

Madeleine Weinstein

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RESEARCH INTERESTS Metric algebraic geometry, intersection theory, geometry of data.

EDUCATION **University of California Berkeley**

Ph.D. Candidate, Mathematics (expected May 2021)

- Advisor: Bernd Sturmfels

Harvey Mudd College

B.S. in Mathematics, May 2016

- High Distinction and Honors in Mathematics
- Thesis: *Adinkras and Arithmetical Graphs*. Advisor: Dagan Karp

Budapest Semesters in Mathematics

Fall 2014

FELLOWSHIPS AAAS IF/THEN Ambassador 2019
National Science Foundation Graduate Research Fellow 2016
UC Berkeley Chancellor's Fellow 2016

PAPERS *Voronoi Cells in Metric Algebraic Geometry of Plane Curves* (with M. Brandt). Submitted.

96120: The degree of the linear orbit of a cubic surface (with L. Brustenga i Moncusi and S. Timme). To appear in *Le Matematiche*.

The Bottleneck Degree of Algebraic Varieties (with S. Di Rocco and D. Eklund). *SIAM J. Appl. Algebra Geometry* 4-1 (2020), pp.227-253.

Voronoi Cells of Varieties (with D. Cifuentes, K. Ranestad, and B. Sturmfels). To appear in *Journal of Symbolic Computation*.

Offset Hypersurfaces and Persistent Homology of Algebraic Varieties (with E. Horobet). *Comput. Aided Geom. Design* 74 (2019), 101767.

Learning Algebraic Varieties from Samples (with P. Breiding, S. Kalisnik, and B. Sturmfels). *Revista Mathematica Complutense* **31** (2018), 545-593.

Invariance of the Sprague-Grundy Function for Variants of Wythoff's Game. *Integers* (16 (2016), G4).

Gaussian Distribution of the Number of Summands in Generalized Zeckendorf Decompositions in Small Intervals (with A. Best, P. Dynes, X. Edelsbrunner, S. J. Miller, B. McDonald, and C. Turnage-Butterbaugh). *Integers* (16 (2016), A6).

Gaussian Behavior of the Number of Summands in Zeckendorf Decompositions in Small

Intervals (with A. Best, P. Dynes, X. Edelsbrunner, S. J. Miller, B. McDonald, and C. Turnage-Butterbaugh), *Fibonacci Quarterly* **52** (2014), no.5, 35-46.

Benford Behavior of Zeckendorf Decompositions (with A. Best, P. Dynes, X. Edelsbrunner, S. J. Miller, B. McDonald, and C. Turnage-Butterbaugh), *Fibonacci Quarterly* **52** (2014), no.5, 47-53.

Geometric-Progression-Free sets over Quadratic Number Fields (with A. Best, K. Huan, N. McNew, S.J. Miller, J. Powell, K. Tor), *Proceedings of the Royal Society of Edinburgh, Section A: Mathematics* **147**(2017), no. 2, 242-262.

Benford Behavior of Generalized Zeckendorf Decompositions (with A. Best, P. Dynes, X. Edelsbrunner, S.J. Miller, B. McDonald, and C. Turnage-Butterbaugh), *Combinatorial and Additive Number Theory II: CANT*, New York, NY, USA, 2015 and 2016, Springer, New York, 2017.

Ramsey Theory Problems over the Integers: Avoiding Generalized Progressions (with A. Best, K. Huan, N. McNew, S.J. Miller, J. Powell, K. Tor), *Combinatorial and Additive Number Theory II: CANT*, New York, NY, USA, 2015 and 2016, Springer, New York, 2017.

CONFERENCES AND TALKS	<p><i>Stanford Algebraic Geometry Seminar</i>, Stanford, CA November 2019</p> <ul style="list-style-type: none"> • Talk: Metric Algebraic Geometry <p><i>Commutative Algebra and Algebraic Geometry Seminar</i>, Berkeley, CA November 2019</p> <ul style="list-style-type: none"> • Talk: Metric Algebraic Geometry <p><i>Western Algebraic Geometry Symposium</i>, Salt Lake City, UT November 2019</p> <ul style="list-style-type: none"> • Poster: Voronoi Cells in Metric Algebraic Geometry of Plane Curves <p><i>Varieties, Polyhedra, Computation</i>, Berlin, Germany October 2019</p> <ul style="list-style-type: none"> • Poster: Voronoi Cells in Metric Algebraic Geometry of Plane Curves <p><i>AMS Sectional</i>, Madison, WI September 2019</p> <ul style="list-style-type: none"> • Invited Talk: Voronoi Cells in Metric Algebraic Geometry of Plane Curves <p><i>Intersection Theory Seminar</i>, Leipzig, Germany July 2019</p> <ul style="list-style-type: none"> • Talk: Fano Schemes <p><i>SIAM Conference on Applied Algebraic Geometry</i>, Bern, Switzerland July 2019</p> <ul style="list-style-type: none"> • Invited Talk: Voronoi Cells of Varieties <p><i>Trieste Algebraic Geometry Summer School</i>, Trieste, Italy June 2019</p> <ul style="list-style-type: none"> • Course Assistant: Algebraic Geometry of Data Clouds • Talk: Voronoi Cells of Varieties <p><i>Invitation to Nonlinear Algebra Course</i>, Leipzig, Germany June 2019</p> <ul style="list-style-type: none"> • Talk: Representation Theory <p><i>MEGA: Effective Methods in Algebraic Geometry</i>, Madrid, Spain June 2019</p> <ul style="list-style-type: none"> • Talk: Voronoi Cells of Varieties <p><i>ASGARD Math</i>, Oslo, Norway May 2019</p>
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- Talk: Voronoi Cells of Varieties
- First Meeting on Cubic Surfaces*, Oslo, Norway May 2019
- Applied Invariant Theory Seminar*, Berkeley, CA March 2019
- Talk: The Reach of an Algebraic Variety
- Nonlinear Algebra Seminar*, Berkeley, CA February 2019
- Talk: Voronoi Cells of Varieties
- Connections for Women: Derived Algebraic Geometry, Birational Geometry and Moduli Spaces*, Berkeley, CA January 2019
- Poster: Voronoi Cells of Varieties
- Real Algebraic Geometry and Optimization at ICERM*, Providence, RI October 2018
- Poster: Offset Hypersurfaces and Persistent Homology of Algebraic Varieties
- Shape and Structure of Materials at MSRI*, Berkeley, CA October 2018
- Applied Algebra and Topology Seminar*, Oxford, England May 2018
- Talk: Offset Hypersurfaces and Persistent Homology of Algebraic Varieties
- Macaulay2 Workshop* Leipzig, Germany June 2018
- IAS Women and Mathematics*, Princeton, NJ May 2018
- Talk: Gender Equity in Mathematical Studies
- Linking Topology to Algebraic Geometry and Statistics*, Leipzig February 2018
- Poster: Algebraicity of Persistent Homology
- Nonlinear Algebra Seminar*, Leipzig, Germany January 2018
- Talk: Offset Hypersurfaces and Persistent Homology of Algebraic Varieties
- Commutative Algebra and Algebraic Geometry Seminar*, Berkeley, CA September 2017
- Talk: Symbolic Powers and the Zariski-Nagata Theorem
- Reading Group on Real Algebraic Geometry*, Leipzig, Germany July 2017
- Polynomials and Polytopes*, Berlin, Germany June 2017
- Algebraic Topology Class*, Berkeley, CA April 2017
- Talk: Simplicial Homology
- Combinatorial Commutative Algebra Seminar*, Berkeley, CA April 2017
- Talk: Plücker Coordinates

HONORS AND
AWARDS

- UC Berkeley Outstanding Student Leadership Award, Nominee* 2016
- Nominated for award recognizing a student who has significantly impacted the community through leadership
- National Science Foundation We Are Mathematics Video Contest, Honorable Mention* 2016
- Received Honorable Mention for MatheMaddies' Ice Cream Map in competition for videos to showcase math research in a way that is exciting and accessible to a broad audience
- National Science Foundation Graduate Research Fellowship* 2016
- An award of \$102,000 to support three years of graduate study
- UC Berkeley Chancellor's Fellowship* 2016
- An award of \$60,000 to support two years of graduate study by exceptional applicants who also advance the Regents' goals for diversification of the academy
- Greever Mathematical Research Prize* 2015
- Awarded by Harvey Mudd College for an original contribution to the theory of mathematics
- Alice T. Schafer Prize, Honorable Mention* 2015
- Awarded by the Association for Women in Mathematics to an outstanding undergraduate female mathematician
- Giovanni Borrelli Mathematics Prize* 2015
- Awarded by Harvey Mudd College to two seniors who have distinguished themselves scholastically and show promise of contributing in an important way to the mathematical sciences
- Goldwater Scholarship Honorable Mention* 2015
- Outstanding Presentation Award, Joint Mathematics Meeting* 2014
- Robert James Prize* 2013
- Awarded by Harvey Mudd College to three sophomores for excellence in mathematics
- National Merit Scholarship* 2012-2016
- Harvey S. Mudd Merit Award* 2012-2016

TEACHING

- Volunteer Tutor, Willard Middle School, Berkeley, CA* September 2017-May 2019
- Tutored several middle school students
 - Established program to bring other mathematics students from UC Berkeley to volunteer at Willard Middle School
- Teacher, Youth Support Program, Willard Middle School, Berkeley, CA* September 2016-May 2017
- Developed curriculum in alignment with Common Core standards to meet needs of students who struggled in previous math courses
 - Taught after-school credit recovery course to 8th grade students
- Teaching Assistant, Bridge to Enter Advanced Mathematics, New York City, NY* July 2016-August 2016
- Assisted teacher in Mathematical Logic course at summer camp for talented middle school students from underserved communities
 - Led homework sessions and encouraged development of students' skills at solving difficult math problems

MENTORING

- Grader and Tutor, Harvey Mudd College Math Department, Claremont, CA* June 2013-May 2014
- Led tutoring hours for Intermediate Probability students to assist with homework and exam preparation
 - Provided tutoring over the phone for incoming first-year students completing Summer Math Review
- Horn of Africa Services, Seattle, WA* Winter-Spring 2012
- Improved basic math skills of elementary school students from refugee communities
 - Received Recognition of Excellent Service
- Atlantic Street Center, Seattle, WA* Summer 2009
- Worked as assistant teacher at summer school program for students who had failed Washington State's standardized math exam
- Julia Robinson Math Festival* December 2019
- Volunteered to support math conference for K-12 students
- AAAS IF/THEN Ambassador* Fall 2019- Present
- Serving as a high-profile STEM role model for middle school girls
 - Reached approximately 966 K-12 students as a virtual guest speaker through Nepris platform
- Expanding Your Horizons* March 2019
- Volunteered to support STEM conference for girls
- Co-Leader of Gender Equity in Mathematical Studies* Fall 2017-May 2019
- Organized reading groups to discuss equity and diversity in STEM
 - Organized social events to bring together communities of graduate and undergraduate students in math
 - Organized events to help undergraduates prepare for the graduate school in math
 - Organized volunteer opportunities for other students
- IAS Women and Mathematics Ambassador* Fall 2017-Spring 2018
- Awarded \$1500 to found and run Gender Equity in Mathematical Studies organization for UC Berkeley graduate and undergraduate students with Madeline Brandt
 - Organized semester-long reading group discussing equity and diversity in STEM
 - Organized group of students to volunteer weekly throughout the year in math classrooms at Willard Middle School
 - Organized events to help undergraduates prepare for the GRE Math Subject Test
 - Organized social events to bring together communities of graduate and undergraduate students in math
- UC Berkeley Women in Math Graduate School Panel* October 2016
- Served as volunteer panelist to discuss graduate application process with undergraduate women
- Littlebrook Science Expo, Princeton, NJ* May 2016
- Taught lesson on Mobius Valentine to encourage elementary school students' interest in math
- 3rd Annual Conference on Math and Science for African American Girls* April 2014
- Engaged middle and high school girls in conversations about mathematical careers
- Society of Women Engineers WEST Conference* Claremont, CA April 2014
- Served as invited panelist to discuss undergraduate math experience with high school girls