

Curriculum Vitae of Josephine Yu

Mathematical Sciences Research Institute
17 Gauss Way
Berkeley CA 94720
(415)215-8799

jyu@math.mit.edu
www.math.mit.edu/~jyu
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

Mathematical Sciences Research Institute (Program in Tropical Geometry)

MSRI Postdoctoral fellow and NSF postdoctoral research fellow, Fall 2009

Massachusetts Institute of Technology

Applied Mathematics Instructor, 2007–2009

NSF postdoctoral research fellow, 2008– present

Institute for Mathematics and Its Applications (Program in Applications of Algebraic Geometry)

Graduate student visitor, Spring 2007

Research Interests

Geometric Combinatorics, Combinatorial and Computational Algebra, Tropical Geometry

Publications

Preprints:

1. On a Parametrization of Positive Semidefinite Matrices with Zeros (with Mathias Drton), preprint (2009), 16 pages.
2. An Implicitization Challenge for Binary Factor Analysis (with María Angélica Cueto and Enrique A. Tobis), presented at Effective Methods in Algebraic Geometry (Barcelona, June 2009), submitted to *Journal of Symbolic Computation*, 20 pages.

3. Linear Systems on Tropical Curves (with Gregg Musiker and Christian Haase), preprint (2009), arXiv:0909.3685, submitted to *Mathematische Zeitschrift*, 28 pages.

Journal articles:

4. The Space of Tropically Collinear Points is Shellable (with Hannah Markwig), *Collectanea Mathematica* **60**, 1 (2009), 63–77.
5. Tropical Implicitization and Mixed Fiber Polytopes (with Bernd Sturmfels), *Software for Algebraic Geometry, I.M.A. Volumes in Mathematics and its Applications*, M. Stillman, N. Takayama and J. Verschelde (eds.), **148**, Springer, New York, 2008, 111–132.
6. The Hyperdeterminant and Triangulations of the 4-Cube (with Peter Huggins, and Bernd Sturmfels, and Debbie Yuster), *Mathematics of Computation*, **77** (2008) 1653–1679.
7. Affine Buildings and Tropical Convexity (with Michael Joswig and Bernd Sturmfels), *Albanian Journal of Mathematics*, **1** (2007), 187–211.
8. The Newton Polytope of the Implicit Equation (with Bernd Sturmfels and Jenia Tevelev), *Moscow Mathematical Journal* **7** (2007), 327–346.
9. Tropical Polytopes and Cellular Resolutions (with Mike Develin), *Experimental Mathematics* **16**:3 (2007), 277–291.
10. Tropical Convexity via Cellular Resolutions (with Florian Block), *Journal of Algebraic Combinatorics* **24**, 1 (2006), 103–114.
11. Classification of Six Point Metrics (with Bernd Sturmfels), *Electronic Journal of Combinatorics* **11** (2004) R44, 16 pages.
12. 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.

Refereed conference proceedings:

13. Representing Tropical Linear Spaces by Circuits (with Debbie Yuster), *Proceedings of Formal Power Series and Algebraic Combinatorics (Tianjin, China, 2007)*, 11 pages.

Book chapters and theses:

14. Combinatorial Aspects of Tropical Geometry. Ph.D. dissertation, UC Berkeley, 2007.
15. 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.
16. 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

NSF postdoctoral research fellowship (2008–present)
Liftoff Fellowship, Clay Mathematics Institute (summer 2007)
NSF Graduate Research Fellowship (2003–2006)
UC Berkeley Graduate Opportunity Program Fellowship (2006–2007)
Runner-up, Alice T. Schafer Prize, Association of Women in Mathematics (2003)

Teaching Experience

Students Advised

Dennis Ochse (Diploma thesis at TU Kaiserslautern) on tropical discriminants
Anthony Kim (undergraduate research program at MIT) on chip-firing games

At MIT

Graduate Topics Course, Tropical Geometry (Fall 2008)
Calculus, Multi-variable Calculus, Linear Algebra (2007–2008)

Others

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)
Reader/Grader, UC Davis Mathematics Department (2000–2002)
Academic Peer Advisor UC Davis Mathematics Department (2002–2003)

Professional Activities

Referee for Contemporary Mathematics, Discrete and Computational Geometry, Functional Analysis and Other Mathematics, Journal of Algebraic Combinatorics, Journal of Combinatorial Theory Series A, Journal of Software for Algebra and Geometry: Macaulay2.

Coorganizer for MSRI postdoc seminar (Fall 2009)

Selected Presentations

On a parametrization of positive semidefinite matrices with zeroes
Bay Area Discrete Math Day, Cal State Eastbay, October 2009.

Linear Systems on Tropical Curves
MIT Combinatorics Seminar, September 2008.
SFSU Algebra-Geometry-Combinatorics Seminar, March 2009.
UC Berkeley Discrete Mathematics Seminar, March 2009.
Texas A&M Algebraic Geometry Seminar, October 2009.
MSRI Workshop: Tropical Geometry in Combinatorics and Algebra, October 2009.

Invitation to Tropical Geometry

Math Institutes Modern Mathematics Workshop, SACNAS National conference, Salt Lake City, October 2008.

IMA Workshop: Career Options for Women in Mathematical Sciences, April 2009.

Tropical Implicitization and Mixed Fiber Polytopes

Colloquium, University of Illinois, Chicago, September 2008.

AMS Special Session on Computational Algebra and Convexity, Joint Mathematics Meetings, Washington D.C, January 2009.

Colloquium, CCR-Princeton, March 2009.

University of Kentucky WILDCATS seminar, April 2009.

MSRI workshop: Connections for Women, Tropical Geometry, August 2009.

The Space of Tropically Collinear Points is Shellable

Discrete Mathematics Day, Dartmouth College, October 2007.

Oberwolfach workshop on Tropical Geometry, Oberwolfach, Germany, December 2007.

Valley Geometry Seminar, University of Massachusetts, Amherst, April 2008.

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

19th 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, Hoboken, April 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.

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.

References

Prof. Alicia Dickenstein Universidad de Buenos Aires, Argentina
alidick@dm.uba.ar, +54(11)4576-3390

Prof. Dr. Michael Joswig Technische Universität Darmstadt, Germany
joswig@mathematik.tu-darmstadt.de, +49(6151)16-2959.

Prof. Diane Maclagan University of Warwick, UK
D.Maclagan@warwick.ac.uk, +44-24-76528333

Prof. Frank Sottile Texas A&M University
sottile@math.tamu.edu, (979)845-4169.

Prof. Bernd Sturmfels University of California, Berkeley
bernd@math.berkeley.edu, (510)642-4687.