

# Leonardo Constantin Mihalcea

## University Address

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## Research Interests

Algebraic Geometry; Algebraic Combinatorics; Schubert Calculus; Geometric Representation Theory.

## Employment History

2006- present: Duke University, Visiting Assistant Professor;  
July -August 2007, June - July 2006: Max Planck Institut für Mathematik, visiting position;  
2005-2006: Florida State University, Instructor (postdoctoral position).

## Education

Ph.D. Mathematics, 2005, University of Michigan, Ann Arbor, MI, USA.  
Advisor: Professor William Fulton.  
Dissertation title: *Equivariant quantum cohomology of homogeneous spaces*.  
M.S. Mathematics, 1998, Babes-Bolyai University, Cluj-Napoca, Romania.  
Advisor: Professor Dorin Andrica.  
Dissertation title: *Cone decompositions and critical points*.  
B.A. Mathematics, 1997, Babes-Bolyai University, Cluj-Napoca, Romania.

## Grants and awards

I have applied for a NSF grant, starting on July 2008. Proposal Title:  
“Quantum K-theory of flag manifolds and Chern-Schwartz-MacPherson classes of their Schubert varieties”.  
Max Planck Institut für Mathematik Fellowship, June-July 2006, July-August 2007.  
Rackham One-Term dissertation Fellowship, Winter 2004.  
Graduate student research assistant, Winter 2002, Fall 2004.  
European Union Fellowship for attending the Summer School “Pragmatic 2001”- Catania, Italy, July 2001.  
Department Fellow, Summer 2000 - 2003.  
The Ohio State University Fellowship, 1998 - 1999.

## Publications

Paolo Aluffi and Leonardo C. Mihalcea, *Chern classes of Schubert cells and varieties*, to appear in Journal of Alg. Geom., preprint [arxiv:math.AG/0607752](http://arxiv.org/abs/math/0607752).

Leonardo C. Mihalcea, *On equivariant quantum cohomology of homogeneous spaces: Chevalley formulae and algorithms*, Duke Math. J. **140** (2007), no. 2, 321–350.

Leonardo C. Mihalcea, *Equivariant quantum Schubert Calculus*, Adv. in Math. **203** (2006), no. 1, 1–33.

Leonardo C. Mihalcea, *Positivity in equivariant quantum Schubert Calculus*, Amer. J. of Math. **128** (2006), no. 3, 787–803.

Leonardo C. Mihalcea, *Giambelli formulae for the equivariant quantum cohomology of the Grassmannian*, to appear in Transactions of AMS, preprint arXiv:math.CO/0506335.

Leonardo C. Mihalcea, *Equivariant quantum cohomology of homogeneous spaces*, Ph.D. thesis, University of Michigan, 2005.

Gianni Ciolli and Leonardo C. Mihalcea, *A canonical resolution of singularities of a triple covering of algebraic surfaces*, Le Matematiche - proceedings of the Summer School "Pragmatic 2001", Catania, Italy (2001), Vol. LVI - Fasc. II, pag. 281-296.

### **Preprints/Work in preparation**

Anders Buch and Leonardo C. Mihalcea, *Quantum K-theory of Grassmannians*, expected in 2007.

T. Ikeda, L. C. Mihalcea, and H. Naruse, *Double Schubert polynomials for classical groups*, in preparation.

T. Ikeda, L. C. Mihalcea, and H. Naruse, *Giambelli formulae for the equivariant quantum cohomology of the Lagrangian Grassmannian*, in preparation.

Leonardo C. Mihalcea, *Non-intersecting lattice paths, binomial determinants and positivity of Chern-Schwartz-MacPherson classes*, preprint arXiv: math/0702566.

### **Invited lectures**

*Summer School on Combinatorial Models in Geometry and Topology of Flag manifolds*, A series of lectures on classical and quantum Schubert Calculus (Regina, June 2007).

### **Presentations**

*Workshop in Schubert Calculus*, Kyoto, 18-21 March, 2008.

*University of Pittsburgh - Algebra Seminar*, Pittsburgh, Nov. 2007.

*University of North Carolina at Chapel Hill - Geometric Methods in Representation Theory Seminar*, Chapel Hill, Nov. 2007.

*Duke University - Algebraic Geometry Seminar*, Durham, Oct. 2007.

*Workshop on Interactions between Algebraic Geometry and Algebraic Combinatorics - Centre de Recherche Mathématique*, (Montreal, May 2007).

*AMS meeting - Stevens Institute of Technology - Special Session on Combinatorial Algebraic Geometry*, (Hoboken, NJ, April 2007).

*Workshop on Contemporary Schubert Calculus and Schubert Geometry - Banff International Research Station*, (Banff, March 2007).

*AMS meeting - University of Connecticut - Special Session: Combinatorial Methods in Equivariant Topology*, (Storrs, Connecticut, Oct. 2006).

*University of North Carolina at Chapel Hill - Geometric Methods in Representation Theory Seminar*, Chapel Hill, Sept. 2006.

*KTH Stockholm (Algebraic Geometry Seminar)*, (Stockholm, Sweden, July 2006.).

*Florida State University (Algebra Seminar)*, (Tallahassee, FL, Oct. 2005.).

*Fields Institute (Workshop in Schubert Calculus)*, (Toronto, Canada, June 2005).

*AMS meeting - University of California at Santa Barbara - special session in Geometry and Combinatorics*, (Santa Barbara, CA, Apr. 2005.).

*University of Michigan (Combinatorics Seminar)*, (Ann Arbor, MI, Nov. 2004.).

*AMS meeting - Northwestern University - special session in Modern Schubert Calculus*, (Evanston, IL, Oct. 2004.).

*University of Illinois (Algebraic Geometry Seminar)*, (Urbana-Champaign, IL, Sept. 2004.).

*The Ohio-State University (Algebraic Geometry Seminar)*, (Columbus, OH, May 2004.).

*Several talks in the Schubert Calculus Vigre working group*, organized by Julianna Tymoczko (University of Michigan, Winter 2005).

*University of Michigan (Moduli spaces Seminar)*, (Sept. 2001.).

*Several talks in the Algebraic Geometry / Commutative Algebra student seminar*, (University of Michigan, 2001 - 2004.).

## Teaching

Duke University	Linear algebra and differential equations; Fall 2007 Introduction to Schubert Calculus; minicourse Spring 2007 Applied Combinatorics; Fall 2006. Ordinary Differential Equations; Fall 2006, Spring 2007.
Florida State University	Calculus I; Spring 2006. Calculus II; Fall 2005.
University of Michigan	Instructor, Math 105 Pre-calculus; Fall 1999. Instructor, Math 115 Calculus I; Winter 2000, Fall 2000. Instructor, Math 116 Calculus II; Fall 2001. Instructor, Math 215 Calculus III; Fall 2002. Instructor, Math 216 Differential Equations; Winter 2001, Fall 2004. Instructor and Course coordinator, Math 115 Calculus I; Spring 2004.

## Professional activities

Participant:

AMS meetings:

- *Hoboken - Special session: Combinatorial Algebraic Geometry*, April 2007.
- *Storrs - Special session: Combinatorial Methods in Equivariant Topology*, Oct. 2006.
- *Eugene - Special Session in Algebraic Combinatorics*, Nov. 2005.
- *Santa Barbara - Special Session in Geometry and Combinatorics*, Apr. 2005.
- *Evanston - Special Session in Modern Schubert Calculus*, Oct. 2004.
- *Boston - Special Session in Schubert Calculus*, Nov. 2002.
- *Ann Arbor*, March 2002.

MSRI workshops:

- *Introductory workshop in topological aspects of Real Algebraic Geometry*, Jan. 2004.
- *Intersection Theory on stacks*, March 2002.

- *Introductory workshop in Algebraic Stacks, Intersection Theory and non abelian Hodge Theory*, Jan. 2002.

Workshops:

- Workshop in Interactions between Algebraic Geometry and Algebraic Combinatorics, CRM, Montréal, May 2007.
- *Workshop in Schubert Calculus*, Fields Institute, Toronto, June 2005.
- *Presentations by Young Researchers*, Snowbird, UT, July 2004.
- *Red-Raider Mini-Symposium, in Contemporary Algebra and Algebraic Geometry*, Texas-Tech University, Lubbock, Nov. 2002.
- *Algebraic Transformation Groups*, CRM, Université de Montréal, June 2002.

Summer Schools:

- Summer School on Combinatorial Models in Geometry and Topology of Flag manifolds, Regina, Saskatchewan, Canada, 2007.
- *Pragmatic 2001*, Catania, Italy, July 2001.
- *Scuola Matematica Interuniversitaria*, Perugia, Italy, July 1997.

Member of American Mathematical Society.

**References**

William Fulton, Department of Mathematics, University of Michigan, 2074 East Hall, Ann Arbor, MI 48109-1109, email: wfulton@umich.edu

Sergey Fomin, Department of Mathematics, University of Michigan, 2074 East Hall, Ann Arbor, MI 48109-1109, email: fomin@umich.edu

Shrawan Kumar, Department of Mathematics, University of North Carolina at Chapel Hill, Chapel Hill, NC 27599-3250, email: shrawan@email.unc.edu

Ravi Vakil, Department of Mathematics, Stanford University, Building 380, Palo Alto, CA 94305-2125, email: vakil@math.stanford.edu

Mark Stern (teaching), Department of Mathematics, Duke University, Physics Building, P.O.Box 90320, Durham, NC 27708 - 0320, email: stern@math.duke.edu