

Gregg J. Musiker

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Employment

Fall 2009 Mathematical Sciences Research Institute, Postdoctoral Scholar. Tropical Geometry Program.

2007–Present Massachusetts Institute of Technology, NSF Postdoctoral Fellow and Instructor in Applied Mathematics. *Sponsoring scientist: Richard Stanley*

Fall 2006 University of California, San Diego, Associate Instructor.

Education

Ph.D. Mathematics, University of California, San Diego, June 2007

M.A. Mathematics, University of California, San Diego, June 2004

A.B. Mathematics, Harvard University, June 2002, *Magna Cum Laude*

Research Interests

Algebraic and Geometric Combinatorics: Chip-Firing Games, Cluster Algebras, Critical Groups and the Abelian Sandpile Model, Invariant Theory, Metric Graphs, Symmetric Functions, Tropical Geometry

Algebraic Geometry and Number Theory: Diophantine Systems, Elliptic Curves, Jacobians and other Abelian Varieties, Linear Systems, Zeta Functions

Publications

G. Musiker and R. Schiffler. Cluster expansion formulas and perfect matchings. *Journal of Algebraic Combinatorics* (to appear) <http://math.mit.edu/~musiker/mussch.pdf>

G. Musiker. The critical groups of a family of graphs and elliptic curves over finite fields. *Journal of Algebraic Combinatorics* **30** (2009), Issue 2, 255-276. <http://math.mit.edu/~musiker/CGs.pdf>

A. Garsia, G. Musiker, N. Wallach, and G. Xin. Invariants, Kronecker products and combinatorics of some remarkable Diophantine systems. *Advances in Applied Mathematics* **42** (2009), no. 3, 392-421. <http://math.mit.edu/~musiker/Dio.pdf>

G. Musiker. A graph theoretic expansion formula for cluster algebras of classical type. *Ann. Comb.* (to appear) <http://math.mit.edu/~musiker/Finite.pdf>

J. Bandlow and G. Musiker. A new characterization for the m -quasiinvariants of S_n and explicit basis for two row hook shapes. *J. Combin. Theory Ser. A* **115** (2008), no. 8, 1333-1357. <http://math.mit.edu/~musiker/QuasiTwoHook.pdf>

G. Musiker. Combinatorial aspects of elliptic curves. *Seminaire Lotharingien de Combinatoire* **56** (2007), Article B56f [arXiv:math.CO/0707.3179](http://arxiv.org/abs/math.CO/0707.3179)

G. Musiker and J. Propp. Combinatorial interpretations for rank-two cluster algebras of affine type. *Electronic Journal of Combinatorics*. **14** (2007), R15, 1-23. [arXiv:math.CO/0602408](http://arxiv.org/abs/math.CO/0602408)

J. Bandlow and G. Musiker. Quasi-invariants of S_3 . *J. Combin. Theory Ser. A* **109** (2005), no 2, 281-298. [arXiv:math.CO/0603482](https://arxiv.org/abs/math/0603482)

Publications Submitted

C. Haase, G. Musiker, and J. Yu. Linear systems and tropical curves.
[arXiv:math.CO/0909.3685](https://arxiv.org/abs/math/0909.3685)

G. Musiker, R. Schiffler, and Lauren Williams. Positivity for cluster algebras from surfaces.
[arXiv:math.CO/0906.0748](https://arxiv.org/abs/math/0906.0748)

Conference Proceedings

G. Musiker and R. Schiffler. Cluster algebras of unpunctured surfaces and snake graphs. *Discrete Mathematics and Theoretical Computer Science Proc.* **AK** (2009), 673-684 (Abridged version of “Cluster expansion formulas and perfect matchings”)

J. Bandlow and G. Musiker. The quasiinvariants of the symmetric group. *Discrete Mathematics and Theoretical Computer Science Proc.* **AJ** (2008), 599-610 (Abridged version of “A new characterization for the m -quasiinvariants of S_n and explicit basis for two row hook shapes”)

G. Musiker. Perfect matchings and cluster algebras of classical type. *Discrete Mathematics and Theoretical Computer Science Proc.* **AJ**, (2008), 435-446 (Abridged version of “A graph theoretic expansion formula for cluster algebras of classical type”)

G. Musiker. Elliptic curve groups and chip-firing games. (Proceedings of FPSAC 2007 Conference)
<http://www.fpsac.cn/PDF-Proceedings/Posters/26.pdf>

G. Musiker. Combinatorial aspects of elliptic curves. (Proceedings of FPSAC 2006 Conference) (Abridged version of “Combinatorial aspects of elliptic curves”)
<http://garsia.math.yorku.ca/fpsac06/papers/64.pdf>

Theses

A combinatorial comparison of elliptic curves and critical groups of graphs,
Ph.D. Thesis, UCSD, 2007 Advisor: Adriano Garsia <http://math.mit.edu/~musiker/Thesis.pdf>

Cluster algebras, Somos sequences, and exchange graphs. Senior Honors Thesis, Harvard University, 2002 Advisor: Richard Stanley (MIT) <http://math.mit.edu/~musiker/uthesis.pdf>

Preprints

A. Itsara, G. Musiker, J. Propp, and R. Viana. Combinatorial interpretations for the Markoff numbers, memo dated May 1, 2003 <http://math.mit.edu/~musiker/Markoff2003.pdf>

Upcoming Presentations

Tropical Geometry Seminar, MSRI, Berkeley, Nov. 2009

Representation Theory, Geometry and Combinatorics Seminar, University of California, Berkeley, Nov. 2009

Combinatorics Seminar, University of California, San Diego, Nov. 2009

Colloquium, University of Southern California, Los Angeles, Dec. 2009

Algebraic Combinatorics Session, Canadian Math Society Summer Meeting, Fredericton, June 2010

Presentations

Discrete Mathematics Seminar, Arizona State University, Phoenix, Nov. 2009

Algebraic Geometry Seminar, Texas A & M University, College Station, Nov. 2009

Postdoctoral Seminar, MSRI, Berkeley, Oct. 2009

Algebraic Combinatorics Special Session, Fall Eastern Section Meeting of the AMS, University Park, Oct. 2009

Combinatorics Seminar, Stanford University, Palo Alto, Oct. 2009

Combinatorics Seminar, University of Washington, Seattle, Oct. 2009

Combinatorics Seminar, Massachusetts Institute of Technology, Cambridge, Sept. 2009

Algebra, Geometry, and Combinatorics Seminar, San Francisco State University, San Francisco, Sept. 2009

21st International Conference on Formal Power Series and Algebraic Combinatorics, Hagenberg, Austria, July 2009

LACIM Seminar, Université du Québec à Montréal, May 2009

Maurice Auslander Distinguished Lectures and International Conference, Woods Hole, April 2009

Combinatorics Seminar, University of Michigan, Ann Arbor, April 2009

Combinatorics Seminar, Georgia Institute of Technology, Atlanta, Jan. 2009

International Conference on Cluster Algebras and Related Topics, Mexico City, Mexico, Dec. 2008

Colloquium, Tulane University, New Orleans, Dec. 2008

Algebra Seminar, University of Connecticut, Storrs, Nov. 2008

Combinatorics Seminar, Massachusetts Institute of Technology, Cambridge, April 2008

Representation Theory Seminar, Northeastern University, Boston, Mar. 2008

Low Genus Curves and Applications Special Session, Joint Meetings of the AMS and MAA, San Diego, Jan. 2008

Combinatorics and Probability Seminar, University of Pennsylvania, Philadelphia, Dec. 2007

Representation Theory Seminar, University of Massachusetts, Amherst, Nov. 2007

Combinatorics Seminar, University of Kansas, Lawrence, Oct. 2007

Combinatorics Seminar, Massachusetts Institute of Technology, Cambridge, Sept. 2007

Combinatorics Seminar, University of California, Davis, April 2007

Recent Progress in Combinatorics on Words, Centre de Recherches Mathématiques, Université du

Québec à Montréal, Mar. 2007

Colloquium, Dartmouth College. Hanover, Feb. 2007

Combinatorics Seminar, University of California, San Diego, Feb. 2007

Colloquium, University of Kentucky, Lexington, Jan. 2007

Combinatorics Seminar, University of California, Berkeley, Dec. 2006

Food for Thought Seminar, University of California, San Diego, Oct. 2006

18th International Conference on Formal Power Series and Algebraic Combinatorics, San Diego, June 2006

Food for Thought Seminar, University of California, San Diego, Mar. 2006

LACIM Seminar, Université du Québec à Montréal, Dec. 2005

Graduate Student Research Seminar, University of California, San Diego, Oct. 2005

Joint Meetings of the AMS and MAA, Phoenix, Jan. 2004 (Contributed Paper)

Math Table, Harvard University, Cambridge, Feb. 2002

Poster Presentations

20th International Conference on Formal Power Series and Algebraic Combinatorics, Vina del Mar, Chile, June 2008

19th International Conference on Formal Power Series and Algebraic Combinatorics, Nankai University, Tianjin, China, July 2007

Harvey Mudd College Conference on Enumerative Combinatorics, Claremont, Oct. 2006

Undergraduate poster session, Joint Meetings of the AMS and MAA, San Diego, Jan. 2002

Other Conferences and Research Programs attended

Participant, MSRI Workshop on Combinatorial, Enumerative and Toric Geometry, Berkeley, Mar. 2009

Invited Reseach Guest of Etsuro Date, Osaka University, Jan. 2009

Participant, Clifford Lectures at Tulane University, New Orleans, Nov. 2008

Participant, MSRI Workshop on Topics in Combinatorial Representation Theory, Berkeley, Mar. 2008

Participant, SAGE Days 7 Conference, hosted by IPAM at the University of California, Los Angeles, Feb. 2008

Participant, MSRI Introductory Workshop during Semester in Combinatorial Representation Theory, Berkeley, Jan. 2008

Participant, School: Combinatorics on Words, Centre de Recherches Mathématiques, Université du Québec à Montréal, Mar. 2007

Participant, Les journées Pierre Leroux-Colloque en l'honneur de Pierre Leroux, Université du Québec à Montréal, Sep. 2006

Participant, 17th International Conference on Formal Power Series and Algebraic Combinatorics, Taormina, Sicily, June 2005

Participant, Institute for Advanced Study/Park City Mathematics Institute, Graduate Summer School in Geometric Combinatorics, Park City July 2004

Research Assistant, University of California, San Diego, Summers 2003–2006

Research Assistant, NSF REACH group, 2001–2002 <http://www.math.harvard.edu/~propp/reach/>

Research Assistant, NSF Research Experience for Undergraduates at Mt. Holyoke College, June–July 2001 <http://www.mtholyoke.edu/acad/math/reu/>

Professional Activities

Journals refereed: *Acta Mathematica Sinica*, *Advances in Mathematics*, *Electronic Journal of Combinatorics*, *Journal of Algebraic Combinatorics*, *Journal of Combinatorial Theory, Series A*

Organizer of Chip-firing working group, MSRI, Fall 2009 (with Sam Payne)

Contributor to Girls' Angle Bulletin: Wrote problem set and solution set for a magazine aimed at middle school aged girls for mathematical enrichment <http://www.girlsangle.org>

Supervisor of Andrei Frimu, Undergraduate Research Opportunity Program, MIT, Summer 2009 : Applications of the Combinatorial Nullstellensatz

Organizer of Combinatorics Seminar, MIT, 2008-2009 (with David Speyer and Lauren Williams)

Supervisor of Anthony Kim, Undergraduate Research Opportunity Program, MIT, Spring 2008 (with Josephine Yu): Chip-firing and tropical geometry

Organizer of Graduate Student Research Seminar, UCSD, 2005 (with William Stein and Amanda Beeson)

Vice President of Financial Affairs, Graduate Student Association of UCSD, 2005–2006

Representative for Mathematics Department in the Graduate Student Association of UCSD, 2004–2006

Awards and Honors

National Science Foundation Mathematical Sciences Postdoctoral Fellowship, 2007

Achievement Rewards for College Scientists Scholar, San Diego Chapter, 2003–2007

Teaching Experience

Instructor in Applied Mathematics, Massachusetts Institute of Technology, Spring 2009 (Algebraic Combinatorics) <http://math.mit.edu/~musiker/18-312.html>

Course materials also have been published through MIT's Open Courseware repository at <http://ocw.mit.edu/OcwWeb/Mathematics/>

Associate Instructor, University of California, San Diego, Fall 2006 (Precalculus)

Teaching Assistant, University of California, San Diego, 2002–2006, Spring 2007 (Applied Algebra, Combinatorics, Cryptography, Linear Algebra, Mathematical Reasoning, Number Theory, and Statistical Methods)

Course Assistant, Harvard University, 2000–2002 (Abstract Algebra, Calculus, and Linear Algebra)

Volunteer Teacher, Harvard Chinatown ESL (English as a Second Language), 2000–2002

Resident/Teaching Assistant, Summer Institute for the Gifted, Summers 1999-2002 <http://www.giftedstudy.com>

