Mark W. Meckes

Curriculum vitae — October 8, 2020

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Appointments

2007–present: Case Western Reserve University (Case).
- 2018–present: Professor.
- 2013–18: Associate Professor.
- 2007–13: Assistant Professor.

2003–06: Stanford University, Lecturer.

Visiting positions

2020–2021: Mathematical Institute, University of Oxford, Academic Visitor.
2013–2014: Institut de Mathématiques de Toulouse, Université Paul Sabatier, Associate Researcher.
2006–07: Cornell University, Visiting Assistant Professor.

Education

Ph.D. in Mathematics. Case, May 2003.
- Dissertation: *Random Phenomena in Finite-Dimensional Normed Spaces*.
- Advisors: Stanisław 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, 2014–20.
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.

Memberships

American Mathematical Society.
Institute of Mathematical Statistics.
National Association of Mathematicians.

Publications

Refereed articles

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

Fluctuations of the spectrum in rotationally invariant random matrix ensembles, with E. Meckes.
Random Matrices Theory Appl., to appear.

Random matrices with prescribed eigenvalues and expectation values for random quantum states (with E. Meckes).
Trans. Amer. Math. Soc. 373 (2020) no. 7, 5141–5170.

On the magnitude and intrinsic volumes of a convex body in Euclidean space.
Mathematika 66 (2020) no. 2, 343–355.

Quenched central limit theorem in a corner growth setting (with H.C. Gromoll and L. Petrov).
Electron. Commun. Probab. 23 (2018) no. 101, 1–12.

A sharp rate of convergence for the empirical spectral measure of a random unitary matrix (with E. Meckes).
Zap. Nauchn. Sem. S.-Peterburg. Otdel. Mat. Inst. Steklov. (POMI) 457, 276–285, 2017; reprinted in *J. Math. Sci. (N.Y.)* 238, no. 4, 530–536, 2019.

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, 2018.

Talks

Colloquia, short courses, and plenary talks

Short course on concentration inequalities, Summer School on Mathematical Aspects of Quantum Information, Institut des Études Scientifiques de Cargèse, Corsica, September 2017.
Statistics Colloquium, Ohio State University, November 2014.
Mathematics Colloquium, University of York, May 2014.
Pure Mathematics Colloquium, University of Sheffield, May 2014.

Mathematics Advanced Study Semester Colloquium, Penn State University, September 2012.
Plenary talk, MAA Ohio Section Meeting, October 2011.

Selected conference talks

Magnitude 2019: Analysis, Category Theory, Applications; Edinburgh, July 2019.
Functional Inequalities in Probability, University of Connecticut, November 2018.
Emerging Trends in Geometric Functional Analysis, BIRS, March 2018.
Workshop on Random Matrices, Foundations of Computational Mathematics, Barcelona, July 2017.
Perspectives on Integral Geometry, University of Georgia, June 2016.
Stochastic Processes and High Dimensional Probability Distributions, Euler Institute, Saint Petersburg, June 2014.
Interplay of Convex Geometry and Banach Space Theory, BIRS, March 2013.
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.
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.
Convex Geometry and High Dimensional Phenomena, Vienna, July 2005.
Gaussian Measure and Geometric Convexity, Snowbird, Utah, July 2004.
Non-commutative Phenomena and Random Matrices, University of British Columbia, August 2002.

Teaching activities

Course development

Math 405: Advanced matrix analysis. First taught Spring 2010.
Math/Stat 382/482: High dimensional probability. First taught Spring 2020.

Courses taught

Case: Undergraduate:
Math 101: Precalculus (now offered as Math 120).
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 227: Honors calculus III.
Math 303: Elementary number theory.
Math 305: Introduction to advanced mathematics (transition course).
Math 307: Linear algebra (for mathematics majors).
Math 308: Abstract algebra.
Math 321–322: Real analysis.
Math 324: Complex analysis.
Graduate:
Math 401–402: Abstract algebra.
Math 405: Advanced matrix analysis.
Undergraduate/graduate:
Math/Stat 382/482: High dimensional probability.
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.
David Grzybowski, 2019–present.
M.S. thesis supervision: Stephen Liu, 2020.
Senior capstone projects:
Abbaad Haider (joint with E. Werner), 2009–10.
Tong Zhao, Fall 2016.
Michael Novet, Spring 2018.
Stephen Liu, Spring 2019.
Undergraduate summer research projects:
Robert Fraser and James Munch, 2008.
Sang Du and Mark Syvuk (joint with E. Meckes), 2010.
Charles Clum, 2012.

Professional service

Conference organization

AMS Special Session on Topics in Convexity and Probability, Charlottesville, Virginia, March 2022.

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.

Minisymposium on Asymptotic Geometric Analysis, Cleveland, August 2015.

Refereeing and reviewing

Selected journals and proceedings:

Advances in Mathematics.
American Journal of Mathematics.
Analysis & PDE.
The Annals of Probability.
Computer Science in Russia.
Discrete Analysis.
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.
Pacific Journal of Mathematics.
Probability Theory and Related Fields.
Random Matrix Theory and Applications.
SIAM Journal on Matrix Analysis and Applications.
Stat.
Statistics and Probability Letters.

Other:

Cambridge University Press.
Mathematical Reviews.