

## Max Engelstein

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## Employment

C.L.E. Moore Instructor, MIT, Fall 2016-Present.

Sponsoring Scientist: Professor David Jerison

NSF Postdoctoral Fellowship, Summer 2017-Spring 2020

Huneke Endowed Postdoctoral Fellow, MSRI program on Harmonic Analysis, Spring 2017.

Mentor: Professor Svitlana Mayboroda

## Education

Ph.D. Mathematics, University of Chicago, 2016.

M.S. Mathematics University of Chicago, 2012.

Advisor: Professor Carlos Kenig

Thesis Title: Free Boundary Problems for Harmonic and Caloric Measures

Visited Professor Tatiana Toro at the University of Washington, Seattle. Winter and Spring 2015.

B.S. Mathematics, Yale University, 2010.

Distinction in Major

## Publications

1. with M. Badger and T. Toro. "The Structure of the Singular Set for a Two-Phase Free Boundary Problem for Harmonic Measure." In preparation. Winter 2017.
2. with G. David and T. Toro. "Free Boundary Regularity for Almost-Minimizers." *Submitted*. ArXiv:1702.06580. Winter 2017.
3. with N. Edelen. "Quantitative stratification for some free-boundary problems." *Submitted*. ArXiv:1702.04325. Winter 2017.
4. "Parabolic NTA domains in  $\mathbb{R}^2$ ." *Submitted*. ArXiv:1607.08650. Summer 2016.
5. "A Free Boundary Problem for the Parabolic Poisson Kernel." *Adv. Math.* to appear. ArXiv:1510.05704. Fall 2015.
6. with M. Badger and T. Toro. "Structure of sets which are well approximated by zero sets of harmonic polynomials." *Submitted*. ArXiv:1509.03211. Fall 2015.
7. "A Two-Phase Free Boundary Problem for Harmonic Measure." *Ann. Sci. École Norm. Sup.*, **49** (2016), 859-905.

## Pre-Graduate School Publications

"The Least-Perimeter Partition of a Sphere into Four Equal Areas." *Discrete Comput. Geom.* **Vol 44** (2010), pp 645-653.

with Maurmann et. al. "Asymptotics of Perimeter-Minimizing Partitions." *Can. Math. Bull.* **Vol 53**(2010), pp 516-525.

with Maurmann et. al. "Isoperimetric problems on the sphere and on surfaces with density." *N.Y.J.M.* **Vol 15**(2009), pp 97-123.

## Awards/Grants

**NSF Postdoctoral Fellowship**, 2017-2020.

**Graduate Student Travel Grant** American Mathematical Society (\$250 to attend the AMS Spring Sectional Meeting at Stony Brook). Winter 2016

**Wirszup Fellowship**, University of Chicago Math Department (awarded to an excellent finishing graduate student). Winter 2016.

**GSA Travel Fund**, University of Chicago Graduate Student Association (\$750 for international conference expenses). February 2015.

**NSF Graduate Research Fellowship**, 2010-2015.

**DoD National Defense Science and Engineering Graduate Fellowship**, 2010-2013.

**McCormick Fellowship**, University of Chicago Mathematics Department, 2010-2012.

**DeForest Senior, Benjamin Barge, George Beckwith, Anthony Stanley Departmental Prizes**, Yale Mathematics Department, 2007, 2008, 2009, 2010.

## Talks and Presentations

### Invited Talks

MSRI Postdoc Seminar, MSRI. April 2017.

Calderon-Zygmund Seminar, University of Chicago. February 2017.

AMS Special Session: Geometric Aspects of Harmonic Analysis, Brunswick, ME. September 2016.

PDE Seminar, University of Minnesota, Twin Cities. April 2016.

Analysis and PDE Seminar, Johns Hopkins University. March 2016.

AMS Special Session: Geometric Measure Theory and Its Applications, Stony Brook. March 2016.

Analysis Seminar, University of Wisconsin, Madison. March 2016.

Analysis Seminar, Northwestern University. November 2015.

Calderon-Zygmund Seminar, University of Chicago. November 2015.

Rainwater Seminar, University of Washington, Seattle. March 2015.

PDE Seminar, Purdue University. January 2015.

Calderon-Zygmund Seminar, University of Chicago. March 2014.

### Contributed Talks/Presentations

6th Symposium on Analysis and PDEs. West Lafayette, Indiana. June 2015.

X Americas Conference on Differential Equations and Nonlinear Analysis. Buenos Aires, Argentina. February 2015.

Introductory School to the Programme "Free Boundary Problems and Related Topics." Cambridge, UK January 2014. Poster Presentation.

## Teaching, Service and Outreach

### Teaching at MIT

**Recitation Leader, 18.02** Fall 2016. Taught two sections of an introductory multivariate course.

### Teaching at the University of Chicago

**Co-Instructor, Calculus of Variations** Summer 2016. Co-taught a two-week course on the Calculus of Variations to students in the University of Chicago summer REU.

**Instructor, Math 112: Studies in Mathematics** Fall 2015. Taught an elementary number theory course for students majoring in non-quantitative fields fulfilling their math requirement.

**Instructor, Math 196: Linear Algebra** Fall 2014. Taught an introductory linear algebra class for non-majors.

**College Fellow.** Fall 2011-Spring 2012. Teaching assistant for Math 204, Math 205 (with Prof. Webster), Math 270 (with Prof. Bejenaru): introductory courses in real and complex analysis.

### Service

**MathSciNet Reviewer.** Spring 2017-Present

**Organizer of MSRI's Harmonic Analysis Postdoc Seminar** Spring 2017.

**Selection Panelist for DoD's NDSEG Fellowship** 2017.

**Refereed Journal Articles for:** *Forum of Mathematics: Sigma*, *GAEA*, *Memoirs of the AMS*, *Journal of Fourier Analysis and Applications*.

**WOMP Co-organizer** Fall 2012. Co-organized and co-led the University of Chicago orientation for incoming graduate students.

**UChicago REU Co-organizer** Summer 2012, 2016. Helped organize the summer research experience for undergraduates at the University of Chicago (over fifty students participated).

### Outreach and Mentoring

**Mentor, University of Chicago Directed Reading Program.** Fall 2012, Fall 2015, Winter 2016, Spring 2016. Supervised undergraduates in independent reading courses on measure theory, functional analysis and elliptic PDE.

**Assistant Instructor, MathILy** Summers 2013, 2015. MathILy is a summer program for mathematically gifted high school students which mainly utilizes discovery based learning.

**Mathematics Tutor, "Upward Bound"** Fall 2013-Winter 2015. "Upward Bound" is run by the University of Chicago to help local, disadvantaged high school students prepare for college.

**TA, Adventures in Analysis** Summer 2014. "Adventures in Analysis", is a program for underrepresented minority students who are about to begin graduate school in mathematics and statistics.

**Mentor, University of Chicago REU.** Summers 2011, 2012, 2016. Supervised ten expository mathematics papers over three years, including four selected as among the best in the program.