Two Years of the Atlantic Algebra Centre

Atlantic Algebra Centre (AAC) came to existence on September 1, 2006. Since then AAC organized two International Workshops attended by 60 participants, including renowned specialists from 12 countries, four minicourses by prominent professors from Israel, United Kingdom, Germany, and Argentina. In addition to our Algebra Seminar, we maintained a series of AAC Colloquiums talks given by our visitors, including our colleagues from the universities of Atlantic Canada. Our visitors gave several Distinguished Colloquium Talks at Department of Mathematics and Statistics of Memorial University. AAC supported the research work of two postdoctoral fellows and three graduate students and organized two Undergraduate Algebra Competitions for the students of the universities of Atlantic Canada. The Proceedings of our first International workshop will appear in the Journal "Acta Applicandae Matematicae". Our funding and other forms of support have been generously provided by Atlantic Association for Research in Mathematical Sciences and Memorial University of Newfoundland
Our objectives and governance

The main objective of the Atlantic Algebra Centre (AAC) is the promotion of the research and study in Algebra and its applications at participating universities of Atlantic Canada. At its start, AAC enjoys the support of the Atlantic Association for Research in the Mathematical Sciences (AARMS) and Memorial University of Newfoundland (MUN). Algebra traditionally has been a strong point at the Department of Mathematics and Statistics of MUN. The algebraists of MUN maintain strong ties with their research colleagues at various universities of Canada and throughout the world. Our Advisory Board includes Yuri Manin (Max Planck Institute and Northwestern University), Sudarshan Sehgal (University of Alberta), and Efim Zelmanov (University of San Diego). AAC is governed by the Board of Directors, currently: Yuri Bahturin (Coordinator), Edgar Goodaire, Mike Parmenter, and Yiqiang Zhou. Core members of AAC include Eddy Campbell and Mikhail Kochetov.

International Workshops

**Graded Algebras & Superalgebras**
August 29 - September 2, 2008

The conference was held at Memorial University of Newfoundland in St. John’s, Newfoundland. The total number of participants was 25, from 10 different countries. The two-lecture series were delivered by prominent people in the entitled areas: Georgia Benkart (University of Wisconsin-Madison, USA), Vesselin Drensky (Bulgarian Academy of Sciences), Dimitry Leites (University of Stockholm, Sweden) and Ivan Shestakov (University of Sao Paulo, Brazil).

**Titles of talks**

**Eli Aljadeff**
*Technion, Israel*
On G-fine gradings on matrix algebras and their polynomial identities

**Georgia Benkart**
*University of Wisconsin - Madison, USA*
1. Weyl-like algebras and their modules
2. Centralizers of Groups of Matrices

**Matej Bresar**
*University of Maribor, Slovenia*
Functional identities and their application to graded algebras
Eddy Campbell and Jianjun Chuai  
Memorial University of Newfoundland  
Invariant Theory for Sub-representations

Deanna Caveney  
College of Charleston, USA  
Universal Imbeddings of Jordan systems into graded Lie algebras

Participants of “Graded Algebras and Superalgebras” after Gatherall’s Whale and Puffin Boat Tour in Bay Bulls, NL

Cristina Draper  
University of Malaga, Spain  
Some features and techniques on the gradings on exceptional Lie algebras

Vesselin Drensky  
Bulgarian Academy of Sciences  
1. Computing with multiple symmetric functions and graded cocharacters of graded PI-algebras  
2. Graded algebra structure of the centralizer of a matrix

Alberto Elduque  
University of Zaragoza, Spain  
Gradings on composition algebras

Mikhail Kochetov  
Memorial University of Newfoundland  
Formal group actions and gradings by p-groups in characteristic p

Pitcher plant, one of the symbols of Newfoundland
Plamen Koshlukov  
*University of Campinas, Brazil*  
Identities in graded tensor products of PI algebras

Dimitry Leites  
*Stockholm University, Sweden, also ASSMS, HEC, Lahore*  
1. Classification of simple finite dimensional modular Lie superalgebras with Cartan matrix  
2. Towards classification of simple finite dimensional modular Lie superalgebras

Jason McGraw  
*Memorial University of Newfoundland*  
Gradings on simple Lie algebras of Cartan type

Vincenzo Nardozza  
*University of Bari, Italy*  
Graded algebras and tensor product theorems

Michael Natapov  
*Indiana University - Bloomington, USA*  
On graded polynomial identities of matrices

Erhard Neher  
*University of Ottawa*  
Universal central extensions of graded Lie algebras

Ivan Shestakov  
*University of Sao Paulo, Brazil*  
1. The Coordinatization Theorem for Jordan Algebras and Superalgebras  
2. The skew-symmetric identities of octonions

Oleg Smirnov  
*College of Charleston, USA*  
On Classification of simple Kantor pairs

Marina Tvalavadze  
*University of Saskatchewan*  
On varieties parameterizing graded complex Lie algebras

Yoji Yoshii  
*Akita National College of Technology, Japan*  
Locally affine root systems and locally affine Lie algebras

**Groups, Rings, Lie and Hopf Algebras. II**  
August 13-17, 2007

The workshop was held at the Bonne Bay Marine Station on Newfoundland’s West Coast, which is surrounded by Gros Morne National Park. There were 34 participants from five countries. One-hour plenary talks were given by Eric Jespers (Free University of Brussels), Mikhail Kotchetov (MUN), Michael Lau (University of Windsor),
Dmitry Nikshych (University of New Hampshire), Erhard Neher (University of Ottawa), David Radford (University of Illinois, Chicago), Sudarshan Sehgal (University of Alberta), and Vera Serganova (University of California, Berkeley).

**Titles of talks**

**Yuri Bahturin**  
*Memorial University of Newfoundland.*  
Some thoughts on the gradings of simple Lie and Jordan algebras

**Margaret Beattie**  
*Mount Allison University.*  
Co-Frobenius Hopf Algebras

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**Ivan Dimitrov**  
*Queens University*  
Cup Product on Homogeneous Varieties and Generalized PRV Components

**Allen Herman**  
*University of Regina*  
Equivalence of Central Simple G-algebras
Kris Janssen  
*Free University of Brussels*  
Group Corings

Eric Jespers  
*Free University of Brussels*  
Primes of Height One and a Class of Noetherian Finitely Presented Algebras

Yevgenia Kashina  
*DePaul University*  
Groups of Grouplike Elements of a Semisimple Hopf Algebra and its Dual

Mikhail Kochetov  
*Memorial University of Newfoundland*  
Group gradings on simple Lie algebras

Michael Lau  
*University of Windsor*  
Thin Coverings of Modules

Yuanlin Li  
*Brock University*  
Strongly Clean Matrix Rings

Mitja Mastnak  
*University of Waterloo*  
Bialgebra Cohomology, Pointed Hopf Algebras, and Deformations

Erhard Neher  
*University of Ottawa*  
Lie Tori

Dmitry Nikshych  
*University of New Hampshire*  
Modular Categories, Their Group-Theoretical Properties, and Categorification of Manin Pairs

Mike Parmenter  
*Memorial University of Newfoundland*  
Group Gradings and Graded Reversibility in Integral Group Rings

Kenneth Price  
*University of Wisconsin*  
A Domain Test for Lie Color Algebras

David Radford  
*University of Illinois*  
Pointed Hopf algebras from enveloping algebras to quantum groups and beyond

Sudarshan Sehgal  
*University of Alberta*  
Hartleys conjecture and problems arising therefrom

Vera Serganova  
*University of California*  
On weight representations of sl(n) (joint work with D. Grantcharov)
Marina Tvalavadze  
*University of Western Ontario*  
Group gradings on superalgebras (joint work with T. Tvalavadze)

Teymuraz Tvalavadze  
*Carleton University*  
Representations of toroidal Lie algebras and superalgebras

Joost Vercruysse  
*Free University of Brussels*  
On Generalizations of Hopf-Galois Theory: A Unifying Approach

Xiande Yang  
*Memorial University of Newfoundland*  
On Strongly Clean Matrix Rings

Mikhail Zaicev  
*Moscow State University*  
Numerical invariants of algebras with polynomial identities

Alexandre Zalesski  
*University of East Anglia*  
On eigenvalues of groups elements in representations of simple algebraic groups

**AAC Mini Courses**

The fourth mini course was given by Professor Nicolás Andruskiewitsch from the University of Cordoba, Argentina. He visited Atlantic Algebra Centre from May 17 to May 24, 2008. The title of the mini course was *Introduction to Pointed Hopf Algebras.*
The third mini course was given by Professor Otto Kegel from Freiburg University, Germany. He visited the Atlantic Algebra Centre from October 10 to October 16, 2007. The title of the mini course was *Constricted Symmetric Groups and Some Derivates*.

![Yuri Bahturin, Ros English, and Otto Kegel after mini course lectures and before... Halloween](image)

The second mini course was given by Professor Alexander Premet from the University of Manchester, UK. He visited the Atlantic Algebra Centre from May 19 to May 27, 2007. The title of the mini course was *Coadjoint Action of Algebraic Groups and Modular Representation Theory*.

![A group of participants of the mini course by Alexander Premet (second right) received by the Head of Department of Mathematics and Statistics Chris Radford (first right)](image)
The first mini course was given by Professor Amitai Regev from Weizmann Institute of Science, Israel. He visited the Atlantic Algebra Centre from September 26 to October 6, 2006. The title of the mini course was Representation of the Symmetric Group and Related Topics of Analysis and Combinatorics.

AAC Colloquium Series

On May 21, 2008, an AAC Colloquium Talk Hopf Algebras: from Hyperalgebras to Quantum Groups was given by Professor Nicolas Andruskiewitsch of University of Cordoba, Argentina.

On November 2, 2007, an AAC Colloquium Talk Counting Factorizations of Permutations into Star Transpositions was given by Professor John Irving of St. Marys University.

On August 20, 2007, an AAC Colloquium Talk Hurwitz groups: The classification problem was given by Professor Alexandre Zalesski of University of East Anglia, UK.

Our second mini course lecturer Professor Alexander Premet gave a talk Classification of the finite-dimensional simple Lie algebras of characteristic $p>3$ in the Distinguished Colloquium Series of the Department of Mathematics and Statistics of Memorial University of Newfoundland on May 23, 2007.

On February 22, 2007, an AAC Colloquium Talk Classical Invariant Theory Revisited was given by Professor Roman Smirnov of Dalhousie University. He was visiting us from February 21 to February 23, 2007.

Our Atlantic Algebra colleague, Professor Margaret Beattie of Mount Allison University visited AAC from November 29 to December 2, 2006. On November 30 she gave a talk Coalgebras and Bilinear Forms in our AAC Colloquium Series.
From October 27 November 6, 2006, we had a visitor, Professor Vladislav Kharchenko of UNAM (National University of Mexico). He gave a Departmental Colloquium talk *Lie algebras and their generalizations* on November 1, 2006.

On October 4, 2006 our first mini course speaker Amitai Regev gave a Distinguished Colloquium Talk under the title *On asymptotic growth in PI algebras*.

**Algebra Seminar**

*The general classification problem for Hopf algebras*,
Margaret Beattie, Mount Allison University, May 20, 2008

*Group gradings on algebras of finitary linear transformations*,

*Simple Lie algebras over a field of positive characteristic II*,

*Simple Lie algebras over a field of positive Characteristic*,

*Modules of covariants of a finite linear group*,
Jianjun Chuai, MUN, October 31, 2007.

*Classification of semisimple Hopf algebras*,
Yevgenia Kashina, DePaul University, August 8, 2007

*Quasi-morphic Rings*,
Keith Nicholson, University of Calgary, August 6, 2007

*Group gradings on superinvolution simple superalgebras*,

*Normal Complements and the Number Two*,
Heather McIntosh MUN, April 25, 2007

*The isomorphism theorem for simple algebraic groups*,
Jason McGraw MUN, April 18, 2007

*Classical invariant theory revisited*,
Roman Smirnov Dalhousie, February 22, 2007

*A theorem on unit regular rings*,
Yiqiang Zhou MUN, February 15, 2007

*Reversible and graded reversible group rings*,
Mike Parmenter MUN, February 7, 2007

*Strongly clean matrices*,
Xiande Yang MUN, December 6, 2006

*Coalgebras and bilinear forms*,
Margaret Beattie Mount Allison, November 30, 2006

*On Burnside problems*,
Yuri Bahturin MUN, November 22, 2006
Undergraduate Algebra Competition

The Atlantic Algebra Centre invited all undergraduate students from universities of Atlantic Canada to participate in the second Undergraduate Algebra Competition this past winter. The first Undergraduate Algebra Competition was held in winter 2007.

The winner of the first Undergraduate Algebra Competition was Andrew Stewart from the Memorial University of Newfoundland. The winner of the second Undergraduate Algebra Competition was Matthew Fiset from the University of New Brunswick.