computer equipment</td>
<td>$226,482</td>
<td>$209,480</td>
</tr>
<tr>
<td>Other equipment</td>
<td>$204,599</td>
<td>$200,592</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>675,701</strong></td>
<td><strong>502,396</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cost</td>
</tr>
<tr>
<td>Furniture</td>
<td>$94,674</td>
</tr>
<tr>
<td>Computer equipment</td>
<td>$224,503</td>
</tr>
<tr>
<td>Other equipment</td>
<td>$202,455</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>521,632</strong></td>
</tr>
</tbody>
</table>
5. Deferred contributions
Deferred contributions consist of grants and donations received for specific projects that will be carried out in future periods. The changes in the deferred contributions balance are as follows:

<table>
<thead>
<tr>
<th></th>
<th>2017</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance, beginning of year</td>
<td>484,149</td>
<td>1,428,312</td>
</tr>
<tr>
<td>Restricted contributions received [note 7]</td>
<td>4,558,887</td>
<td>3,810,646</td>
</tr>
<tr>
<td>Amount recognized as revenue</td>
<td>(4,625,268)</td>
<td>(4,754,809)</td>
</tr>
<tr>
<td>Balance, end of year</td>
<td>417,768</td>
<td>484,149</td>
</tr>
</tbody>
</table>

6. Internally restricted net assets
The Board of Directors [the “Board”] internally restricts net assets for designated purposes, as periodically determined by the Board. During the year, the Board approved the transfer of $783,000 [2016 – nil] to internally restricted net assets.

7. Endowment net assets
Endowment net assets consist of externally restricted donations received by the Institute, the income of which is restricted to fund a lecture series. The endowment principal is required to be maintained intact subject to the Institute’s preservation of capital policy.

Institute policy has been established with the objective of protecting the real value of the endowments by limiting the amount of income made available for spending and requiring reinvestment of income not made available. Under this policy, the income available for spending must normally fall between the range of 3% and 5% of the fair market value of the endowment. In any particular year, should net investment income be insufficient to fund the amount to be made available for spending or if the investment return is negative, the amount that is made available for spending is transferred from endowment net assets.

In 2017, 3.7% of the fair value of the investments held for endowments, or $8,571 [2016 – $7,707], was made available for spending and recorded in deferred contributions [note 5]. In 2017, there was an excess of investment income earned on endowments over the amount made available for spending of $27,512 that was added directly to endowment net assets. In 2016, there was a shortfall of investment income earned on endowments to the amount made available for spending of $9,754 that was deducted directly from endowment net assets.

8. Relationship with the University of Toronto
The University is the host site for the Institute and has agreed to provide certain services and access to certain facilities as described in the agreement between the Governing Council of the University and the Institute dated October 1, 1995. The agreement is for a term of 25 years. The Institute is currently in the process of renegotiating the terms of this agreement.
The University has licensed the Institute to use the premises located at 222 College Street, Toronto, Ontario and charged the Institute an annual “Block Fee” of $770,503 [2016 – $757,065] for the cost of this space and services.

The University processes all transactions for the Institute. Interest is earned or paid on the average monthly cash balance held by the University. In 2017, interest income of $9,143 [2016 – $9,383] was earned and has been included in investment income in the statement of operations.

9. The American Friends of Fields Foundation

During the year, the Institute received nil [2016 – nil] from The American Friends of Fields Foundation [“US Foundation”] that is recorded as endowment contributions in the statement of changes in net assets. As at December 31, 2016, the US Foundation had unrestricted net assets of US$21,155 [2015 – US$21,383] based on unaudited financial statements.

10. Related party transactions

The Institute provides space, administrative and other services to incubated companies. A Board member of the Institute is a Director of one of these companies, and a Director of the Institute is related to a Director of another company. During the year, the Institute earned income of $9,000 [2016 – nil] from the first company and $4,500 [2016 – $7,500] for the second company. Total income from incubated companies during the year was $21,000 [2016 – $17,500], which has been recorded as miscellaneous income in the statement of operations.

The Institute grants funds to another organization for scientific activities and also provides administrative support to this organization. The Institute and the organization share a common Board member, and a Director of the Institute is also a Board member of this organization. During the year, the Institute granted the organization $197,128 [2016 – $172,216], which is recorded in general scientific expenses in the statement of operations. In addition, the Institute has future funding commitments to this organization of $200,000 in 2018 and 2019.

Related party transactions are recorded at the exchange amount agreed upon by the parties.

11. Commitments

The Institute has commitments to make payments under funding agreements in future years as follows:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>240,000</td>
</tr>
<tr>
<td>2019</td>
<td>240,000</td>
</tr>
</tbody>
</table>
12. Financial instruments
The Institute is exposed to various financial risks through transactions in financial instruments.

Currency risk
The Institute is exposed to currency risk with respect to the underlying investments of the University’s Long-Term Capital Appreciation Pool denominated in foreign currencies because the fair value and future cash flows will fluctuate due to the changes in the relative value of foreign currencies against the Canadian dollar.

Credit risk
The Institute is exposed to credit risk in connection with its accounts receivable and because of the risk that one party to the financial instrument may cause a financial loss for the other party by failing to discharge its obligation.

Interest rate risk
The Institute is exposed to interest rate risk with respect to its investment in the University’s Long-Term Capital Appreciation Pool that holds fixed income securities because the fair value will fluctuate due to changes in market interest rates.

Other price risk
The Institute is exposed to other price risk through changes in market prices [other than changes arising from interest rate or currency risks] in connection with its investment in the University’s Long-Term Capital Appreciation Pool.

13. Correction of accounting error
During the year, the Institute received an instalment related to a bequest that had not been accrued as revenue and accounts receivable in the year ended March 31, 2016. As a result, the financial statements for the 2016 comparative year have been retroactively restated to correct this error. On the statement of operations, donations revenue and net operating surplus increased by $190,000 (previously reported as $63,873 and $692,411, respectively), with a corresponding increase in unrestricted net assets in the statement of changes in net assets (previously reported as $1,305,946). On the balance sheet, accounts receivable and unrestricted net assets increased by $190,000 (previously reported as $213,803 and $1,305,946, respectively). On the statement of cash flows, net operating surplus and change in accounts receivable increased by $190,000 (previously reported as $692,411 and $149,601, respectively).