

Xiuyuan Cheng

Email: xiuyuan.cheng@yale.edu

51 Prospect St., AKW 113, New Haven, CT 06511

Tel: +01 (203)-432-1231

EDUCATION

Princeton University

Princeton, NJ, U.S., 2009-2013

Ph.D. Program in Applied and Computational Mathematics

Thesis Title: Random matrices in high-dimensional data analysis. Thesis Advisor: Prof. Amit Singer

Peking University

Beijing, China, 2005-2009

B.S. Mathematics

WORKING EXPERIENCE

Yale University

New Haven, CT, U.S. 2015.8-present

Gibbs Assistant Professor

Applied Mathematics Program

École Normale Supérieure

Paris, France, 2013.12-2015.6

Post-doctoral Researcher

Foundation Sciences Mathématiques de Paris Postdoc Fellow

Princeton University

Princeton, NJ, U.S., 2010.7-2013.11

Research Assistant, Teaching Assistant

Research project: random matrix theory in high-dimensional data analysis.

HONORS

Princeton University Harold W. Dodds Fellowship (dissertation honorific fellowship)

Princeton, NJ, U.S., 2012-2013

Princeton University C.V. Starr Fellowship

Princeton, NJ, U.S., 2009-2010

PUBLICATIONS

Mathematical analysis of deep neural network:

1. X. Cheng, X. Chen and S. Mallat, "Deep Haar scattering networks", **Information and Inference: A Journal of the IMA** (2016).
2. U. Shaham, X. Cheng, O. Dror, A. Jaffe, B. Nadler, J. Chang and Y. Kluger, "A Deep Learning Approach to Unsupervised Ensemble Learning", *Proceedings of The 33rd International Conference on Machine Learning (ICML'16)* (2016).
3. X. Chen, X. Cheng and S. Mallat, "Unsupervised deep Haar scattering on graphs", *Advances in Neural Information Processing Systems 27 (NIPS'14)* (2014).

Random matrix theory in high dimensional data analysis:

4. X. Cheng and A. Singer, "The spectrum of high-dimensional random inner-product matrices", **Random Matrices: Theory and Applications**, 02, 04 (2013).
5. T. Zhang, X. Cheng and A. Singer, "Marchenko-Pastur Law for Tyler's and Maronna's M-estimators", **Journal of Multivariate Analysis** (2016).
6. N. Boumal and X. Cheng, "Concentration of the Kirchhoff index for Erdos-Rényi graphs", **System and Control Letters**, 74, 74-80 (2014).

Data analysis of Cryo-EM images of symmetric molecules:

7. G. Pragier, I. Greenberg, X. Cheng and Y. Shkolnisky, "A Graph Partitioning Approach to Simultaneous Angular Reconstitution", **IEEE Transactions on Computational Imaging** (2016).

Computation and analysis of rare events in physics and dynamical systems:

8. W. E, X. Zhou and X. Cheng, "Sub-critical bifurcation in spatially extended systems", **Nonlinearity**, 25, 761 (2012)
9. X. Cheng, L. Lin, W. E, P. Zhang and A.C. Shi, "Nucleation of ordered phases in block copolymers", **Physical Review Letters**, 104, 148301 (2010).
10. L. Lin, X. Cheng, W. E, A.-C. Shi and P. Zhang, "A numerical method for the study of nucleation of ordered phases", **Journal of Computational Physics**, 229, 1797 (2010).

IN PREPARATION

1. Adaptive Diffusion Kernels with Application to Mass Cytometry Data (with Cloninger, Kluger and Coifman)
2. Hypertension Phenotypes by Big Health Data in China (with Linderman, Krumholz and Coifman)
3. Symmetry Detection in CryoEM by Kam's Theory (with Singer and Shkolnisky)
4. Extrema of Eigenvectors of Laplacians and Applications (with Steinerberger and Rachh)

PROFESSIONAL SERVICES

Organized Conference

SIAM mini-Symposium on "Computational Methods for Cryo-EM Single Particle Reconstruction"

(co-organized with Prof. Zhizhen Zhao at UIUC)

Albuquerque, NM, May 2016

Refereeing

Journals: Bernoulli, Annuals of Statistics

Conference: IEEE International Symposium on Information Theory

Contributed Talks and Posters

International Conference on Machine Learning 33 (ICML '16)

New York City, NY, June 2016

SIAM Conference on Imaging Science

Albuquerque, NM, May 2016

Oral Presentation session: Computational Methods for Cryo-EM Single Particle Reconstruction III

Neural Information Processing Systems 27 (NIPS '14)

Montreal, Canada, December 2014

UCL-Duke Workshop on Sensing and Analysis of High-Dimensional Data

London, U.K., September 2014

APS (American Physical Society) March Meeting 2012

Boston, MA, U.S., 2012

Oral Presentation session: Modeling of rare events, methods and applications II.

Seminars

Department of Mathematics, *Duke University*

Durham, NC, September 2016

Institute for Mathematics and its Applications (IMA), *University of Minnesota*

Minneapolis, MN, September 2016

Department of Mathematics, *California Institute of Technology*

Pasadena, CA, May 2016

Department of Mathematics, *The University of Texas at Austin*

Austin, TX, April 2016

Applied Mathematics Seminar, *Yale University*

New Haven, CT, 2015

Courant Institute Probability Seminar, *New York University*

New York City, NY 2012

Wilks Statistics Seminar, *Princeton University*

Princeton, NJ, 2012

Ergodic Theory & Statistical Mechanics Seminar, *Princeton University*

Princeton, NJ, 2012