David Renfrew
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Education

- **PhD in Applied Mathematics** (June 2012)
  - University of California at Davis
  - **Advisor:** Alexander Soshnikov
- **MS in Electrical Engineering**
  - California Polytechnic State University at San Luis Obispo
- **BS in Math and Electrical Engineering**
  - California Polytechnic State University at San Luis Obispo

Research Interests

- Random Matrix Theory, Probability, Mathematical Physics, and Free Probability

Academic Experience

- SUNY Binghamton- Associate Professor (2025-present)
- SUNY Binghamton- Assistant Professor (2016-2024)
- IST, Austria- Lise Meitner Senior Post-doc Fellowship (2017-2019)
- CU Boulder- Ulam Visiting Professor (Winter 2016)
- UCLA- RTG Assistant Adjunct Professor (2012-2015)

Research Papers

- *Planar Novikov-Shubin invariant for block random matrices*,
  joint work with Torben Krüger
  available at arXiv:2411.10311
- *Universality for roots of derivatives of entire functions via finite free probability*,
  joint work with Andrew Campbell, Sean O'Rourke
  available at arXiv:2410.06403
- *The fractional free convolution of R-diagonal operators and random polynomials under repeated differentiation*,
  joint work with Andrew Campbell, Sean O'Rourke
  International Mathematics Research Notices, v. 2024, Issue 13, (2024)
- *Singularity degree of structured random matrices*,
  joint work with Torben Krüger,
  Annales de l'Institut Henri Poincaré v. 61, No. 2 (2025)
- *Non-Hermitian random matrices with a variance profile (II): Properties and Examples*,
  joint work with Nicholas Cook, Walid Hachem, Jamal Najim
  Journal of Theoretical Probability, v. 35, No. 4 (2022)
- *Eigenvalues of random non-Hermitian matrices and randomly coupled differential equations*,
  extended abstract, **Oberwolfach Report. v. 16, No. 4 (2020)**
- *Randomly coupled differential equations with correlations*,
  joint work with László Erdős, Torben Krüger
  Annals Applied Probability, v. 33, No. 4 (2023)
- *Power Law Decay for Systems of Randomly Coupled Differential Equations*,
  joint work with László Erdős, Torben Krüger
  SIAM Journal of Mathematical Analysis, v. 50 Issue 3 (2018)

- *Non-Hermitian random matrices with a variance profile(I):deterministic equivalents and limiting ESDs.*
  joint work with Nicholas Cook, Walid Hachem, Jamal Najim
  Electronic Journal of Probability, v. 23 (2018)
- *Low-dimensional dynamics of structured random networks*,
  joint work with Johnatan Aljadeff, Marina Vegué, and Tatyana O. Sharpee
  Physical Review E v. 93, No. 2 (2016)
- *Eigenvalues of block structured asymmetric random matrices*,
  joint work with Johnatan Aljadeff and Merav Stern
  Journal of Mathematical Physics v. 56, Issue 10 (2015)
- *Central limit theorem for linear eigenvalue statistics of elliptic random matrices*,
  joint work with Sean O'Rourke
  Journal of Theoretical Probability v. 29, No. 3 (2016)
- *Products of independent elliptic random matrices*,
  joint work with Sean O'Rourke, Alexander Soshnikov, and Van Vu
  Journal of Statistical Physics, v. 160, Issue 1, 89-119 (2015)
- *Low rank perturbations of large elliptic random matrices*,
  joint work with Sean O'Rourke
  Electronic Journal of Probability, v. 19, no. 43, 1-65 (2014)
- *On Finite Rank Deformations of Wigner Matrices II: Delocalized Perturbations*,
  joint work with Alexander Soshnikov
  Random Matrices: Theory and Applications, v. 02, Issue 01 (2013)
- *Fluctuations of Matrix Entries of Regular Functions of Sample Covariance Matrices*,
  joint work with Sean O'Rourke and Alexander Soshnikov
  Theory of Probability & Its Applications, v. 58, No. 4, 615-639 (2014)
- *On Fluctuations of Matrix Entries of Regular Functions of Wigner Matrices with Non-Identically Distributed Entries*,
  joint work with Sean O'Rourke and Alexander Soshnikov
  Journal of Theoretical Probability v. 26, No. 3, 750-780 (2013)
- *On Finite Rank Deformations of Wigner Matrices*,
  joint work with Alessandro Pizzo and Alexander Soshnikov
  Annales de l'Institut Henri Poincare (B), v. 49, No. 1, 64-94 (2013)
- *Fluctuations of Matrix Entries of Regular Functions of Wigner Matrices*,
  joint work with Alessandro Pizzo and Alexander Soshnikov
  Journal of Statistical Physics, v. 146, Issue 3, 550-591 (2012)
- *Spectral Properties of Large Random Matrices with Independent Entries*
  joint work with Pierre Dueck, Sean O'Rourke, and Alexander Soshnikov
  Noncommutative Harmonic Analysis with Applications to Probability III, Banach Center Publications. vol. 96, 115-134 (2012)
- *Numerical ranges of cube roots of the identity*,
  joint work with Thomas Ryan Harris, Michael Mazzella, Linda J. Patton, Ilya M. Spitovsky
  Linear Algebra Appl., 435, pp. 2639-2657 (2011)

Recent Talks and Conferences

- Rochester Probability Seminar, Rochester, 2025
- Syracuse Math department Colloquium, Syracuse, 2024
- Binghamton Analysis Seminar, Binghamton, 2024
- International Workshop on Operator Theory and its Applications, Special Session on Random Matrices and Free Probability, Canterbury, England, 2024

- CU Boulder Probability Seminar, Boulder, 2024
- Random matrices and Free Probability Theory, Colorado Springs, 2024
- Many Faces of Random Matrices, Montreal, 2023
- Binghamton Analysis Seminar, Binghamton, 2023
- CU Boulder Math Colloquium, Boulder, 2023
- Los Angeles Probability Forum, Los Angeles, 2023
- UC Davis Probability seminar, Davis, 2023
- Friedrich-Alexander-Universität stochastics seminar, Erlangen, Germany, 2022
- Joint Math Meetings, Online, 2022
- UCSD Probability Seminar, San Diego, 2022
- Cornell Probability Seminar, Ithaca, 2021
- Temple and UPenn probability seminar, Philadelphia, 2021
- Binghamton analysis seminar, Binghamton, 2020
- ICTS - Universality in random structures: Interfaces, Matrices, Sandpiles, Bengaluru, India, 2020
- Random Matrices, Oberwolfach, Germany, 2019
- IST think and drink seminar, Presented general audience talk, 2019
- Séminaire MEGA, Paris, France, 2019
- Northeastern Analysis Meeting, New Paltz, 2018
- Budapest University of Technology and Economics Probability seminar, Budapest, Hungary, 2017
- IST probability seminar, Vienna, Austria, 2017
- AMS Sectionals, Denver, 2016- *Co-organized special session*
- OSU Probability Seminar, Columbus, 2016

Teaching experience at SUNY Binghamton

- **Instructor**, Introduction to Financial Mathematics, Multivariable Calculus, Probability Theory, Mathematical Statistics, Real Analysis, Advanced Topics in Probability (Fall 2016 - present)

Teaching experience at CU Bouder

- **Instructor**, Introduction to Probability, (Winter 2016)

Teaching experience at UCLA

- **Instructor**, Calculus, Linear Algebra, Probability, Fourier Analysis (2012-present)

Teaching experience at UC Davis

- **Instructor**, Multivariable Calculus, (Summer 2010)
- **Teaching Assistant**, Graduate Analysis (Winter 2010)
- **Instructor and Director**, Math Modeling Experience (Fall 2009 & 2010)

Teaching experience at Cal Poly

- **Instructor**, Precalculus, (Winter, Spring 2008)
- **Workshop Leader**, Calculus and Undergraduate Analysis (2006-2007)

Academic Service

- Ph.D. Thesis Committee - Andrew Campbell, CU Boulder 2023
- Journal Referee- various probability and math physics journals
- Binghamton Faculty Committees - Graduate student committee, the Calculus committee, Undergraduate advising committee, Statistics committee, and the Actuarial sciences committee