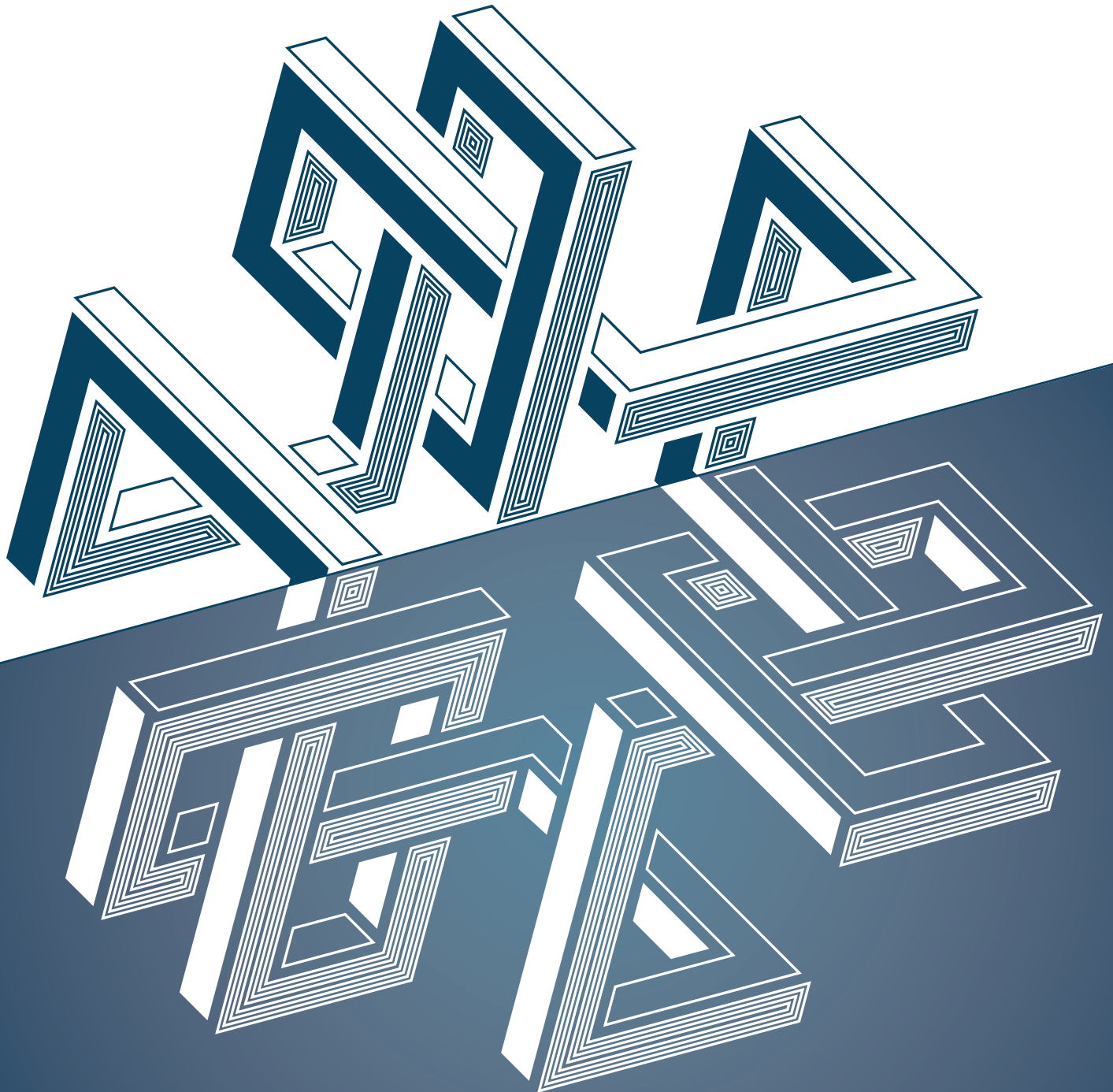


Canadian Mathematical Society

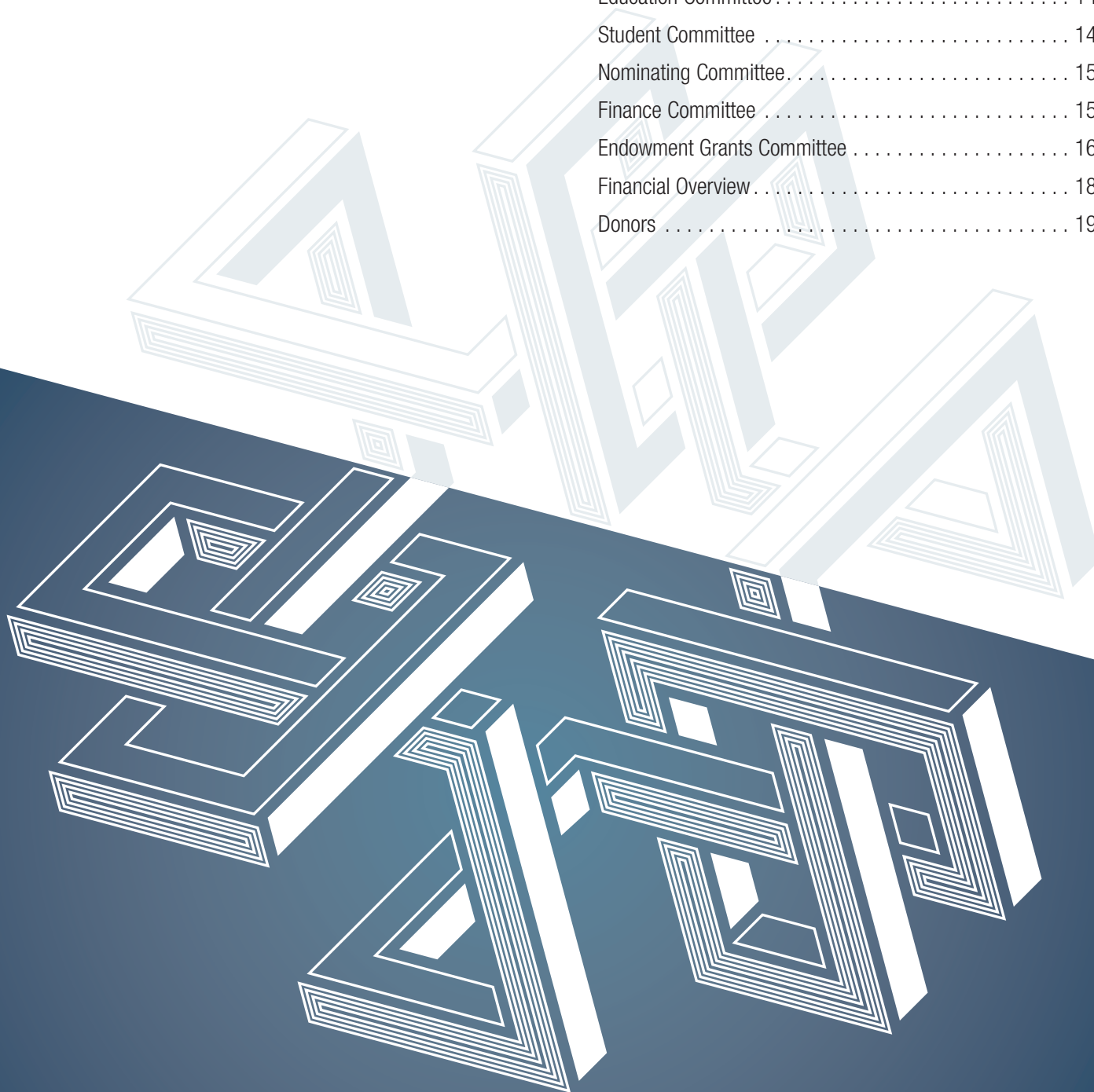
# Annual Report

2017



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*\*Also members of the Executive*

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### CMS Notes Editorial Board

Editors-in-Chief: Robert Dawson and Srinivasa Swaminathan (Dalhousie)

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Editor-in-Chief: Kseniya Garaschuk (Fraser Valley)

### CMS Books in Mathematics Series Editorial Board

Editors-in-Chief: Karl Dilcher and Keith Taylor (Dalhousie)

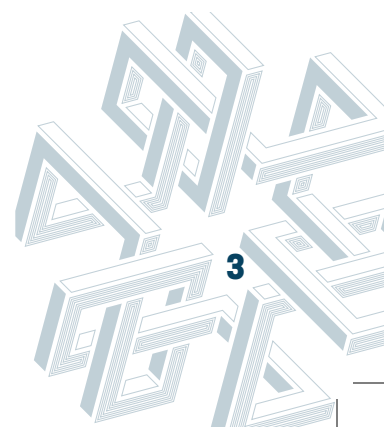
## Administrative Offices

### Executive Office

Yvette Roberts – Manager, Finance & Operations  
Alan Kelm – Manager, Electronic Services  
Denise Charron – Manager, Memberships & Publications  
Val Kelly – Manager, Meetings and Events (*Sarah Watson on leave*)  
Patricia Dack – Fundraising and Communications Officer  
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Srinivasa Swaminathan – Associate Technical Editor  
Lee-Ann Baldwin – Administrative Assistant  
Penny Gilbert – Technical Assistant



## President's Report

### Michael Bennett (UBC)



In 2017, the Canadian Mathematical Society (CMS) experienced another year of change and challenge. In the summer, we played host to the largest mathematics conference to be held in Canada since the International Congress of 1974, the Mathematical Congress of the Americas (MCA) 2017, in Montreal, QC. In addition, we

had a highly-successful Winter meeting in Waterloo, Ontario, coinciding with the 50<sup>th</sup> anniversary of the founding of their Faculty of Mathematics. Many special thanks are owed to the scientific directors, session organizers, committee members, volunteers and staff who made these meetings successful. In the coming year, the 2018 Summer Meeting will be held in Fredericton, New Brunswick, and the 2018 Winter Meeting will take place in Vancouver, British Columbia.

The Society also saw plans advanced for transforming our journal publishing through a partnership with an internationally recognized academic publisher, the details of which will be forthcoming. This transition from our own highly-regarded “in-house” publishing operation in Manitoba is of critical importance, in helping to ensure the financial health of the Society going forward. At the same time, we must make every effort to strive to maintain the high production quality that is a hallmark of our journals.

The CMS Executive Office has continued to run smoothly during this period thanks to our dedicated staff in Ottawa and the remarkable work of Graham Wright. Our single most major challenge facing us in 2018 is our search for Graham's successor as Executive Secretary.

As the reader will note from later in this report, in 2017 the Society was able to honour a wide variety of distinguished educators and researchers: Robert McCann (Jeffery-Williams Prize), Stephanie van Willigenburg (Krieger-Nelson Prize), Sabin Cautis (Coxeter-James Prize), Konstantin Tikhomirov (Doctoral Prize), Richard Hoshino (Adrien Pouliot Award), Bernard Hodgson (Excellence in Teaching Award), Alan Beardon (G. de B. Robinson Award) and Joseph Khoury (Graham Wright Award for Distinguished Service). These remarkable people represent the breadth and diversity of Mathematics at the University level in Canada.

Math Team Canada placed 29<sup>th</sup> at the 2017 International Mathematical Olympiad (IMO) in Rio de Janeiro, Brazil, bringing home 1 gold, 2 silver and 2 bronze medals. The first of these was awarded to William Zhao who placed 14<sup>th</sup> overall. Congratulations to the team and everyone involved.

As this 2017 Annual Report demonstrates, the year was a busy one for the CMS. I encourage all members to get involved in CMS's activities, promoting the advancement of mathematics in Canada.

My term as President ends on June 3, 2018 and I wish to thank the Executive, Board, Staff and CMS members and volunteers for their support during my two years as President, and to especially thank those Vice Presidents, members of the Board of Directors and Committee Chairs whose terms expired in 2017. In addition, I would like to express my gratitude to Graham Wright for his continued service to the CMS. I welcome Mark Lewis as incoming President and wish him every success.

## Prizes & Awards

### Jeffery-Williams Prize



#### Robert McCann (Toronto)

Dr. McCann is at the forefront of the new development of the theory of optimal transportation. At first sight, problems related to transportation may appear simple, yet the recent work of Dr. McCann has impact in geometry,

analysis, dynamics, partial differential equations, economics, weather prediction and computer vision. McCann, together with his collaborators and peers worldwide, has led a renaissance in the theory of optimal transportation, helping to transform it into one of the most vibrant and exciting areas in mathematics today.

One of McCann's seminal contributions was his discovery linking optimal transport to the fundamental geometric notions of curvature—sectional, Ricci and mean. Sectional curvature compares the median of each triangle in a given space to one in a model space, such as the Euclidean plane or sphere; in Einstein's relativistic theory of gravity it represents the local strength of the tidal force. Ricci curvature represents the average sectional curvature of all triangles sharing a given side; it detects the local presence of matter or energy in Einstein's theory. Mean curvature measures how much one space bends inside another; it is proportional to the pressure difference across a soap film. Although originally motivated by quite different goals, McCann's work links transportation to all three.

### Krieger-Nelson Prize



#### Stephanie van Willigenburg (UBC)

An expert in algebraic combinatorics, Professor Stephanie van Willigenburg has made significant contributions to the combinatorial understanding of a variety of special functions. She is highly regarded in the Canadian mathematics

community and worldwide. She has been recognized with many international prizes and her research papers are very warmly received. She has an extraordinary talent for communicating mathematics and gives spectacular talks. One of the thriving forces in Prof. van Willigenburg's research is the combinatorial study of "Schur like" functions in different spaces and their generalizations. These are fundamental objects that manifest themselves in various areas of mathematics and the sciences. Her research with

collaborators is full of deep insight that has motivated many to push beyond what was initially expected, and to succeed. Algebraic combinatorics is a vibrant area of mathematics, with connections to many other areas of mathematics such as representation theory, algebraic geometry, mathematical physics, topology and probability. Within algebraic combinatorics, a central topic of research is the study of symmetric functions, and the fundamental objects in this space are Schur functions.

### Coxeter-James Prize



#### Saubin Cautis (UBC)

Professor Sabin Cautis (University of British Columbia) is a leader in the new and rapidly developing field of categorification as it relates to geometric representation theory, algebraic geometry, mathematical physics and

low-dimensional topology. Categorification is a search for deeper structure behind invariants in algebra and topology. An elementary example of this phenomenon is the relationship between the Betty numbers of a manifold and its homology groups. The homology groups are richer invariants and the Betty numbers can be recovered as their dimensions. Similarly, vector space invariants (or more generally, representation-theoretic invariants) can sometimes be "upgraded" to categories (respectively, categories with an action). The original vector space can then be recovered as the Grothendieck group of the category and when this is possible, the resulting categorical invariant contains new information. For example, representations constructed this way contain remarkable canonical bases, coming from the small objects in the category.

### Doctoral Prize

#### Konstantin Tikhomirov (Princeton)



Dr. Konstantin E. Tikhomirov has made outstanding contributions to several open problems in probability theory, convex geometry, functional analysis, and random matrix theory. He currently holds a postdoctoral position at Princeton University and has been

offered a prestigious Viterbi Postdoctoral fellowship at MSRI for the Fall 2017 semester program on Geometric Functional Analysis and Applications. In his doctoral studies, Konstantin

Tikhomirov investigates a series of open problems in diverse areas of mathematics. He wrote at least ten papers related to Asymptotic Geometric Analysis, Random Matrices, Probability Theory, and Convex Geometry. In particular, he worked on the problem of estimating the distance between an  $n$ -dimensional polytope with a fixed number of vertices and the Euclidian ball. In this case he solved the exact dependence between the dimension and the number of vertices. Konstantin Tikhomirov also considered problems like understanding better the limit of the smallest singular value of some families of random matrices, or when does the convex hull of a random walk includes the origin. The impact of his work will have many ramifications as it is innovative and can be applied in other situations.

### Adrien Pouliot Award



#### Richard Hoshino (Quest)

Richard Hoshino is honoured for the impact his work has had within the Canadian mathematical community, and for his involvement with several important outreach activities in Canada and beyond. Richard was attracted to mathematics and problem solving at an early age. He finished second at the Canadian Mathematical Olympiad in 1996, and went on that year to take a silver medal at the International Mathematical Olympiad in India. His passion for mathematics and problem solving continued, and, with it, his determination to share his passion with others. As an undergraduate at the University of Waterloo, Richard received two honourable mentions in the Putnam Mathematics Competition, and taught a 3<sup>rd</sup>-year undergraduate mathematics course on problem solving. While still an undergraduate, he won the university-wide “Distinguished Award for Teaching” in 2001. He followed the same path in graduate school at Dalhousie, with the “Award for Teaching Excellence” in 2002 for teaching courses in calculus and problem solving.

As a way to reach even more students, with John Grant McLoughlin, Richard wrote *Combinatorial Explorations*, a lively booklet of episodes suitable for the classroom, published in the CMS ATOM series. More recently, Richard wrote a novel “The Math Olympian” aimed at young people. This inspiring work tells the story of a young woman whose dream is to represent Canada in the IMO, and encounters social, gender, and spiritual barriers. In the end she overcomes them, accomplishes her goal, learns some wonderful mathematics, and gains a new direction for her life. The book has received outstanding reviews at Amazon and Goodreads, has sold over 1000 copies.

### Excellence in Teaching Award



#### Bernard Hodgson (Laval)

Bernard Hodgson’s career has been devoted to promoting excellence in the teaching of mathematics. His influence has been felt at many levels: he inspired elementary and high school teachers, and people teaching at universities, CEGEPs and colleges. It was felt in his department at Université Laval, but also provincially, nationally, and internationally. As a university teacher Bernard has taught more than twenty different undergraduate courses, including five first-year courses. His students write in glowing terms of Bernard’s enthusiasm and passion for mathematics, about his skill in communicating ideas, his attentiveness to students, and his ability to motivate them. It is clear from testimony that Bernard’s teaching has had a lasting influence in the lives of many students who have taken a course from him. Bernard made an enormous contribution at Université Laval in designing new mathematics courses aimed at students seeking careers as teachers at the various levels of the education system: primary, secondary, and college. The notes which Bernard wrote for these courses reflect an exemplary coherence and clarity of vision. *(Photo credit: Marc Robitaille)*

## Math Camps

Each summer, CMS Math Camps provide students with an interest in mathematics with a unique and unforgettable experience. The camps take place in universities and CEGEPs across Canada and range from day camps to week long events. Students who attend the camps leave with new friends, new ideas, and a new outlook on mathematics. CMS Math camps are a great opportunity to enhance life long skills and knowledge, gain a new perspective on mathematics and make new friends with similar interests. In 2017 the CMS offered 20 Regional Camps, 3 National Camps and 2 Specialty Camps.



## G. de B. Robinson Award



**Alan Beardon** (formerly Cambridge)

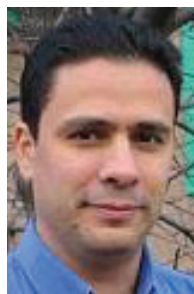
Dr. Alan Beardon was the 2017 recipient of the G. de B. Robinson Award for his paper on Non-discrete frieze groups published in the Canadian Mathematical Bulletin (Canad. Math. Bull. 59 (2016), 234-243). This paper deals with groups of real isometries which map the real

number line to itself, with a particular focus on studying the conjugacy classes of the groups whose discrete forms correspond to the seven classic frieze groups. The results of this paper (written in an effective way to make itself more accessible to the reader) will be of interest to a wide audience.

For the last fifteen years, Beardon has devoted much of his time to the African Institute of Mathematical Sciences (AIMS) in South Africa, and has lectured at AIMS Ghana and AIMS Tanzania. He is the author of eight texts and nearly 200 research papers. Beardon is interested in many areas of pure mathematics, and particularly in applying ideas that cross subject boundaries.

Beardon's first two teaching positions were at the University of Maryland, 1964-66, working with Professor Joe Lehner, and the University of Kent at Canterbury, 1966-68. He obtained his Ph.D. in 1964 from Imperial College, London, under the supervision of Professor Walter Hayman. Since then, Beardon had been at the University of Cambridge until his retirement in 2007.

## Graham Wright Award for Distinguished Service



**Joseph Khoury** (Ottawa)

In addition to serving on and frequently chairing numerous CMS committees over the years, Dr. Khoury has often “stepped up” to take on everything from daily challenges to long-term projects benefiting the society, demonstrating time and time again his remarkable level

of commitment to the well-being of the CMS as a whole.

His contributions to the greater mathematical community are equally diverse, ranging from committee service, to writing books that attract readers to mathematics, to developing successful and sustained outreach activities at many levels, focused on improving the general community's perception of mathematics and mathematics education. Dr. Khoury is “the kind of individual who sees what needs to be done – or what can be done – and finds a way to make it happen”. Khoury has also been involved in many projects related to the general perception of mathematics and mathematical education.

Dr. Khoury received his B.Sc. (Hons.) from the Lebanese University in Beirut and his Ph.D. from the University of Ottawa in 2001, for a thesis focused on types of locally nilpotent derivations, a subject linked to Commutative Algebra and Algebraic Geometry. Since 2001, Dr. Khoury has held the position of coordinator of the Math Help Center and Instructor in the Department of Mathematics and Statistics at the University of Ottawa, where he also leads the department's outreach program. Joseph has published a number of scientific articles in referred journals and he is currently writing his third book entitled *A tale of Discrete Mathematics*.



## Committee Reports

### Research Committee

Chair: Nantel Bergeron (York)

The CMS Research Committee oversees the research activities of the Society including the selection of the scientific organizers for the summer and winter meetings, participating in the scientific organization of these meetings and advising the Executive Committee on research related issues.

The Research Committee plays a major role in the selection of winners for research-related prizes: the Coxeter-James Prize, recognizing a young mathematician who has made outstanding contributions to mathematical research; the Jeffery-Williams Prize, recognizing a mathematician who has made outstanding contributions to mathematical research; and the Krieger-Nelson Prize, recognizing outstanding research by a female mathematician.

The Research Committee also oversees the selection of the CMS Doctoral Prize, recognizing outstanding performance by a doctoral student.

With the support from PIMS, Fields, CRM, and AARMS, the CMS semi-annual national meetings attracted nearly 1,500. Together, the summer and winter meetings included more than 100 scientific sessions, encompassing 121 talks, 10 plenary lectures, 6 Prize Lectures and 3 public lectures.

In 2017, the CMS summer meeting was joint with the Mathematical Congress of the Americas involving societies throughout the Americas.

### MCA 2017/CMS Summer Meeting

The second Mathematical Congress of the Americas (MCA) took place at Centre Mont-Royal and McGill University, July 24 to 28, 2017. Building on the success of the first congress which took place in Mexico in 2013, approximately 1100 mathematicians from North America, Central America, South America and the Caribbean attended.

The main goals of the MCA are to highlight the mathematical achievements of the Americas on an international level and to foster further collaboration between the continents' researchers, students, institutions and mathematical societies. The Canadian Mathematical Society (CMS) was honoured to be the host to many invited speakers, participants, award winners and students from the Americas.

The first event was the Opening Ceremony that included the announcement of the recipients of the Americas Prize as well

as the Solomon Lefschetz, and the MCA Prizes. A welcome reception on Sunday night set the tone for a most successful event and gave registrants the chance to meet and connect with colleagues before the week ahead.

The CMS Krieger-Nelson (Stephanie van Willigenburg - UBC) and Jeffery-Williams (Robert McCann - Toronto) prize lectures preceded the welcome reception and various other CMS activities took place during MCA 2017.

MCA 2017 included two public lecturers, Erik Demaine (MIT) and Étienne Ghys (ENS Lyon); and five plenary speakers: Shafrira Goldwasser (MIT, USA); Yuval Peres (Microsoft Research, USA), Manuel de Pino (Universidad de Chile); Peter Ozsvath (Princeton University, USA); and Kannan Souñdararajan (Stanford University, USA). In addition there were 20 other invited lecturers, more than 70 special sessions, and seven prize lectures.

As part of the conference, participants were treated to a lively discussion on Gender and Mathematics in McGill's Trottier Atrium. The Panel included the Director of Research and Analysis for the Association for Women in Science (AWIS), Heather Metcalf, and Associate Professor of Psychology at New York University, Andrei Cimpian.

Student mathematicians organized an Early Career Panel, 16 Student Research Presentations, 19 poster sessions, 16 contributed talks including a CV Writing Workshop, as well as a Fireworks Outing and Social.

The MCA Banquet was well attended and was a wonderful culmination to the week. The Canadian Mathematical Society wishes to thank the members of the organizing committee, the program committee, the steering committee, the awards subcommittee and the Council for MCA for helping the meeting be such a success. The Society is very grateful for the support from McGill University, Université de Montréal, the CMS Research Institutes (CRM, Fields and PIMS), the AMS and the members of the organizing committee, particularly Jacques Hurtubise and Susan Friedlander.

The next MCA is scheduled for 2021 in Buenos Aires.

### 2017 CMS Winter Meeting

More than 350 mathematicians were welcomed to the University of Waterloo for the 2017 CMS Winter meeting, December 8 to 11<sup>th</sup> and to help celebrate the 50<sup>th</sup> anniversary of the Faculty of Mathematics. Participants attended 23 Regular Sessions; five Plenary Lectures; four Prize Lectures and one Public Lecture during the course of the meeting.



The meeting opened with an hilarious Public Lecture given by Professor Edward Burger (Southwestern) on "How Always to Win at Limbo" which was enjoyed by a packed house and included an hilarious 'limbo demo' which you can find on the CMS Facebook page!

On Sunday December 10<sup>th</sup> the CMS Awards Banquet recognized the following 2017 CMS Award winners: Professor Richard Hoshino (Quest) recipient of the Adrien Pouliot Award; Bernard Hodgson (Laval) recipient of the Excellence in Teaching Award; Professor Sabin Cautis (UBC) recipient of the Coxeter-James Prize; Konstantin Tikhomirov (Princeton) recipient of the Doctoral Prize; and Alan Beardon (Cambridge) and Joseph Khoury (Ottawa) recipients of the G de B Robinson Award and the Award for Distinguished Service respectively.



Bernard Hodgson (Laval) receives the Excellence in Teaching Award

Professor Jeremy Quastel (Toronto) was named the recipient of the 2018 Centre de recherche mathématiques - Fields - PIMS Prize Winner.

The Student Poster Awards were also presented at the banquet - AARMS Prize: Farinaz Forouzannia (Waterloo); CMS President's Prize: Behnoosh Zamanlooy (Concordia); and the CMS Student Committee Prize: François Larivière (Montréal).



Behnoosh Zamanlooy (Concordia) receives the CMS President's Prize

The CMS would like to acknowledge the financial and administrative support from the Faculty of Mathematics, University of Waterloo with particular thanks to Kenneth Davidson and Cameron Stewart Co-Scientific Directors, Kathryn Hare (Chair - Department of Pure Mathematics) and the staff of the University of Waterloo.

Finally the CMS wishes to acknowledge the 23 session organizers for their part in making the 2017 CMS Winter Meeting a success.

IMO Send-Off Reception 2017



## Upcoming International Meetings

### International Congress on Mathematical Physics 2018 (ICMP)

**M $\cap$  $\Phi$**   
**ICMP**  
**2018**  
**MONTRÉAL**

After 35 years, the International Congress on Mathematical Physics (ICMP) will return to North America in 2018, which will also mark the first time that Canada will host the congress. The ICMP, on its three year cycle, is the most important event of the International Association of Mathematical Physics. The XIX<sup>th</sup> ICMP will take place in Montreal in 2018, and, following recent tradition, it will be preceded by the Young Researchers Symposium (YRS). The YRS will be held at McGill University from July 20 to July 21 and the ICMP will be held at the Centre Mont-Royal and McGill University from July 23 to July 28.

Canada is looking forward to welcoming the world of mathematical physics in 2018! ICMP 2018 will be staged by the CMS in collaboration with many physics and mathematics organizations, including: CRM, McGill University, PIMS, FIELDS, ISM, AARMS, CANSSI, BIRS, Perimeter Institute, U. Montréal, and UQAM.

### International Affairs Committee

Chair: Martin Barlow (UBC)

The International Affairs Committee acts as a liaison between the Canadian mathematical sciences community and various international organisations relating to mathematics and mathematics education. The committee includes representatives from other national organisations such as CAIMS and SSC and, for the International Mathematical Union, the committee acts as the Canadian National Committee.

The committee also interacts with the National Research Council of Canada, which provides the funding for Canada's membership for International scientific organisations.

Canada has been a member of the International Mathematical Union (IMU) since 1932, and since 1998 has been a "group V" country – the top category. The main task of the IAC in 2017 was the selection of the Canadian delegation to the 2018 meeting of the IMU, which takes place just before the International Congress of Mathematicians. The 2018 Canadian delegation is: Alejandro Adem (UBC); Henri Darmon (McGill); Jim Colliander (UBC); Ian Hambleton (McMaster); and Luc Vinet (Montréal).

### Publications Committee

Chair: Javad Mashreghi (Laval)

2017 was an extremely busy year for the Publications Committee on a number of issues. The most essential issue was the formation of a special task force subcommittee to pursue the future of CMS publications and to look for an appropriate publication house to assume the production and distribution of CJM and CMB. In fact, Karl Dilcher and Rahim Mousa initiated the movement and contacted several publication houses in 2016. Subsequently, the subcommittee continued this work, an RFP was prepared and the responses were evaluated by the subcommittee. Based upon numerous discussions, face to face meetings and conferences calls, the subcommittee submitted a recommendation to the Publications Committee. After further review by the committee, the recommendation was approved and was sent to the Executive Committee for further consideration.

On other issues, a new edition of the publication "The Canadian Mathematical Olympiad 1969-1993" to celebrate the CMO's 50th anniversary in 2018 was considered and will be pursued by the CMS Publications Office. Most of the remaining committee business included some "housekeeping" issues.

In 2017, the CMS published the following:

- Canadian Journal of Mathematics, (Volume 69);
- Canadian Mathematical Bulletin, (Volume 60);
- Crux Mathematicorum, (Volumes 42 and 43); and
- A Taste Of Mathematics (ATOM) Volume XVII: Recurrence Relations.

### Mathematical Competitions Committee

Chair: Dorette Pronk (Dalhousie)

The Mathematical Competitions Committee (MCC) oversees the Society's involvement in several mathematics contests. The Society sponsors and runs two competitions: the Canadian Open Mathematics Challenge (COMC) and the Canadian Mathematical Olympiad (CMO). The MCC is also responsible for Canada's participation in the Asian Pacific Mathematics Olympiad (APMO) and the International Mathematical Olympiad (IMO) in addition to related training camps and the CMS National Math Camp. The CMS wishes to thank Sun Life Financial for its tremendous support for the CMS competitions program for many years. This valuable sponsorship ended in 2017. The Actuarial Profession, particularly the Casualty Actuarial Society (CAS) and the Society of Actuaries (SOA), are generously supporting the COMC as Premier Sponsors for the next three years.

Most of the work of the MCC is done by its three subcommittees (the COMC, CMO, and IMO committees). Further information, including press releases, on most of the items in this report can be found through the CMS Competitions web pages: [www.cms.math.ca/Competitions](http://www.cms.math.ca/Competitions) and [www.cms.math.ca/MediaReleases](http://www.cms.math.ca/MediaReleases)

The MCC and (especially) its subcommittees have been very active, with a large number of deadlines throughout the year. We would like to thank all members for their enthusiasm, reliability, and hard work in making sure that everything ran smoothly. The CMS Executive Office staff also deserve considerable thanks for their dedication and support.

### The Canadian Open Mathematics Challenge

The 22<sup>nd</sup> writing of the COMC, the first one sponsored by the Casualty Actuarial Society and the Society of Actuaries, took place on November 2-3, 2017. The contest was again supported by a partnership of universities across Canada. The CMS extends a special note of thanks and appreciation to all the volunteers, at several locations across the country, who helped to mark the competition papers. The CMS was delighted to have the support of Crowdmark for the grading of the 2017 COMC. This cooperation made it much easier to complete our re-marking of the top papers since the graders could work at their location. Other potential benefits from using Crowdmark will occur as the graders become more familiar with the Crowdmark system.

The competition questions were developed by the 2017 Problem Committee which consisted of Margo Kondratieva (Chair), Eddy Liu, Shawn Godin, Margo Kondratieva, Mohamed Omar, and James Rickards, along with problem submissions from Richard Hoshino and Adrian Tang.

The COMC serves several purposes. First and foremost, it aims to encourage students in their exploration of mathematics and problem solving. Second, the COMC provides an enrichment activity for teachers to use with their students during the fall term. Third, the COMC is used by the CMS to identify students to write the Canadian Mathematical Olympiad and who will be invited to attend, among other events, the Winter Training Seminar and the National Math Camp.

Almost 5900 students wrote the 2017 COMC (5278 in Canada and 616 elsewhere). There were two perfect papers (both in Canada) and the median mark of 36.5 out of 80 was 3.5 points higher than the previous year.

As in previous years, the top awards in the 2017 COMC were given in two categories:

Canadian-schooled students, and students (regardless of citizenship) at schools outside Canada. The top competitors in the Canadian category were:

- Gold Awards: Qinyu Cui (Montreal Math Circle, Montreal, QC) and Alvin Zou (Olympic Educational Centre, Vancouver, BC)
- Silver Award: Victor Rong (Marc Garneau C.I., Toronto, ON)
- Bronze Award: Edgar Wang (Collège Jean-de-Brébeuf, Montreal, QC)
- Three other Canadian students were named to the Honour Roll:
  - Howard Halim, University of Toronto Schools, Toronto, ON;
  - Andrew Lin, University Hill Secondary School, Vancouver, BC;
  - William Zhao, Richmond Hill H.S., Richmond Hill, ON.

Math Team Canada 2017



In the International category the top competitors were:

- Gold Award: Thomas Guo, Phillips Exeter Academy, USA
- Silver Award: Freddie Zhao, ICAE, USA
- Bronze Award: Michael Ken, Phillips Academy, USA
- Four more students were listed on the International Honour Roll:
  - August Chen, Redmond High School, USA
  - Kevin Cong, Bergen County Academies, USA
  - Bill Qin, Phillips Academy, USA
  - Chittesh Thavamani, ICAE, USA

In addition, hundreds of awards were given at the provincial level and at various regional and grade levels. A number of prizes were also awarded to teachers in appreciation of their participation in the 2017 COMC.



From left to right: Thomas Guo (left 1), William Zhao (middle), and Victor Rong (right 1)

Further details are available at [www.cms.math.ca/Competitions/COMC](http://www.cms.math.ca/Competitions/COMC).

## The Canadian Mathematical Olympiad

The 49<sup>th</sup> Canadian Mathematical Olympiad (CMO) was written by 81 candidates on March 29, 2017. Most students were invited to write the CMO based upon their performance in the 2016 Canadian Open Mathematics Challenge or the CMO Qualifying Repêchage, a set of 8 problems posted online in the first half of February with invited participants having one week to submit solutions. The Repêchage was assembled by a group of volunteer experts, chaired by Lino Demasi, who was helped with the grading by Mark Saaltink and Graeme Kemkes. The top students from the Repêchage were invited to the CMO with a few additional students based on high school competition results in Alberta and Québec.

The following students received prizes:

### FIRST PRIZE and the CMO Cup:

- Thomas Guo, Olympiads School, North York, ON

### SECOND PRIZE:

- Rui Ming Xiong, Western Canada High School, Calgary, AB.

### THIRD PRIZE:

- Victor Rong, Marc Garneau Collegiate Institute, Toronto, ON.

### HONOURABLE MENTIONS:

- Edward Jiang, Moscrop Secondary School, Burnaby, BC;
- Michael Li, Marc Garneau Collegiate Institute, Toronto, ON;
- Jason Yuen, Pierre Elliot Trudeau High School, Markham, ON;
- William Zhao, Richmond Hill High School, Richmond Hill, ON;
- Daniel Zhou, Centennial Collegiate, Saskatoon, SK.

### INTERNATIONAL HONOURABLE MENTIONS:

- Qi Qi, Phillips Exeter Academy, Exeter, NH, USA;
- Freddie Zhao, ICAE, Troy, MI, USA.



From left to right: Thomas Guo, Victor Rong, Jeffrey Liu, Jason Yuen, and William Zhao

A full report of the 2017 CMO, including the question paper, solutions and analysis of the results can be found at [www.cms.math.ca/Competitions/CMO](http://www.cms.math.ca/Competitions/CMO).

## The Asian Pacific Mathematics Olympiad

The 29<sup>th</sup> Asian Pacific Mathematics Olympiad (APMO) was written on March 13, 2017 in North and South America, and on March 14 in the Western Pacific and Asia, with Mexico serving as the coordinating country. Of the 28 Canadian students who wrote the four hour competition, 10 were Canada's top scorers:

- The top Canadian student was William Zhao (Richmond Hill High School, Richmond Hill, ON), who was given a Gold Award.
- Qi Qi (Phillips Exeter Academy, Exeter, NH, USA) and Victor Rong (Marc Garneau Collegiate Institute, Toronto, ON) were given Silver Awards.
- Bronze Awards went to Rui Ming (Max) Xiong (Western Canada High School, Calgary, AB), Kai Sun (A.B. Lucas Secondary School, London, ON), Andrew Lin (University Hill Secondary School, Vancouver, BC), and Nicholas Sun (Phillips Exeter Academy, Exeter, NH, USA).

- Honourable Mentions went to Ruizhou Yang (University Hill Secondary School, Vancouver, BC), Angela Deng (North Carolina School of Science and Mathematics, Durham, NC) and Jason Yuen (Pierre Elliot Trudeau High School, Markham, ON).

Canada ranked 8<sup>th</sup> among 39 participating countries. Further details regarding the APMO are available through [www.cms.math.ca/Competitions/APMO](http://www.cms.math.ca/Competitions/APMO)

### International Mathematical Olympiad

The 2017 IMO Winter Training Camp was hosted by York University, January 3-8, 2017, and was attended by thirteen high school students (eleven male and two female) from across Canada. The local organizer was Neal Madras, assisted by Ann-Marie Carless, Ada Chan, Alfred Pietrowski, Tom Salisbury, Hongmei Zhu, Suzanne Park, and the staff of Norman Bethune College at York. The 2017 IMO team leaders (James Rickards, Sarah Sun and Matthew Brennan) organized the camp with help from additional trainers - Byung Chun, Alex Song, and David Arthur.

The Summer Training Camp took place at BIRS in Oaxaca (Mexico) from July 2-16, 2017, after a send-off event at the University of Toronto. Parents and family members, representatives from the Brazilian and Mexican consulates, former contestants, and teachers and students from local math training centers attended the send-off. The Summer Training Camp was conveniently located on the way to Rio de Janeiro – the host city for the 2017 IMO. The Canadian and Mexican team leaders organized the training in Oaxaca. Many thanks go to Rogelio Valdez (leader), Marco Ibarra (leader observer), Jorge Vargas (deputy leader), as well as the other trainers: Daniel Perales, David Torres, Enrique Treviño, and Eduardo García. They acted as the main planners

for this training camp; without them, this would not have been possible!

The 58<sup>th</sup> International Mathematical Olympiad (IMO) took place in Rio de Janeiro, Brazil, from July 12 to 23, 2017. The Team Leader was James Rickards (McGill), the Deputy Leader was Sarah Sun (TD Bank and Waterloo), and the Deputy Leader Observer was Matthew Brennan (MIT). The six high school students on the Canadian team (Canadian citizens or permanent residents) were:

- Thomas Guo, William Berczy Public School (Markham, ON);
- Qi Qi, Phillips Exeter Academy (Exeter, NH);
- Victor Rong, Marc Garneau Collegiate Institute (Toronto, ON);
- Rui Ming (Max) Xiong, Western Canada High School (Calgary, AB);
- Ruizhou Yang, University Hill Secondary School (Vancouver, BC);
- William Zhao, Richmond Hill High School (Richmond Hill, ON).

The Canadian team placed 29<sup>th</sup> out of 111 countries. The top three countries were the Republic of Korea, China and Vietnam. This IMO contained some unusually difficult problems. For instance, only 600 students obtained marks on the third problem. Math Team Canada received five medals and an honourable mention. A Gold Medal was awarded to William Zhao who also placed 14<sup>th</sup> overall, Silver Medals were awarded to Thomas Guo and Victor Rong, Bronze Medals were awarded to Qi Qi and Rui Ming (Max) Xiong, and Ruizhou (Steven) Yang received an Honourable Mention. The team's total score was 110 out of 252.

The CMS's Media Releases on the 2017 IMO can be found at <https://cms.math.ca/MediaReleases/2017/IMOteam2017> and <https://cms.math.ca/MediaReleases/2017/imoresults>



## Education Committee

Chair: Malgorzata Dubiel (Simon Fraser)

The role of the Education Committee in a professional academic society like the CMS is to implement education strategies and initiatives, consistent with the Society's mission and Strategic Plan. The Committee is also involved in developing new ideas and strategies to either expand the existing programs or to create new ones with the goal of impacting more students and educators. This is accomplished by reviewing reports and issues that may have an impact on education-related topics pertaining to the CMS, by selecting winners for national education prizes and by recommending support for various educational activities. As part of these general objectives, the committee has a number of specific tasks. These include proposing speakers for education plenary talks at CMS meetings, the selection of organizers for the education sessions at these meetings, the annual selection of the winners of the Adrien Pouliot Award and the CMS Excellence in Teaching Award, and the awarding of grants for math competitions run in different provinces. In 2017 the Committee met at each of the CMS meetings and its main activities can be summarized as follows:

- The winner of the 2017 Excellence in Teaching Award was Bernard Hodgson, from Laval University.
- The winner of the 2017 Adrien Pouliot Award was Richard Hoshino from Quest University.
- Both prize winners, Brian Hodgson and Richard Hoshino, gave prize lectures at the 2017 CMS Winter Meeting in Waterloo.
- 2017 CMS Winter Meeting included two very successful education sessions: Rethinking First Year Experience, organized by Malgorzata Dubiel (SFU) and Kseniya Garaschuk (UFV), with nine talks, given by speakers from Canada and USA, and Using Digital Assets in Mathematics Education and Outreach, organized by Barbara Forrest and Brian Forrest (University of Waterloo), also with nine speakers, from Canada and USA.
- Provincial Grants: The committee made 11 awards spanning most of the provinces, for the total amount of \$5000.
- Darja Kalajdziewska and Joseph Khoury have represented CMS as judges for the 2017 Prime Minister's Teaching Award.

The Committee on Education Materials on the CMS Website started discussions on what sort of materials the committee should focus upon. One that was deemed essential was resources for math camps. This could inspire more people to give presentations at camps, and maybe organize new camps, in places where camps do not currently exist.

## Student Committee

Co-chairs: Aram Dermenjian (UQAM) and Jean Lagacé (Montréal)

The year 2017 was a fruitful one for StudC in terms of recruiting new members and undertaking new initiatives. Seven new members joined StudC in July, with each taking on a different role within the committee: Yunjing Li (University of Toronto), Emma Jane Krentz (McMaster University), Douglas White (University of Victoria), Robert Redelmeier (McMaster University), Asmita Sodhi (Dalhousie University), Kaveh Mousavand (UQAM), and Jean Lagacé (Montréal). Jean took over as co-chair from Aaron Berk (UBC), who was elected as the Student Director. At the MCA 2017 meeting in Montréal, more than 40 students attended at the student social, there were 16 student research presentations, and 18 posters in the poster session. StudC also organized an early career panel, a job fair and two workshops for students. At the 2017 winter meeting in Waterloo, 26 students attended the student social, there were six student research presentations and 12 posters in the poster session. It is hoped these numbers will increase in the future. StudC also approved support for six student conferences that took place across Canada.

The 2017 Canadian Undergraduate Mathematics Conference (CUMC) was a very successful event hosted by the University of Montréal under the leadership of the 2017 CUMC President Alexis Langlois-Rémillard. There were more than 155 participants and more than 96 student talks. The 2018 CUMC will be hosted by the University of Saskatchewan. It will be led by the CUMC President Nicole Zolkavich.

Finally, StudC has started to increase outreach to students at the various universities throughout Canada by investigating what student societies exist at each university. Additionally workshops are being planned on "how to talk maths" to non-mathematicians.



## Nominating Committee

Chair: Thomas Salisbury (York)

The CMS Nominating Committee actively solicits and recruits individuals with an interest in volunteering with the CMS, in support of the Canadian mathematics community.

The Nominating Committee ensures that the Executive and Board receive all necessary nominations required to fill vacancies in CMS standing committees, and also that a slate of nominations is received for Executive and Board elections. It also periodically reviews the terms of reference for all CMS standing committees.

During 2017, 175 individuals contributed to the work of the CMS, either by election or by service on one or more of the CMS's standing committees, subcommittees or editorial boards. 2017 was an election year, which saw 25 candidates for 17 vacant positions.

## Finance Committee

Chair: Bradd Hart (McMaster)

The mandate of the Finance Committee is to provide the Executive Committee and the Board of Directors with financial oversight of the operations of the CMS. The committee typically meets twice a year, once in the spring and once in the fall. Two things of note were accomplished in 2017 through the work of the committee, the Executive Committee and an ad-hoc publications committee. First of all, the prospects for CMS publications revenue were greatly enhanced by reaching an agreement between the CMS and a publication house that will take on the research publication duties of the Society. This should ensure a stable revenue stream for the foreseeable future. In addition, realistic 5 year projections for the Society's finances are now in place and costs have been brought under control. There is now a clear link between revenue streams and the corresponding expenses which should ensure that the Society remains on an even keel.

MCA 2017, Montréal



## Endowment Grants Committee

Chair: Tim Alderson (UNBSJ)

The CMS Endowment Grants Committee adjudicates proposals for projects that request financial support from the CMS Endowment Grants Competition. Projects that are funded must contribute to the goals of the CMS and to the broader good of the Canadian mathematical community.

In 2017 the total of all funding requests considered by the EGC was once again more than double the amount budgeted to the program. The committee deliberated and eventually arrived at a consensus. In 2017, the CMS funded the six programs listed Under Endowment Grants on page 17.

CMS Winter Meeting, University of Waterloo



## Grants

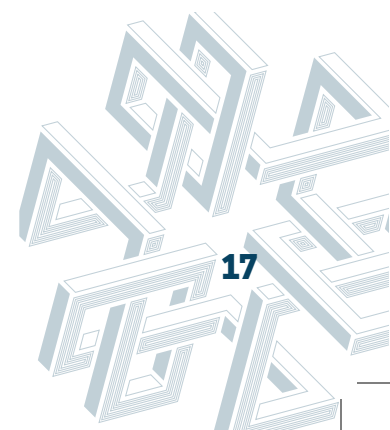
Through the Society's Competitions and Endowment Grants Programs, the CMS funds projects that promote the discovery, learning and application of mathematics in Canada. The following were awarded grants in 2017:

### Competition Grants

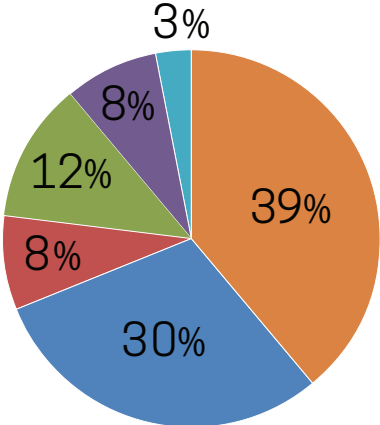
- Alberta High School Mathematics Competition - University of Alberta
- Association québécoise des jeux mathématiques (AQJM) - Université Laval
- BC Secondary School Mathematics Contest - Okanagan Region - Thompson Rivers University
- BC Secondary Schools Mathematics Contest - University of the Fraser Valley
- Calgary Elementary School Math Contest - Mount Royal University
- Caribou Cup Contests
- Concours de mathématiques Möbius - Université de Moncton
- Concours de mathématiques Poincaré - Université de Moncton
- Concours de mathématiques Sierpinski - Université de Moncton
- Mohawk Math Engineering Competition - Mohawk College
- New Brunswick Math League - University of New Brunswick, Fredericton
- Nine Chapters on the Mathematical Art Contest - Grand River Chinese School
- The Operations Research Challenge (TORCH) - 3 universities: Montreal, Toronto and Waterloo
- Truro Elementary Math Fair - Truro Elementary School
- Vancouver Math Olympiad - Canadian Secondary School Mathematics Association

### Endowment Grants

- Canadian Mathematics Education Study Group (CMESG) - Quest University Canada
- Création d'un spectacle interactif pour le 1<sup>er</sup> cycle du primaire - Université Laval
- Diversity in Mathematics Summer School - Simon Fraser University
- Math Enrichment at Carleton - Carleton University
- Math Horizons Day - University of Ottawa
- Semaine des Maths, ateliers, spectacles et formations - Université Laval

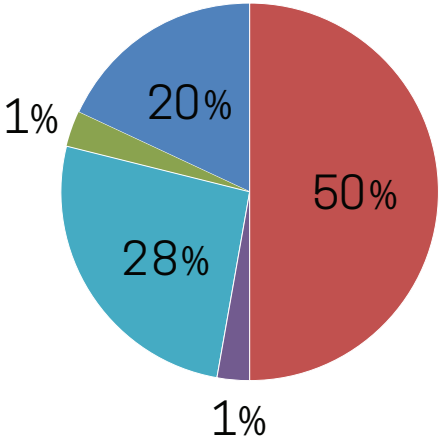


# Financial Overview



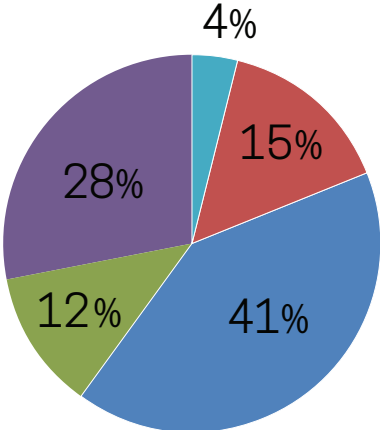
## Revenues \$1,898,036

- Registration Fees, other sales
- Membership Fees
- Grants
- Other
- Services, advertising and sales
- Subscriptions and publications



## Expenses \$1,745,623

- Learning
- Discovery
- Operations
- Other
- Advancement



## Invested Funds \$2,356,815

- Legacy
- Operations
- Olympiads
- Endowment
- Borwein Distinguished Career

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The Canadian Mathematical Society is very appreciative of the following individuals for their financial support and encouragement as well as those supporters who contributed anonymously to the Society's various activities.

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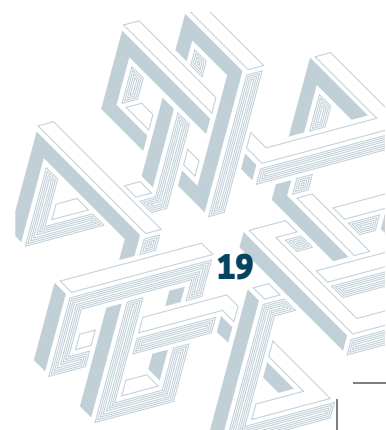
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