

# Mark W. Meckes

Curriculum vitae — August 11, 2017

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## Appointments

2013–present: Associate Professor, Case Western Reserve University (Case).  
2013–2014: Associate Researcher, Institut de Mathématiques de Toulouse, Université Paul Sabatier.  
2007–13: Assistant Professor, Case.  
2006–07: Visiting Assistant Professor, Cornell University.  
2003–06: Lecturer, Stanford University.

## Education

Ph.D. in Mathematics. Case, May 2003.  
Dissertation: *Random Phenomena in Finite-Dimensional Normed Spaces*.  
Advisors: Stanislaw J. Szarek and Elisabeth M. Werner.  
B.S. in Mathematics, *summa cum laude*, with minors in Physics and German. Case, May 1999.

## Grants and honors

Simons Foundation Collaboration Grant, 2014–19.  
Simons Fellowship, 2013–14.  
NSF grant DMS-0902203, 2009–13.  
Graduate Dean's Award for Instructional Excellence. Case, 2001.  
Max Morris Prize for the outstanding undergraduate in mathematics. Case, 1999.  
Phi Beta Kappa, 1999.

## Research publications

Links to preprints and online published versions appear on my web page.

A sharp rate of convergence for the empirical spectral measure of a random unitary matrix (with E. Meckes).

To appear in *Zapiski Seminarov POMI*.

The magnitude of a metric space: from category theory to geometric measure theory (with T. Leinster).

*Measure Theory in Non-Smooth Spaces*, 156–193, DeGruyter Open, 2017.

Rates of convergence for empirical spectral measures: a soft approach (with E. Meckes).

*Convexity and Concentration*, 157–181, IMA Volumes in Mathematics and its Applications 161, Springer, 2017.

Self-similarity in the circular unitary ensemble (with E. Meckes).

*Discrete Analysis*, 2016:9, 15 pp.

Maximizing diversity in biology and beyond (with T. Leinster).

*Entropy* 18 (2016) no. 3, article 88.

A rate of convergence for the circular law for the complex Ginibre ensemble (with E. Meckes).

*Ann. Fac. Sci. Toulouse Math. Series 6*, 24 (2015) no. 1, 93–117.

Magnitude, diversity, capacities, and dimensions of metric spaces.

*Potential Anal.* 42 (2015) no. 2, 549–572.

On the equivalence of modes of convergence for log-concave measures (with E. Meckes).

*Geometric Aspects of Functional Analysis*, 385–394, Lecture Notes in Math. 2116, Springer, 2014.

Spectral measures of powers of random matrices (with E. Meckes).

*Electron. Commun. Probab.* 18 (2013) no. 78, 1–13.

Concentration and convergence rates for spectral measures of random matrices (with E. Meckes).

*Probab. Theory Related Fields* 156 (2013), 145–164.

Positive definite metric spaces.

*Positivity* 17 (2013) no. 3, 733–757.

The spectra of random abelian  $G$ -circulant matrices.

*ALEA Lat. Am. J. Probab. Math. Stat.* 9 (2012) no. 2, 435–450.

Concentration for noncommutative polynomials in random matrices (with S. Szarek).

*Proc. Amer. Math. Soc.* 140 (2012), 1803–1813.

Another observation on operator compressions (with E. Meckes).

*Proc. Amer. Math. Soc.* 139 (2011), 1433–1439.

Some results on random circulant matrices.

*High Dimensional Probability V: The Luminy Volume*, 213–223, IMS Collections 5, Institute of Mathematical Statistics, Beachwood, OH, 2009.

Gaussian marginals of convex bodies with symmetries.

*Beiträge Algebra Geom.* 50 (2009) no. 1, 101–118.

On the spectral norm of a random Toeplitz matrix.

*Electron. Commun. Probab.* 12 (2007), 315–325.

The central limit problem for random vectors with symmetries (with E. Meckes).

*J. Theoret. Probab.* 20 (2007), 697–720.

Some remarks on transportation cost and related inequalities.

*Geometric Aspects of Functional Analysis*, 237–244, Lecture Notes in Math. 1910, Springer, 2007.

Sylvester’s problem for symmetric convex bodies and related problems.

*Monatsh. Math.* 145 (2005) no. 4, 307–319.

Volumes of symmetric random polytopes.

*Arch. Math.* 82 (2004) no. 1, 85–96.

Concentration of norms and eigenvalues of random matrices.

*J. Funct. Anal.* 211 (2004) no. 2, 508–524.

## Textbook

*Linear Algebra*, with E. Meckes. Cambridge University Press. To appear, 2018.

## Selected talks

Short course at Summer School on Mathematical Aspects of Quantum Information, Institut des Études Scientifiques de Cargèse, Corsica, September 2017.

Workshop on Random Matrices, Foundations of Computational Mathematics, Barcelona, July 2017.

AMS Special Session on Discrete Structures: Analysis and Applications (IMA Reunion), Minneapolis, October 2016.

Perspectives on Integral Geometry, University of Georgia, June 2016.

AMS Special Session on Probabilistic and Analytic tools in Convexity, Athens, Georgia, March 2016.

Statistics Colloquium, Ohio State University, November 2014.

AMS Special Session on High Dimensional Convexity and Applications, San Francisco, October 2014.

Stochastic Processes and High Dimensional Probability Distributions, Euler Institute, Saint Petersburg, June 2014.

Mathematical Physics seminar, University of Bristol, May 2014.

Mathematics Colloquium, University of York, May 2014.

Pure Mathematics Colloquium, University of Sheffield, May 2014.

Analysis seminar, University of Edinburgh, April 2014.

Functional Analysis seminar, University of Paris VI, March 2014.

Interplay of Convex Geometry and Banach Space Theory, BIRS, March 2013.

AMS Special Session on Harmonic Analysis and Convexity, Akron, Ohio, October 2012.

Mathematics Advanced Study Semester colloquium, Penn State University, September 2012.

Plenary talk, MAA Ohio Section Meeting, October 2011.

High Dimensional Probability VI, BIRS, October 2011.

Random Matrices, Geometric Functional Analysis and Algorithms, Oberwolfach, May 2011.

Geometric Probability and Optimal Transportation, Fields Institute, November 2010.  
 Probability in Asymptotic Geometry, Texas A&M University, July 2009.  
 Advances in Stochastic Inequalities and Applications, BIRS, June 2009.  
 AMS Special Session on Concentration Inequalities, San Francisco, April 2009.  
 Affine Convex Geometric Analysis, BIRS, January 2009.  
 High Dimensional Probability V, CIRM, May 2008.  
 Workshop on Random Matrices, DIMACS, March 2008.  
 Probability Inequalities with Applications to High Dimensional Phenomena, Texas A&M University, August 2007.  
 Cornell Probability Summer School, Cornell University, June 2007.  
 AMS Special Session on Affine Invariants, Randomness, and Approximation in Convex Geometry, Hoboken, NJ, April 2007.  
 AMS Special Session on Random Matrices and Non-commutative Probability, Oxford, Ohio, March 2007.  
 AMS Special Session on Recent Trends in Convex and Discrete Geometry, Joint Mathematics Meetings, San Antonio, January 2006.  
 Convex Geometry and High Dimensional Phenomena, Vienna, July 2005.  
 Gaussian Measure and Geometric Convexity, Snowbird, Utah, July 2004.  
 AMS Special Session on Analytic Convex Geometry, Lawrenceville, NJ, April 2004.  
 AMS Special Session on Convex Geometry, Boston, October 2002.  
 Non-commutative Phenomena and Random Matrices, University of British Columbia, August 2002.

## Courses taught

### Case: Undergraduate:

Math 101: Precalculus.  
 Math 125–126: Mathematics I and II (probability, single-variable calculus, and other topics, primarily for life and social sciences).  
 Math 121: Calculus I.  
 Math 124: Honors calculus II.  
 Math 224: Elementary differential equations.  
 Math 303: Elementary number theory.  
 Math 305: Introduction to advanced mathematics.  
 Math 307: Linear algebra (for mathematics majors).  
 Math 308: Abstract algebra.  
 Math 321–322: Real analysis.

### Graduate:

Math 401–402: Abstract algebra.  
 Math 405: Matrix analysis (new course).

**Cornell:** Math 105: Finite mathematics for life and social sciences.  
 Math 112: Calculus II.

**Stanford:** Math 41–42: Calculus I and II.  
 Math 51: Linear algebra and multivariable differential calculus.  
 Math 53: Differential equations and linear algebra.

Math 103: Matrix theory and applications.  
Stanford Summer Engineering Academy mathematics module.

## Advising and mentoring

**Ph.D. supervision:** Kyle Taljan, 2016–present.

**Senior capstone projects:**

Abbaad Haider (joint with E. Werner), 2009–10.  
Tong Zhao, Fall 2016.

**Undergraduate summer research projects:**

Robert Fraser and James Munch, 2008.  
Sang Du and Mark Syvuk (joint with E. Meckes), 2010.  
Charles Clum, 2012.

**Membership on thesis committees (all at Case except where noted):**

Yukun Song, M.S. in Mathematics, August 2017.  
Gregory Knapp, M.S. in Mathematics, May 2017.  
Scott Beck, Ph.D. in Physics, August 2016.  
Luke Keltner, Ph.D. in Physics, August 2015.  
Omar Rivasplata, Ph.D. in Mathematics, University of Alberta, spring 2012 (external reader).  
Umut Caglar, M.S. in Mathematics, May 2010.  
Yi-Zen Chu, Ph.D. in Physics, May 2010.  
Deping Ye, Ph.D. in Mathematics, May 2009.

## Other department and university service

Department of MAMS, Appointments Committee and Hiring Committee, 2016–17.  
Department of MAMS, Graduate Committee chair, 2014–16.  
Co-organizer of Department of Mathematics Undergraduate Colloquium, 2012–13.  
Department of Mathematics Graduate Committee, 2008–10 and 2011–12.  
Department of Mathematics Colloquium Committee, 2008–10.  
Writing and grading Ph.D. qualifying exams in Abstract Algebra, Matrix Theory, and Real Analysis.  
Class academic advisor for mathematics majors (Case), 2011–13.  
Freshman academic advisor (Stanford), 2005–06.  
Faculty Senate Committee on By-Laws, 2010–13.

## Conference organization

AMS Special Session on Random Matrix Theory Beyond Wigner and Wishart, Ann Arbor, Michigan, October 2018.  
AMS Special Session on Probability in Convexity and Convexity in Probability, Columbus, Ohio, March 2018.  
Organizer for minisymposium on Asymptotic Geometric Analysis, Cleveland, August 2015.

Local organizer for conference “Perspectives in High Dimensions”, Cleveland, August 2010.

## Refereeing and reviewing

### Selected journals and proceedings:

Advances in Mathematics.  
American Journal of Mathematics.  
The Annals of Probability.  
Computer Science in Russia.  
Electronic Communications in Probability.  
Electronic Journal of Probability.  
Geometriae Dedicata.  
Homology, Homotopy, and Applications.  
IEEE Transactions on Signal Processing.  
Journal of Mathematical Analysis and Applications.  
Journal of Numerical Analysis, Industrial and Applied Mathematics.  
Journal of Statistical Planning and Inference.  
Journal of Theoretical Probability.  
Neural Computation.  
Probability Theory and Related Fields.  
Random Matrix Theory and Applications.  
SIAM Journal on Matrix Analysis and Applications.  
Stat.

### Other:

Cambridge University Press.  
Mathematical Reviews.