

# ERIC KATZ

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## Employment

2010 – 2011 NSF Institutes Postdoc, Mathematical Sciences Research Institute, taken at University of Texas-Austin  
Fall 2009 Postdoctoral Member, Mathematical Sciences Research Institute  
2007 – 2010 Lecturer/RTG Postdoc, University of Texas-Austin  
2004 – 2007 Assistant Research Professor, Duke University

## Education

2004 Ph.D. Stanford University, Mathematics (advisors: Ravi Vakil and Yakov Eliashberg).  
Thesis: *A Formalism for Relative Gromov-Witten Invariants*  
1999 B.S. Ohio State University, Columbus, OH, Mathematics

## Research interests

Tropical geometry, algebraic geometry, combinatorial algebraic geometry, enumerative geometry, moduli spaces, geometric combinatorics, intersection theory, toric varieties, deformation theory

## Publications

### Articles

1. *Tropical Geometry and the Motivic Nearby Fiber* (with Alan Stapledon). *Compositio Math.*, to appear. [arXiv:1007.0511](https://arxiv.org/abs/1007.0511).
2. *Monodromy Filtrations and the Topology of Tropical Varieties* (with David Helm). *Canadian Journal of Math.*, to appear. [arXiv:0804.3651](https://arxiv.org/abs/0804.3651).
3. *Realization Spaces for Tropical Fans* (with Sam Payne). *Proceedings of the Abel Symposium*, to appear.
4. *Tropical Intersection Theory from Toric Varieties*. *Collect. Math.*, to appear.
5. *The tropical  $j$ -invariant* (with Hannah Markwig and Thomas Markwig). *LMS J. Comput. Math.*, **12**:275–294, 2009.
6. *A Tropical Toolkit*. *Expo. Math.*, **27**:1–36, 2009.
7. *Tropical Invariants from the Secondary Fan*. *Adv. Geom.*, **9**:153–180, 2009.
8. *The  $j$ -invariant of a plane tropical cubic* (with Hannah Markwig and Thomas Markwig). *Journal of Algebra*, **320**:3832–3848, 2008.
9. *Piecewise polynomials, Minkowski weights, and localization on toric varieties* (with Sam Payne). *Algebra Number Theory*, **2**:135–155, 2008.
10. *An Algebraic Formulation of Symplectic Field Theory*. *Journal of Symplectic Geometry*, **5**:385–437, 2007.

## Submitted Journal Articles

11. *Obstructions to Lifting Tropical Curves in Hypersurfaces* (with Tristram Bogart). arXiv:1101.0297.
12. *Tropical Realization Spaces and Tropical Approximation*. arXiv:1008.1836.
13. *Lifting Tropical Curves in Space and Linear Systems on Graphs*. arXiv:1009.1783.

## Articles in Progress

14. *The Universal Deformation Variety of a 3-manifold* (with Henry Segerman).
15. *Counting Tropical Curves on Abelian Surfaces* (with David Helm).
16. *Tropical Linear Systems on Surfaces* (with Christian Haase, Gregg Musiker, and Alan Stapledon).
17. *A Cohomological Approach to Linear Systems on Graphs*.

## Unpublished Manuscripts

18. *Line-bundles on Stacks of Relative Maps*. math.AG/0507322.
19. *Topological Recursion Relations by Localization*. math.AG/0310050.

## Invited Talks

- 2011 Dec Workshop on Tropical Geometry, Castro Urdiales, Spain: *TBA*
- Jan University of Waterloo, Colloquium: *Lifting Tropical Curves and Linear Systems on Graphs*.
- Jan Miami University, Colloquium: *Lifting Tropical Curves and Linear Systems on Graphs*.
- Jan AMS Special Session on Combinatorial Algebraic Geometry, New Orleans, LA: *Lifting Tropical Curves and Linear Systems on Graphs*.
- 2010 Dec University of California-Berkeley, Mirror Symmetry Working Group: *The Combinatorics of Kontsevich-Soibelman Wall-Crossing*.
- Nov San Francisco State University, Geometry Seminar: *Lifting Tropical Curves and Linear Systems on Graphs*.
- Nov AMS Session on Applications of Non-Archimedean Geometry, Richmond, VA: *Lifting Tropical Curves and Linear Systems on Graphs*.
- Oct Georgia Tech, Tropical Geometry Seminar: *Lifting Tropical Curves*.
- Sep Texas A&M University, Algebraic Geometry Seminar: *Lifting Tropical Curves and Linear Systems on Graphs*.
- Sep University of Texas, Geometry Seminar: *Lifting Tropical Curves and Linear Systems on Graphs*
- Aug Australian National University, Seminar: *Lifting Tropical Curves in Hypersurfaces*.
- Jul Australian National University, Mathematics and Physics on the Borderline between Algebraic and Differential Geometry: *Lifting Tropical Curves and Linear Systems on Graphs*.
- Jun SIAM Discrete Math '10, Austin, TX: *Lifting Tropical Curves*.

- Apr University of British Columbia, Algebraic Geometry Seminar: *Lifting Tropical Curves*.
- Mar Texas A&M University, Algebraic Geometry Seminar: *Lifting Tropical Curves in Subvarieties*.
- Feb University of Kentucky, Combinatorics Seminar: *Lifting Tropical Curves in Subvarieties*.
- Feb University of California-San Diego, Conference on Tropical Geometry and Mirror Symmetry: *Lifting Tropical Curves in Subvarieties*.
- Jan University of Oklahoma, Colloquium: *Lifting Tropical Curves*.
- 2009 Oct MSRI, Tropical Geometry in Combinatorics and Algebra: *Realization Spaces of Tropical Fans*.
- Sep MSRI, Tropical Program: *Counting Tropical Curves on Abelian Surfaces*.
- Apr University of Texas: *Counting Tropical Curves on Abelian Surfaces*.
- Apr Ohio State University Undergraduate Math Club: *Tropical Geometry*.
- Apr Ohio State University: *Counting Tropical Curves on Abelian Surfaces*.
- 2008 Oct University of Texas Undergraduate Math Club: *Realizability of Polytopes*.
- Jun Real and Tropical Algebraic Geometry, EPFL, Lausanne: *Tropical Geometry and Monodromy*.
- Apr University of Michigan: *Tropical Geometry and Monodromy*.
- Feb Texas A&M University: *Monodromy of Tropical Curves*.
- 2007 Dec MFO Workshop on Tropical Geometry, Oberwolfach: *Piecewise Polynomials in Tropical Geometry*.
- Nov Rice University: *The  $j$ -invariant of a Plane Tropical Cubic*.
- Oct University of Texas: *Tropical Geometry*.
- Oct AMS Session on Toric Varieties, Rutgers: *Piecewise Polynomials and Localization on Toric Varieties*.
- Jun Yashafest, Stanford: *An Algebraic Formulation of Symplectic Field Theory*.
- Mar Wesleyan University: *Tropical Geometry*.
- Feb North American Workshop on Tropical Geometry, Banff: *Equivariant Cohomology and Localization in Tropical Geometry*.
- 2006 Nov Stanford University: *Tropical Invariants from the Secondary Fan*.
- Sep Duke University Graduate/Faculty Seminar: *Tropical Geometry*.
- Apr Brown University: *Tropical Degree of Cones in the Secondary Fan*.
- 2005 Apr Princeton University: *Relative Gromov-Witten Invariants and Symplectic Field Theory*.
- Feb Duke University: *A Formalism for Relative Gromov-Witten Invariants*.
- 2003 Nov Stanford University: *Topological Recursion Relations by Localization*.

### Seminars Organized

- 2005 Spring Duke University: Tropical Geometry (with Christian Haase).

## Awards

Faculty Excellence Award for mentorship in the Ronald E. McNair Post-baccalaureate Achievement Program, a Department of Education program designed to prepare students from disadvantaged backgrounds for doctoral studies. Awarded for mentoring of José Rodríguez, University of Texas, April 2010.

## Mentoring Activities

### Graduate Research Supervised

2007 – *Tropical Geometry and Topological Quantum Field Theory*, Brian Katz (now teaching at Augustana College), unofficial doctoral student. Ph.D. expected by May 2012.

### Undergraduate Research Supervised

2008 – 2010 *The Newton Polytope of Belyi Polynomials*, José Rodríguez (now a graduate student at UC-Berkeley). Mentored under the Ronald E. McNair Post-baccalaureate Achievement Program, University of Texas.

2008 *Isospectral Graphs*, Peter Glaze (now a graduate student at UIUC). Summer Reading/Research Project, University of Texas.

2006 – 2007 *Application of discrete geometry to the construction of Laurent-rational zeros*, Charles Staats (now a graduate student at University of Chicago). Mentored under Program for Research for Undergraduates, Duke University.

## Teaching Activities

### Courses Designed

2006 *Tilings, Symmetry, and Geometry* (freshman seminar), Duke University.

### Courses Taught

2010 *Linear Algebra*, University of Texas.

*Matrix Computations*, University of Texas.

2009 *Introduction to Number Theory* (Moore Method), University of Texas.

2008 *Seq., Series, and Multi. Calc.*, University of Texas.

*Algebraic Structures I*, University of Texas.

2007 *Introduction to Number Theory*, University of Texas.

*Linear Algebra*, Duke University.

2006 *Multivariable Calculus*, Duke University.

*Algebraic Topology*, Duke University.

2005 *Multivariable Calculus*, Duke University.

*Multivariable Calculus*, Duke University.

2004      *Single Variable Calculus II*, Duke University.

**Journals Refereed**

Advances in Geometry  
Advances in Mathematics  
Arkiv for Matematik  
Collectanea Mathematica  
Compositio Mathematica  
Discrete Mathematics  
International Mathematics Research Notices  
Journal of Combinatorial Theory, Series A

Date of CV: January 2011.