Newsletter Summer 2014

Message From the Director

The most enjoyable part of my position as director is getting to know our mathematical community, and to learn of its achievements. We mathematicians can be a bit insular. Sometimes we are too absorbed in our own work to note the interests and accomplishments of our closest colleagues. When encouraged to take a bird's eye view of all the mathematical activities in our region, a picture of a vibrant research community emerges.

Reading proposals for activities on a plethora of topics has made me appreciate the variety and quality of the AARMS community. In the past year, I visited UNB and Memorial University for the public lectures in the year of Mathematics of Planet Earth. I took the opportunity to meet the people behind the names on these proposals. I enjoyed interacting with the different personalities and observing the shared passion for mathematics and concern for our community.

A decidedly less pleasing, but necessary and useful part of my work for AARMS, is ensuring our continued funding. The past year was crucial in that respect. Ongoing funding commitments from the provinces of Nova Scotia and New Brunswick, and from some university members, were up for renewal. Additionally, AARMS was a partner in the application by the Mathematics Institutes to the NSERC-CTRMS program. While some of the applications are still in progress, I am happy to report a positive outcome for most of our fundraising efforts.

Our participation in the application to NSERC was an interesting learning experience. We took part through the submission of an independent common appendix to the separate applications of CRM, Fields and PIMS. This was an unorthodox process, new to everyone, which turned out to be a positive experience for AARMS. We were given the opportunity to explain our programs in a five page proposal, and to present them in front of the review panel during a meeting in Ottawa. The process led to better awareness at NSERC of our scope, size and quality, and it strengthened relations between AARMS and all the institutes.

The renewal of provincial and university funding likewise gave us the opportunity to evaluate and promote our activities. Our efforts resulted in 3-5 year commitments from the province of New Brunswick, Memorial University and UNB. The best news, however came from the province of Nova Scotia. We received an enthusiastic reply to our request from the provincial department of Labour and Advanced Education. Not only did they promise to increase their support of AARMS by 70%, they promise to consider a future increase if we can demonstrate that our goals align with the provincial objectives of increasing math skills and interest in STEM careers. Clearly, the value and power of mathematics is being recognized in political circles.

The Board recently agreed to extend my term as director by one year, to end in summer 2016. I am honoured by their confidence. I believe that the future of AARMS looks very positive. I look forward to the second half of my term.

The Dalhousie Math Camp

The CMS-Dal math camp has been running for more than 15 years. Every summer the camp is organized and jointly sponsored by Dalhousie University and the Canadian Mathematical Society (CMS). Its goals are to identify, stimulate and encourage mathematical talent among Nova Scotia high school students.

It consists of lectures and problem solving sessions conducted by Faculty members and graduate students from Dalhousie and also includes extracurricular activities. This year the math camp was organised by Danielle Cox, Caroline Cochran and Roman Smirnov; There were 40 applications from qualified candidates of whom 20 were chosen based on merit (10 girls & 10 boys) to participate in the camp. The organizers ask math teachers across the province to nominate their best students.

News

Graphs and Games Collaborative Research Group

On May 26-28th 2014, the Graphs and Games Collaborative Research Group hosted a short course on the "2-coloring number" at Dalhousie University. The 2-coloring number has natural applications to some divergent problems on planar graphs and the aim of the short course was to introduce the problem, present the state-of-the-art of the theory, and consider some applications and open problems. Dr. Hal Kierstead, from the School of Mathematical and Statistical Sciences at Arizona State University was the invited lecturer and gave a series of interesting and engaging talks on the subject. The event was well attended with over 20 participants, including faculty, post-docs, graduate and undergraduate students from universities throughout Atlantic Canada. New relationships were formed and we hope some new collaborations will emerge as a result. Such an event would not have been possible without the support of AARMS.

On July 30-31st, 2014, the Graphs and Games group will host a workshop at St. Francis Xavier University. This 2-day workshop will focus on student engagement. Students will be given an opportunity to present their completed or in-progress combinatorial research projects and will be challenged to combine their skill sets in (open) problem sessions facilitated by Dr. Danny Dyer (MUN). These sessions will introduce participants to some interesting research problems and provide participants an opportunity to work intensively on these problems in small groups. Any undergraduate and graduate students, post-docs, and faculty interested in graphs and combinatorial games are welcome to attend. Registration is free and some travel support will be available. For more information, please contact M.E. Messinger (mmessinger@mta.ca) or S. Finbow (sfinbow@stfx.ca).

Undergrad Researcher first from Canada to attend International Workshop

In early July, Mount Allison University undergraduate student Karen Korstanje attended the Fourth International Workshop on Cryptography, Robustness, and Provably Secure Schemes for Female Young Researchers (CrossFyre 2014) in Bochum, Germany, where she presented new results from her summer research project in cryptography titled "Search for Weak Keys in the Dhall-Pal Cipher." Karen is the first person from Canada to participate in the CrossFyre workshop, and was one of only two undergraduate students in attendance this year. Karen is entering the fourth year of a Joint Computer Science/Mathematics Honours program, and is currently a summer research student in the Department of Mathematics and Computer Science at Mount Allison under the supervision of Dr. Liam Keliher. Her research has focused on the analysis of the Dhall-Pal Cipher (DPC), a symmetric-key cipher introduced in 2010. The DPC was designed to be an efficient alternative to the widely implemented Advanced Encryption Standard (AES) cipher, but Karen's work has revealed that many of the keys used by communicating parties lead to significant weaknesses in the DPC that allow encrypted information to be decrypted by an attacker with a minimum amount of computation (hence the term "weak keys"). This represents a complete break of the DPC. Karen and Dr. Keliher are now preparing a full paper based on this work for refereed publication.

Theo Kolokolnikov awarded NSERC Accelerator

During the 2014 NSERC discovery grants competition, Dr. Theodore Kolokolnikov (Dalhousie University) was awarded an NSERC Discovery Accelerator Supplement Grant for the project "Collective behavior in complex systems". Supplements are valued at a total of $120,000 (over three years) and only 8 supplements were awarded in the Mathematics and Statistics Evaluation Group; 5 in Mathematics and 3 in Statistics. The objective of the program is to provide "substantial and timely additional resources to accelerate progress and maximize the impact of superior research programs". Congratulations Dr. Kolokolnikov!
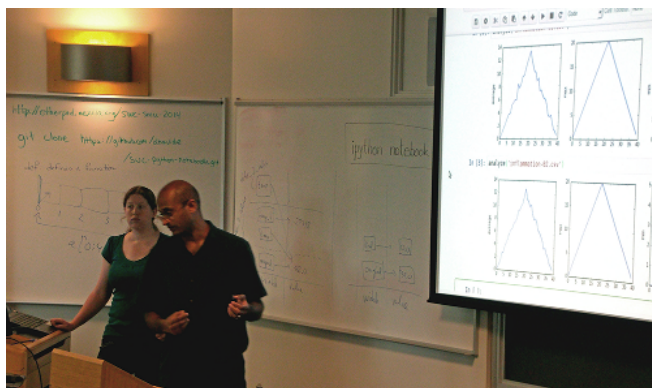
Software Carpentry Bootcamp at St. Mary's

Numerical Analysis/Scientific Computing (NA/SC) involves the development, analysis and application of mathematical algorithms, implemented in high quality software packages, to practical problems in a wide variety of computational domains. There is a long history of interest in NA/SC in Atlantic Canada with a large number of researchers involved in the development and use of scientific software in many significant applications.

In order for one to be able to function effectively and efficiently as a researcher in the area of NA/SC, it is important to be comfortable with the use of the many software support tools that are available to assist in the computational process, from the original investigation of the mathematical algorithms to be implemented in the software, through the software development and testing phase, and on to management of the massive data sets that can arise from use of the software in applications. On a global scale, a growing recognition of the need for training in the use of software support tools for scientific computing has led to what is now known as the Software Carpentry Project (http://software-carpentry.org/).

The Software Carpentry Project is a volunteer organization, founded in 1998, that runs short, intensive workshops (called bootcamps) that teach a core set of skills that enhance the efficiency and reliability of computer-based workflow for anyone who uses a computer as a significant component in their research. The Software Carpentry Project runs bootcamps all over the world, and also provides open access material for self-paced instruction.

On July 2-3, 2014, Saint Mary's University hosted a Software Carpentry Bootcamp, led by Dr. Dhavide Aruliah, an experienced Software Carpentry Bootcamp instructor, from the University of Ontario Institute of Technology. Stephanie Gagne, Dalhousie University, served as a second instructor for the bootcamp. Additional technical support was provided by Ross Dickson (ACENET), Andrew Valencik (Saint Mary's University), and Jack Pew (Saint Mary's University).

Instructors Dhavide Aruliah and Stephanie Gagne leading the group through an exercise during the Software Carpentry Bootcamp (Photo: Nikhil Sharma, Saint Mary's University).

The bootcamp consisted of short tutorials alternating with hands-on practical exercises; learners worked on their own laptops and each had a working software environment by the time the bootcamp was completed. The primary areas covered by the bootcamp were the Unix shell (and how to automate repetitive tasks), Python (and how to grow a program in a modular, testable way), and Git and GitHub (version control software that allows one to track software or document development and share work efficiently). A pre-assessment survey of the registered learners, provided by Software Carpentry, allowed the teaching team to customize the material to the needs of the learning community.

Learners and teaching assistants in action during the Saint Mary's Software Carpentry Bootcamp (Photo: Nikhil Sharma, Saint Mary's University).

The local organizers for the workshop were Paul Muir and Andrew Valencik, Saint Mary's University. AARMS provided the primary financial support for the workshop. Financial support was also provided by the Dean of Science, Saint Mary's University, and the Department of Mathematics and Computing Science, Saint Mary's University. As well, the bootcamp received support from ACENET in the form of publication of the event. Organizational support and publication of the event was also provided by Software Carpentry. Rose Daurie and Jenna Young of Saint Mary's University also provided organizational support.

The original target was to have 30 participants but once registration opened this goal was quickly reached and the size of the bootcamp grew to 40 participants, with another 14 left on the wait list! The bootcamp was attended to almost full capacity throughout the two days. The intense two day workshop featured hands-on learning by all participants, with enthusiastic participation from the instructors and the technical support team. A large fraction of the participants were graduate students from Saint Mary's and Dalhousie University, but the learning community also included some undergraduates, faculty, and a few industry participants.

The Saint Mary's University Software Carpentry Bootcamp local organizers would like to express their thanks to AARMS, the Dean of Science, Saint Mary's University, and the Department of Mathematics and Computing Science, Saint Mary's University, for providing financial support for this event. There was obviously substantial interest in the local community and the bootcamp experience appears to have been considered quite valuable for a large majority of the participants.

- Paul Muir

AMS Meeting at Dalhousie

The Department of Mathematics and Statistics at Dalhousie University will be hosting the 2014 Fall Eastern Sectional Meeting of the American Mathematical Society (AMS). The meeting will have 4 invited plenary addresses, given by François Bergeron (UQAM), Sourav Chatterjee (Stanford), William M. Goldman (U. Maryland), and Sujatha Ramdorai (UBC). There will also be 14 special sessions, many of which are organized by people affiliated with Atlantic universities. The special sessions are:

* Advances in Harmonic Analysis and Partial Differential Equations (organized by David Cruz-Uribe, Trinity, and Scott Rodney, CBU)
* Combinatorial Representation Theory (organized by Cristina Ballantine, College of the Holy Cross, Rosa Orellana, Dartmouth College, and Mercedes Rosas, Universidad de Sevilla)
* Commutative Algebra and Its Interactions with Algebraic Geometry (organized by Susan Marie Cooper, North Dakota State , Sara Faridi, Dalhousie, and William Traves, U.S. Naval Academy)
* Differential Geometry and Mathematical Physics (organized by Virginie Charette, Sherbrooke, and Karin Melnick, Maryland)
* Experimental Mathematics in Number Theory, Analysis, and Combinatorics (organized by Marc Chamberland, Grinnell, and Karl Dilcher, Dalhousie)
* Games on Graphs (organized by Jason Brown, Jeannette Janssen, and Richard Nowakowski, Dalhousie)
* General Relativity (organized by Ivan Booth, MUN, Alan Coley, Dalhousie, Jack Gegenberg, UNB, Viqar Husain, UNB, Hari Kunduri, MUN, and Sanjeev Seahra, UNB)
* Generalized Catalan Algebraic Combinatorics (organized by François Bergeron, UQAM, Franco Saliola, UQAM, Hugh Thomas, UNB, and Nathan Williams, UQAM)
* Hopf Algebras (organized by Yuri Bahturin, MUN, Margaret Beattie, MTA, and Mitja Mastnak, SMU)
* New Directions in Category Theory (organized by Pieter Hofstra, Ottawa, and Dorette Pronk, Dalhousie)
* Sampling Theory (organized by John J. Benedetto, Maryland, Jean-Pierre Gabardo, McMaster, and Ozgur Yilmaz, UBC)
* Special Functions and Their Applications (organized by Mourad E. H. Ismail, Central Florida, and Nasser Saad, UPEI)
* Symbolic Dynamics and Combinatorics on Words (organized by Srecko Brlek, UQAM, and Reem Yassawi, Trent)
* P-adic Methods in Arithmetic (organized by Henri Darmon, McGill, Adrian Iovita, Concordia, and Sujatha Ramdorai, UBC)

There will also be a contributed papers session. We expect about 300 participants for this 2-day meeting. The updated program can be found at: http://www.ams.org/meetings/sectional/2223_progfull.html

CMS Summer Meeting 2014

The CMS 2014 Summer Meeting was held in Winnipeg, from June 6-9. The winner of the AARMS-CMS Student Poster Session was Marco Pérez from the Université du Québec à Montréal (UQÀM) and the title of his poster was "Covers by chain complexes with bounded Gorenstein-flat dimension". The award was presented to Marco by AARMS Director Jeannette Janssen.

New Funding for Math Circles

NS Math Circles is excited to announce a partnership with Eastlink! Over the next five years Eastlink will be donating $500,000 to our province wide outreach program!

In 2009, NS Math Circles began as a high school outreach program, providing engaging, curriculum related workshops to grade 10-12 math classes across Nova Scotia, free of charge. During the 2013-14 school year AARMS sponsored a junior high (grades 7-9) outreach pilot project, which was a great success. With the 5 year commitment from Eastlink, we will now be able to expand our junior high outreach province wide and begin to provide workshops in the elementary schools as well.

To date, we have outreached to over 8000 math students at over 70 different schools, in all the NS school boards, including the First Nation School Board and Conseil Scolaire Acadien Provincial. If you are interested in hosting an event or having NS Math Circles visit your class, please contact us at 494-7036 or visit www.nsmathcircles.com.

- Danielle Cox

News from The Atlantic Algebra Centre

On August 28 – September 1, 2014 Atlantic Algebra Centre welcomes to St. John's, NL, an International workshop "Enveloping Algebras and Representation Theory". The list of speakers includes Alberto Elduque (University of Zaragoza, Spain), Vyacheslav Futorny (University of Sao Paulo, Brazil), Antony Joseph (Weizmann Institute, Israel), Victor Kac (Massachusetts Institute of Technology, USA), Vladislav Kharchenko (Universidad Nacional Autónoma de México), Vladimir Mazorchuk (University of Uppsala, Sweden), Erhard Neher (University of Ottawa), José María Pérez Izquierdo (University of La Rioja, Spain), Alexander Premet (University of Manchester, UK), Ivan Shestakov (Unversity of Sao Paulo, Brazil) and Sudarshan Sehgal (University of Alberta). The total number of participants is around 40, from 9 countries, ranging from Israel to Brazil. Almost a half of them are graduate students and postdoctoral fellows. Those outside St. John's, will be partially supported by the Organizing Committee.

A special feature of this workshop is that it is being organized by two different bodies: The Atlantic Algebra Centre (Yuri Bahturin, Margaret Beattie and Mikhail Kotchetov) and the Network of Ontario Lie Theorists (Yuly Billig and Kirill Zaynullin). The idea of closer cooperation of research groups in Atlantic Canada with those in the other parts of the country belongs to Dr Jeannette Janssen; the Atlantic Algebra Centre suggested the Network of Ontario Lie Theorists as a partner. AAC and NOLT have compiled a research proposal, which was supported by AARMS and Fields Institute. The forthcoming workshop is the first event jointly funded by AARMS and Fields Institute, with additional funds coming from several offices of Memorial University (see http://www.mun.ca/aac/Workshops/NextWork/ and http://www.fields.utoronto.ca/programs/scientific/14-15/enveloping/)

Even before the workshop, we launched our cooperation with NOLT in February 2014 by a mini course "Representation theory of Lie algebra of vector fields on a torus" given by Professor Yuly Billig of Carleton University. The materials of the mini course are available at http://www.mun.ca/aac/AACMiniCourses/YulBil/.

The inserted picture shows Professor Billig (fifth from the right) and some of the audience after the final lecture of the mini course.

Right after the workshop, we plan to have our seventeenth mini course, by Professor John Wilson of University of Oxford, who is also a Distinguished Research Lecturer at University College, Oxford. Professor Wilson is a world-renowned specialist in the Theory of Groups. The workshop will take place at Memorial University in St. John's during the second week of September 2014. As usual, we will be happy to provide partial support to students and postdoctoral fellows.

A significant international event, currently being organized mainly by AAC members Margaret Beattie, Mitja Mastnak and Yuri Bahturin, is a Special session on Hopf Algebras at the AMS Fall Eastern Sectional Meeting to be held in Halifax, Nova Scotia, Canada on October 18-19, 2014 (see http://www.ams.org/meetings/sectional/2223_program_ss11.html#title)

In all 2014, we plan to continue with our new form of exchange of ideas, which we started in Winter 2014, called Algebra Elevenses (see http://www.mun.ca/aac/Algebra11s/). Once a week we invite our Algebra faculty and students for a tea/coffee and suggest that a volunteer starts a discussion with providing basics on a topic of current interest. Then everyone is invited to share one's thoughts on the topic or ask questions. We did not restrict ourselves to Algebra solely but tried to involve people from other areas of Mathematics, and beyond. Our guest and colleague Professor Yuly Billig during one of our elevenses told us about his experience when NASA contacted him concerning stabilization of some of their spacecraft, which required using Lie Theory.

- Yuri Bahturin

Science Atlantic: Preliminary Announcement

The 37th Science Atlantic Mathematics. Statistics and Computer Science Conference and AARMS Research Day on Modelling and Simulation will be hosted by The University of New Brunswick, Saint John, October 3-5, 2014. A general announcement, a website, and paper submission and participation details will be provided shortly. Meanwhile, if you require further information, or if you wish to serve on the AARMS Research Day Committee, please contact M.H. Hamdan (Conference Executive Chair) at hamdan@unb.ca

Call for Proposals

We encourage mathematicians in Atlantic Canada to submit proposals for funding for workshops, conferences, outreach projects, etc to our Online System. The next deadline for submission: September 15, 2014. For more details please visit www.aarms.math.ca/events

Recent and Upcoming Events

Two weeks at WATERLOO - A Summer School for Women in Math
    Organizers: B. Csima, et al
    Location: University of Waterloo
    Date: August 10-23, 2014
    Contact Information: Barbara Csima

Canadian Conference on Computational Geometry
    Organizers: Norbert Zeh, Meng He
    Location: Dalhousie University
    Date: August 11-13, 2014
    Contact Information: Norbert Zeh

Recent developments in the adaptive solution of PDEs
    Organizers: Ronald Haynes, Paul Muir, Hermann Brunner
    Location: Memorial University, St. John's
    Date: August 17-22, 2014
    Contact Information: Ronald Haynes

Enveloping Algebras and representation Theory
    Organizers: Yuri Bahturin,
    Location: Memorial University, St. John's
    Date: August 28 - Sept 1, 2014
    Contact Information: Yuri Bahturin

Atlantic Math/Stats/CS Conference
    Organizer: Mohammad Hamdan
    Location: UNB Saint John
    Date: October 3-5, 2014
    Contact Information: Mohammad Hamdan

Connecting Women in Mathematics Across Canada
    Organizers: Sara Faridi et al
    Location: Banff International Research Station
    Date: October 3-5, 2014
    Contact Information: Sara Faridi

International Symposium in Statistics
    Organizers: Brajendra Sutradhar et al
    Location: Memorial University, St. John's
    Date: July 20-22, 2015
    Contact Information: Brajendra Sutradhar

AHA 2015
    Organizers: Keith Taylor et al
    Location: Dalhousie University, Halifax
    Date: August 17-21, 2015
    Contact Information: Keith Taylor

AARMS is proud to sponsor high-quality activities in Atlantic Canada which significantly enhance research and the training of graduate students.

"The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as poetry."
    ~ Bertrand Russell