



## Newsletter

Summer 2010

### Letter from the Director



AARMS achieved an important milestone in 2009 which places it on a firmer financial footing for at least a few years. AARMS obtained provincial funding from the governments of Nova Scotia and New Brunswick that last year was committed only conditionally on a successful NSERC MRS application.

This is an important recognition of

AARMS' contributions to the development of mathematical sciences in the region. For their assistance in securing this funding I would like to acknowledge the efforts of Greg Kealey (VP-Research at UNB), Jon Thompson (UNB) and Richard Wood (Dalhousie). In addition, the core support for AARMS provided by CRM, Fields and PIMS continues to be very helpful, both for scientific activities and as leverage. I am hopeful that the government of Newfoundland and Labrador will match these provincial and institute contributions. The new funds will be used to expand existing activities and introduce new programs, such as collaborative research groups and industrial workshops, the first of which is presently being planned. AARMS' pdf program has already expanded to provide more support to researchers both in numbers and funds; five new pdfs will be joining groups in the coming Fall. AARMS hopes to have a steady state of 8 pdfs, with at least one in each province.

In other news, AARMS continued with its successful summer school and pdf program, and supported eleven activities throughout the region. The season's focus of the Coast to Coast Seminar Series run (jointly with IRMACS at SFU) was on Analysis, Artificial Intelligence and High Energy Physics. The Summer School will complete its third and final year at UNB in 2010 under the direction of Barry Monson. I am grateful to him for this service to AARMS. The Summer School will be moving to Acadia in 2011.

Finally I would like to welcome Xiaoqiang Zhao as AARMS Deputy Director. He will assume this role for a three year period beginning July 1, 2010. Dr. Zhao is a University Research Professor at Memorial, with interests in differential equations and mathematical biology. He is an excellent researcher who brings new energy to AARMS.

### Five New AARMS Postdocs

Following our recent competition, AARMS is pleased to award five new postdoctoral fellowship positions to promising young researchers who will serve their two-year terms at Universities in Atlantic Canada. It is thanks to increased support from the provinces of New Brunswick and Nova Scotia that we are able to expand our pdf program. The new pdfs are listed below:



**Mahya Ghandehari** received her Bachelors Degree in civil engineering in 2001 from Isfahan University of Technology, Iran. She obtained her Masters degree in mathematics at Sharif university of technology. In 2005, she finished her second Masters degree at Concordia. She is currently a Ph.D. student at Waterloo under the

supervision of Dr. Brian Forrest and Dr. Nico Spronk. She will be working as an ARMS PDF at Dalhousie under the supervision of Keith Taylor. Her research interests are in harmonic analysis, Fourier analysis, and combinatorial structures.



**Alexei Gordienko** obtained his PhD at Moscow State University (Russia) in 2009, worked at MSU from 2008 till 2010. His research interests lie in polynomial identities and their generalizations, codimensions, cocharacters, associative and Lie algebras, Young diagrams. He will work as an AARMS postdoc at Memorial University of Newfoundland under the

supervision of Dr. Mikhail Kotchetov.



**Peter LeFanu Lumsdaine** will take up a his AARMS fellowship at Dalhousie University, working with Peter Selinger in the Atlantic Category Theory Group. His current research is in categorical logic, higher category theory, and constructive mathematics. He obtained his Bachelor's and CASM at the University of Cambridge, and expects to

complete his PhD in 2010 at Carnegie Mellon University, supervised by Steve Awodey.

# News



**Rui Peng** will be working as an AARMS PDF at Memorial under the guidance of Xiaoqiang Zhao. Mr. Peng will obtain his PhD at the University of New England, Australia in 2010. His research interests mainly include nonlinear elliptic and parabolic differential equations and systems. His research focuses on the study of various

qualitative properties of solutions of nonlinear differential equations and systems, mostly arising from applied sciences, such as from mathematical biology, epidemiology and chemical reaction.



**Michael A. Warren** will be working as an AARMS PDF at Dalhousie University under the supervision of Dorette Pronk and Peter Selinger. He received his undergraduate degree from the University of St. Andrews (Scotland) in 2002 and obtained his Ph.D. in 2008 from Carnegie Mellon University (USA). He is currently a

postdoctoral fellow at the University of Ottawa supported by the Fields Institute. His research is in category theory, mathematical logic and homotopy theory.

## ECCC 2010 a Big Success

The Sixth East Coast Combinatorial Conference was held at Saint Mary's University April 29-30th and was attended by close to 40 participants from the Atlantic provinces. Invited talks were given by Frank Bennett, Mount Saint Vincent University, Gary MacGillivray, University of Victoria and Matt Walsh of Indiana-Purdue University at Fort Wayne. There were also about a dozen contributed talks. The opportunity to discuss a variety of problems and work with colleagues was a particularly good way to end the teaching year and obtain a shot of adrenalin to focus on research for the summer. Both of the invited speakers from outside the Atlantic provinces spent extra time in the area and either continued or began collaborations with participants. The support of AARMS was both crucial to the success of the conference and appreciated.

## APICS Mathematics, Statistics & Computer Science Conference

*Oct 15 -17, 2010, Saint Mary's University.*

The Atlantic Provinces Council on the Sciences (APICS) is a non-profit, volunteer organization composed of universities, colleges, government labs and other institutions in Atlantic Canada. Its goal is the advancement of science and technology through education and public awareness and the promotion of scientific literacy, education and research throughout the

region.

The Annual APICS Mathematics/Statistics/Computer Science Meeting is a major event taking place each year at one of the Universities in Atlantic Canada. This year it is being held at Saint Mary's University and will be hosted by the Department of Mathematics and Computing Science.

A unique feature of this meeting is that it specifically encourages participation by undergraduate students: the Friday of the conference hosts two competitions, one in Mathematics and the other in Computer Science. The morning and afternoon of Saturday features undergraduate research talks in Mathematics, Statistics and Computer Science. This day also includes talks by graduate students and faculty. The meeting also sometimes acts as the host for additional research sessions on focused research areas; these sessions typically run Saturday afternoon through Sunday morning.

Of central importance to the meeting are the three plenary talks. These are the Blundon Memorial Lecture, the Field Lecture in Statistics, and the Computer Science Lecture. This year our confirmed speakers for these lectures are, respectively, Dr. Peter A. Forsyth from the University of Waterloo, Dr. Jeffrey S. Rosenthal from the University of Toronto and Dr. Karan Singh from the University of Toronto. The APICS 2010 organizing committee wishes to acknowledge support for the travel costs for these speakers from the Atlantic Association for Research in the Mathematical Sciences (AARMS).

As the meeting time approaches, further information will be available at the APICS 2010 Meeting webpage  
<http://apics2010.smu.ca/>

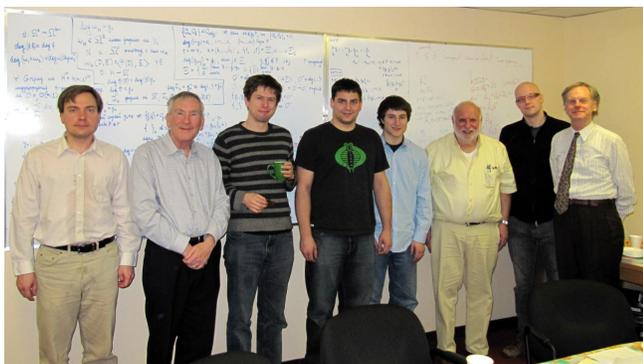
## Atlantic Algebra Centre Update

Late in March – early in April, 2010, AAC invited two mathematicians, one from Atlantic Canada, Dr Mitja Mastnak from St. Mary University (March 26 – March 31) and another from USA, Richard Brauer Professor of University of Wisconsin – Madison Dr Donald S. Passman (March 27 – April 3). On March 26, 2010, Dr Mastnak gave an AAC Colloquium Talk entitled “Hopf algebras in Combinatorics”, which attracted students and specialists not only in Algebra but also in Analysis and Topology. On April 1, 2010, Professor Passman gave a Distinguished Colloquium Talk “Maximal Filtrations of Semisimple Rings and Lie Algebras”, for the students and faculty Department of Mathematics and Statistics.

On the week March 27 to April 3, 2010, Professor Passman gave the mini course entitled “The Semiprimitivity Problem for Group Rings”. This was the tenth mini course organized by AAC since September 2006. The mini course was attended by the students – graduate and undergraduate - the faculty of Memorial University and also by Dr. Mitja Mastnak from St Mary University.

In March – April 2010 AAC carried out the Fourth Undergraduate Algebra Competition for the students of universities of Atlantic Canada. At this time AAC is on the final stages of preparation of the International Workshop

“Infinite dimensional Lie Algebras”. This will be held from July 18 – 23, 2010, at Bonne Bay Marine Station of Memorial University, surrounded by beautiful Gros Morne National Park. As usual, the workshop will be attended by students and researchers from several countries, including Brazil, Canada, Germany, Russia, Slovenia, Spain, and USA. AAC is grateful to the staff of BBMS for helping with our organizational efforts. For more information: [www.math.mun.ca/~aac](http://www.math.mun.ca/~aac)



*Donald S. Passman (third on right) and some of the audience at his AAC mini course*

## **Mathematics Learning Centre Researchers Invited to the German Research Center for Artificial Intelligence**

Dr. Sherry Mantyka and Ms. Theresa Ricketts were invited to attend a 3-week workshop on remedial mathematics instruction at the German Research Center for Artificial Intelligence in Saarbrücken, Germany from Mar. 15 to April 2.

The German Research Center for Artificial Intelligence (DFKI) is Germany's leading research center in the area of innovative software technology for commercial application. With an overall annual budget in 2009 of more than 29 million Euros, it is recognized as one of the most important “Centers of Excellence” in the world for its proven ability to rapidly bring leading edge research to commercially relevant application solutions. Grants for research projects come from the Federal Ministry of Education and Research (BMBF), the European Union (EU) and from various business enterprises such as Daimler AG, Microsoft Deutschland GmbH and Intel Corp, to name a few. In this respect, the DFKI functions as a non-profit Public-Private-Partnership. It has facilities in Kaiserslautern, Saarbrücken, Bremen and a project office in Berlin.

In 2006, while in the process of applying for funding for the Remedial Math Project, the DFKI at the University of Saarbrücken invited Dr. Sherry Mantyka from the Mathematics Learning Centre (MLC) at Memorial University (MUN) to become a partner in the project. Dr. Mantyka visited the DFKI and observed the Math-Bridge system in progress. Subsequent to that visit the MLC submitted a paper for the DFKI entitled Diagnostic Decision Rules Developed

for the German Bureau of Artificial Intelligence, in which typical errors made by MLC students when using operations involving fractions were analyzed.

Although MUN, through the MLC, was named as a partner in the project, the EU funding was only available to the EU partners. However the head of the project, Dr. Erica Melis, of the DFKI was insistent that the expertise of the MLC was needed, and provided the funds for a three-week workshop between representatives of the MLC, the DFKI and pedagogists from the Universities of Kassel and Paderborn in Germany. During the first week Dr. Mantyka and Ms. Ricketts attended meetings with the Math-Bridge technicians, observed demonstrations of the LeActiveMath system and studied its formalized pedagogical strategies, its tutorial components, and its structure and metadata model. They also provided the technicians with insight into the pedagogical and structural design of the MLC remedial program. In the second week, after more consultations Dr. Mantyka and Ms. Ricketts began working on developing a course concept and remedial strategies that could assist the Project pedagogists and Math-Bridge technicians in producing a viable Pedagogical Remedial Scenario for LeActiveMath. This work was completed in the third week and was presented during meetings held with the Kassel and Paderborn pedagogists, Dr. Reinhard Hochmuth, Pascal Rolf Fischer and Thomas Wassong. During these meetings, Dr. Mantyka and Ms. Ricketts also learned more about the structure of current bridging programs with on-line components in the European Union. For example, the universities of Kassel, Paderborn and Darmstadt have been testing several hybrid instructional formats involving Self-Directed-Learning concepts, compulsory attendance at tutorials and varying amounts of teacher-directed guidance, so that there is both an eLearning component and a social aspect of learning. These pedagogists suggest that it should be possible to develop within LeActiveMath different remedial strategies with varying levels of interactivity and adaptivity so as to enable either Self-Directed eLearning or a form of Blended Learning with both eLearning and phases of presence, where tutors and students meet.

The document that was developed by Dr. Mantyka and Ms. Ricketts during their visit to the DFKI in Germany is available on the MLC website (<http://www.mun.ca/mlc/research/>). It is hoped that when the Math-Bridge Remedial Program is ready the MLC will be able to participate in the testing of it by MLC students and that if successful it will be available for use by MUN students and instructors.

This isn't the first time the MLC has achieved recognition for its work in remedial mathematics instruction. Last year, Dr. Mantyka was nominated for the Canadian Mathematical Society's Adrien Pouliot Award for sustained contributions to Mathematics Education. Her nomination was based on her work at the MLC devising “a myriad of innovative processes for making useful mathematics accessible to those who seemed to have no natural aptitude for doing mathematics”, using “scientifically supported principles in developmental and intervention psychology to improve educational outcomes in mathematics.”

# Recent and Upcoming Events

## **Workshop on Mathematical Biology**

June 7-8, 2010 at the University of New Brunswick, Fredericton  
Contact James Watmough (watmough@unb.ca)

## **CMS Satellite Workshop on Noncommutative Geometry**

June 7-9, 2010 at the University of New Brunswick, Fredericton  
Contact Bahram Rangipour (bahram@unb.ca)

## **38th Annual Canadian Operator Theory and Operator Algebras Symposium**

June 7-11, 2010 at the University of New Brunswick, Fredericton  
Contact Dan Kucerovsky (dkucerov@unb.ca)

## **Canadian Number Theory Conference**

July 10-16, 2010 at Acadia University  
Contact Jeff Hooper (hooper@acadiau.ca)

## **Fluid Dynamics Session at CAIMS Annual Conference**

July 17-20, 2010 at Memorial University  
Contact Serpil Kocabiyik (serpil@mun.ca)

## **Mathematical Biology and Medicine Session at CAIMS Annual Conference**

July 17-20, 2010 at Memorial University  
Contact Serpil Kocabiyik (serpil@mun.ca)

## **International AAC workshop in Infinite Dimensional Lie Algebras**

July 18-23, 2010 at Memorial University  
Contact Yuri Bahturin (yuri.bahturin@gmail.com)

## **Atlantic Biostatistics and Epidemiology Conference**

August 23-24, 2010 at the University of New Brunswick, Fredericton  
Contact Renjun Ma (renjun@math.unb.ca)

## **APICS Mathematics/Statistics/Computer Science Conference**

October 15-17, 2010 at Saint Mary's University  
Contact Paul Muir (muir.smu@gmail.com)

## **Special Session in Graphy Theory at the APICS Conference**

October 15-17, 2010 at Saint Mary's University  
Contact Paul Muir (muir.smu@gmail.com)

## **Category Theory "Octoberfest"**

October 23-24, 2010 at Dalhousie University  
Contact Peter Selinger (selinger@mathstat.dal.ca)

## **Combinatorial Algebra meets Algebraic Combinatorics**

January 21-23, 2011 at Lakehead University  
Contact Sara Faridi (faridi@mathstat.dal.ca)

## **Canadian Conference on Computational Geometry**

August 2011 at University of PEI  
Contact Greg Aloupis (aloupis.greg@gmail.com)

## **AARMS Board of Directors**

*Hermann Brunner (Memorial)*  
*Chair of the Board*

*Mark Abrahams (Memorial)*  
*Alejandro Adem (PIMS)*  
*Jacques Allard (Moncton)*  
*Edward Bierstone (Fields)*  
*Russell Boyd (Dalhousie)*  
*David Bremner (UNB)*  
*Hugh Chipman (Acadia)*  
*Viqar Husain (AARMS Director)*  
*David Iron (Dalhousie)*  
*Gregory Kealey (UNB)*  
*Sherry Mantyka (Memorial)*  
*Paul Muir (St. Mary's)*  
*Peter Russell (CRM)*  
*Katherine Schultz (UPEI)*

## **AARMS Scientific Review Panel**

*Uri Ascher (UBC)*  
*Eric Aubanel (UNB)*  
*Yuri Bahturin (Memorial)*  
*Margaret Beattie (Mount Allison)*  
*Richard Charron (PanGeo Subsea)*  
*Hugh Chipman (Acadia)*  
*Ken Davidson (Waterloo)*  
*Nassif Ghoussoub (BIRS)*  
*David Iron (Dalhousie)*  
*Lisa Jeffrey (Toronto)*  
*Leah Keshet (PIMS)*  
*Dan Kucerovsky (UNB)*  
*Franklin Mendivil (Acadia)*  
*Peter Russell (CRM)*  
*Juris Steprans (Fields)*  
*Catherine Sulem (Toronto)*  
*Mary Williams (NRC)*  
*Jianhong Wu (York)*

*"If people do not believe that mathematics is simple, it is only because they do not realize how complicated life is."*

*- John Louis von Neumann*