

# Josephine T. Yu

Department of Mathematics, 2-348  
Massachusetts Institute of Technology  
Cambridge, MA 02139-4307  
(415)215-8799

jyu@math.mit.edu  
www.math.mit.edu/~jyu  
born: Burma, 1982  
U.S. citizen

## Education

University of California, Berkeley, 2003–2007  
Ph.D. in Mathematics  
Advisor: Bernd Sturmfels  
Thesis title: Combinatorial Aspects of Tropical Geometry

University of California, Davis, 1999–2003  
Bachelor of Science in Mathematics (with Highest Honors)  
Bachelor of Science in Computer Science (with Honors)  
Advisor: Motohico Mulase

## Employment and Research Experience

Massachusetts Institute of Technology, 2007–present  
Applied Mathematics Instructor

Institute for Mathematics and Its Applications, Minneapolis, Spring 2007  
Long term visitor

University of California, Berkeley, 2003–2007  
Ph.D. student

## Research Interests

Geometric Combinatorics, Combinatorial and Computational Algebra, Tropical Geometry

## Publications

In print / press:

1. Affine Buildings and Tropical Convexity (with Michael Joswig and Bernd Sturmfels), math.MG/0706.1918, to appear in *Albanian Journal of Mathematics*, special issue on Computational Algebraic Geometry, 22 pages.

2. Tropical Implicitization and Mixed Fiber Polytopes (with Bernd Sturmfels), cs.SC/0706.0564, to appear in *Software for Algebraic Geometry, I.M.A. Volumes in Mathematics and its Applications*, M. Stillman, N. Takayama and J. Verschelde (eds.), 20 pages.
3. Representing Tropical Linear Spaces by Circuits (with Debbie Yuster), to appear in *Proceedings of FPSAC 2007*, 11 pages.
4. The Hyperdeterminant and Triangulations of the 4-Cube (with Peter Huggins, and Bernd Sturmfels, and Debbie Yuster), to appear in *Mathematics of Computation*, 30 pages.
5. The Newton Polytope of the Implicit Equation (with Bernd Sturmfels and Jenia Tevelev), *Moscow Mathematical Journal* **7** (2007), 327–346.
6. Tropical Polytopes and Cellular Resolutions (with Mike Develin), to appear in *Experimental Mathematics* (2006), 19 pages.
7. Tropical Convexity via Cellular Resolutions (with Florian Block), *Journal of Algebraic Combinatorics* **24**, 1 (2006), 103–114.
8. Classification of Six Point Metrics (with Bernd Sturmfels), *Electronic Journal of Combinatorics* **11** (2004) R44, 16 pages.
9. Non-commutative Matrix Integrals and Representation Varieties of Surface Groups in a Finite Group (with Motohico Mulase), *Annales de L'Institut Fourier* **55**, 6 (2005), 2161–2196.

Preprints:

- 10 Shellability of the Moduli Space of  $n$  tropically colinear points in  $\mathbb{R}^d$  (with Hannah Markwig), in preparation.

Book chapters and theses:

11. The EM Algorithm for Hidden Markov Models (with Ingileif B. Hallgrímsson and R. Alexander Milowski), Chapter 12, *Algebraic Statistics for Computational Biology* edited by Lior Pachter and Bernd Sturmfels. Cambridge University Press (2005), 12 pages.
12. Graphical Expansion of Matrix Integrals with Values in a Clifford Algebra (undergraduate senior thesis), *Explorations* **6** A Journal of Undergraduate Research at UC Davis (2003), 47–63.

## Honors

Liftoff Fellowship, Clay Mathematics Institute (summer 2007)

NSF Graduate Research Fellowship (2003–2006)

UC Berkeley Graduate Opportunity Program Fellowship (2006–2007)

King Juan Carlos I Scholarship to attend the ICM in Madrid (2006)

Runner-up, Alice T. Schafer Prize, Association of Women in Mathematics (2003)

## Seminar and Conference Talks

Shellability of the Moduli Space of  $n$  Tropically Colinear Points in  $\mathbb{R}^d$   
Dartmouth Discrete Math Day, October 2007.

Affine Buildings and Tropical Convexity  
MIT Combinatorics Seminar, September 2007.  
University of Pennsylvania Combinatorial Algebraic Geometry Seminar, October 2007.

Representing Tropical Linear Spaces by Circuits  
19<sup>th</sup> International Conference on Formal Power Series and Algebraic Combinatorics, Beijing, China, July 2007.

Tropical Implicitization / The Newton Polytope of the Implicit Equation  
AMS Western Section Meeting, San Francisco, April 2006.  
TU Kaiserslautern, May 2006.  
Universität Stuttgart, May 2006.  
San Francisco State University Algebra-Geometry-Combinatorics Seminar, October 2006.  
University of British Columbia Discrete Mathematics Seminar, October 2006.  
University of Washington Combinatorics Seminar, November 2006.  
AMS Special Session on Commutative Algebra and Algebraic Geometry, Joint Mathematics Meetings, New Orleans, January 2007.  
Institute for Mathematics and Applications, Postdoc seminar, April 2007.  
AMS Special Session on Combinatorial Algebraic Geometry, AMS Eastern Section Meeting, Hoboken, April 2007.  
IMA Postdoc Seminar, Minneapolis, May 2007.  
Graduate Summer School on Applicable Algebraic Geometry, Texas A&M, August 2007.

Tropical Polytopes and Cellular Resolutions  
UC Berkeley Combinatorics Seminar, November 2005.  
UC Davis Discrete Mathematics Seminar, February 2006.  
UT Austin Algebra Seminar, March 2006.  
TU Darmstadt Discrete Optimization Seminar, May 2006.  
Contributed short communication, ICM, Madrid, August 2006.

Tropical Convexity via Cellular Resolutions  
UC Berkeley Commutative Algebra Seminar, April 2005.  
AMS Special Session on Syzygies in Commutative Algebra and Algebraic Geometry, Joint Mathematics Meetings, San Antonio, January 2006.

The EM Algorithm for Hidden Markov Models  
UC Berkeley Algebraic Statistics for Computational Biology Seminar, November 2004.  
AMS Special Session on Algebraic Statistics, Joint Mathematics Meetings, San Antonio, January 2006.

Classification of Six Point Metrics  
UC Berkeley Combinatorics Seminar, March 2004.

QEPCAD : Quantifier Elimination by Partial Cylindrical Algebraic Decomposition  
UC Berkeley Real Algebraic Algorithms Seminar, February 2004.

POLYMAKE Experiments on Higher Dimensional Trees  
UC Berkeley The Mathematics of Phylogenetic Trees Seminar, October 2003.

Matrix Integrals and Representation of a Surface Group  
UC Davis Gromov-Witten Invariants Seminar, June 2003.

## Conferences and Workshops Attended

Formal Power Series and Algebraic Combinatorics, Tianjin, China, July 2007.

Workshop on Real, Tropical, and Complex Enumerative Geometry, CRM, Montréal, June 2007.

Buildings and Combinatorial Representation Theory, AIM, Palo Alto, March 2007.

Thematic Year on Applications of Algebraic Geometry, IMA, Minneapolis, January–June 2007

Joint Mathematics Meetings, New Orleans, January 2007.

Topological Methods in Combinatorics, Computational Geometry, and the Study of Algorithms,  
MSRI, October 2006.

Application of Topology in Science and Engineering, MSRI, September 2006.

Combinatorial and Computational Geometry, Universidad de Alcalá, September 2006.

Geometric and Topological Combinatorics, Universidad de Alcalá, September 2006.

International Congress of Mathematicians, Madrid, August 2006.

Recent Developments in Arrangements and Configuration Spaces, MSRI, August 2006.

Moduli spaces and combinatorics, Banff International Research Station, July 2006.

Discrete and Computational Geometry—Twenty Years Later, Snowbird, June 2006.

Integer Points in Polyhedral Geometry, Number Theory, Representation Theory, Algebra, Opti-  
mization, Statistics, Snowbird, June 2006.

AMS Western Section Meeting, San Francisco, April 2006.

Computational and Algorithmic aspects of Algebra and Arithmetic, Arizona Winter School 2006.

Joint Mathematics Meetings, San Antonio, January 2006.

Algebraic Statistics and Computational Biology, Clay Mathematics Institute, November 2005.

Commutative Algebra: Local cohomology and Applications, Summer school, Snowbird, June 2005.

Joint Mathematics Meetings, Atlanta, January 2005.

Geometric Combinatorics, IAS / PCMI graduate summer school, Park City, July 2004.

Analysis of Algorithms, MSRI summer graduate program, Berkeley, June 2004.

Joint Mathematics Meetings, Baltimore, January 2003.

## Teaching Experience

**Recitation Teacher** Calculus (18.01), MIT (Fall 2007)

**Teaching Assistant** IMA summer school on Applicable Algebraic Geometry (Summer 2007)

**Mathematics Tutor** Berkeley Montessori School (2004–2005)

**Tutor and Tutor Trainer** UC Davis Learning Skills Center (2000 – 2003)

**Academic Peer Advisor** UC Davis Mathematics Department (2002 – 2003)

**Reader/Grader** UC Davis Mathematics Department (2000 – 2002)

## Memberships

American Mathematical Society

Association for Women in Mathematics

## References

Available upon request.