REZA GHEISSARI

CONTACT INFORMATION

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RESEARCH INTERESTS

Probability and mathematical physics—equilibrium and off-equilibrium behavior of spin systems (including Ising, Potts models and spin glasses); relations to sampling, optimization, and learning in high dimensions.

EMPLOYMENT

University of California at Berkeley

Miller Postdoctoral Fellow (Fall 2019–present)
- Hosted by Alistair Sinclair and the Departments of Statistics and EECS

EDUCATION

Courant Institute of Mathematical Sciences, New York University

Ph.D. in Mathematics (May 2019)
- Advisors: Eyal Lubetzky and Charles Newman

Columbia University in the city of New York

B.A. in Mathematics, minors in Physics and English (May 2014)

HONORS AND AWARDS

2020	Kurt O. Friedrichs Prize, NYU Courant for "outstanding dissertation in mathematics"
2019	Miller Research Fellowship, Miller Institute
2019	NSF Postdoctoral Research Fellowship (not used)
2018	Wilhelm Magnus Memorial prize, NYU Courant for "significant contributions to the mathematical sciences"
2014	Magna Cum Laude, Columbia University

PREPRINTS AND PUBLICATIONS

Cutoff for the Glauber dynamics of the lattice free field, with S. Ganguly. Preprint available on arXiv (2021).

Sampling from Potts on random graphs of unbounded degree via random-cluster dynamics, with A. Blanca. Preprint available on arXiv (2021).

Low-temperature Ising dynamics with random initializations, with A. Sinclair. Preprint available on arXiv (2021).

Approximate domain Markov property for rigid Ising interfaces, with E. Lubetzky. Preprint available on arXiv (2020).

Random-cluster dynamics on random regular graphs in tree uniqueness, with A. Blanca. **Communications in Mathematical Physics** (2021).

Diffusions interacting through a random matrix: universality via stochastic Taylor expansion, with A. Dembo.
Probability Theory and Related Fields (2021).

Local and global geometry of the 2D Ising interface in critical pre-wetting, with S. Ganguly. **Annals of Probability** (2021).

Online stochastic gradient descent on non-convex losses from high-dimensional inference, with G. Ben Arous and A. Jagannath.
Journal of Machine Learning Research (2021).

Tightness and tails of the maximum of 3D Ising interfaces, with E. Lubetzky.
Annals of Probability (2020).

Maximum and shape of interfaces in 3D Ising crystals, with E. Lubetzky.
Communications on Pure and Applied Mathematics (2020).

Algorithmic thresholds for tensor PCA, with G. Ben Arous and A. Jagannath.
Annals of Probability (2020).

Bounding flows for spherical spin glass dynamics, with G. Ben Arous and A. Jagannath.
Communications in Mathematical Physics (2020).

Random-cluster dynamics in $\mathbb{Z}^2$: rapid mixing with general boundary conditions, with A. Blanca and E. Vigoda. **Annals of Applied Probability** (2020).
Extended abstract in *Proceedings of RANDOM 2019*.

Quasi-polynomial mixing of critical 2D random cluster models, with E. Lubetzky.
Random Structures and Algorithms (2020).

Ising model: local spin correlations and conformal invariance, with C. Hongler and S.C. Park. **Communications in Mathematical Physics** (2019).

On the spectral gap of spherical spin glass dynamics, with A. Jagannath.
Annales de l'Institut Henri Poincare (B) (2019).

Zero-temperature dynamics in the dilute Curie–Weiss model, with C. Newman and D. Stein. **Journal of Statistical Physics** (2018).

Concentration inequalities for polynomials of contracting Ising models, with E. Lubetzky and Y. Peres. **Electronic Communications in Probability** (2018).

Exponentially slow mixing in the mean-field Swendsen–Wang dynamics, with E. Lubetzky and Y. Peres. **Annales de l'Institut Henri Poincare (B)** (2018).
Extended abstract in *Proceedings of SODA 2018*.

The effect of boundary conditions on mixing of 2D Potts models at discontinuous phase transitions, with E. Lubetzky. **Electronic Journal of Probability** (2018).

Mixing times of critical two-dimensional Potts models, with E. Lubetzky.
Communications on Pure and Applied Mathematics (2018).

Asymptotics of height change in the toroidal Temperleyan dimer model, with J. Dubedat. **Journal of Statistical Physics** (2015).

Other scientific papers

Local minima in disordered mean-field ferromagnets, with E. Y. Song, C. Newman, D. Stein. **Journal of Statistical Physics** (2020).

Nature vs. nurture: dynamical evolution in disordered Ising ferromagnets, with L. Wang, C. Newman, D. Stein. **Chapter in *Statistical Mechanics of Classical and Disordered Systems*** (2019).

Long-time predictability in disordered spin systems following a deep quench, with J. Machta, C. Newman, D. Stein, and J. Ye. **Physical Review E** (2017).

Invited talks

Sept 2021	Brazilian Seminar of Probability
Sept 2021	Simons Institute for the theory of computing
May 2021	University of Cologne, Probability Seminar
Mar 2021	Conference on Stochastic Spatial Processes, OSU
Jan 2021	University of Chicago Probability Seminar
Sept 2020	UC Berkeley Probability Seminar
June 2020	Probability and the City Online Seminar
Nov 2019	UC Berkeley CS Theory Lunch Seminar
Oct 2019	UC Berkeley Probability Seminar
Oct 2019	AMS Eastern Sectional meeting: Sessions on Stochastic Evolution of Discrete Structures Percolation, Random Graphs, and Random Geometry
Oct 2019	Georgia Tech Stochastics seminar
Sept 2019	Stanford Probability Seminar
Sept 2019	RANDOM 2019 at MIT
May 2019	UCLA Probability and Mathematical Physics Seminar
March 2019	Cornell Probability Seminar
Jan 2019	Maleki group meeting at Columbia
Nov 2018	Columbia Probability Seminar
Sept 2018	Courant Institute Probability Seminar
Mar 2018	NYU Shanghai Probability Seminar
Feb 2018	Harvard Probability and Random Matrix Seminar
Jan 2018	Rutgers Discrete Math/Combinatorics Seminar
Nov 2017	CUNY Probability Seminar
Oct 2017	Algorithms and Randomness Colloquium, Georgia Tech
Jan 2017	AMS JMM: Session on Spin Glasses and Disordered Media
June 2016	AIM workshop on Markov chain mixing times

Invited meetings

June 2022	100 years of the Ising model, IHES
Dec 2021	Statistical Mechanics Conference, Rutgers University
Sept 2021	Rigorous Evidence for Information-Computation Tradeoffs Simons Institute for the theory of computing
Mar 2021	Conference on Stochastic Spatial Models, OSU
Oct 2019	AMS Sectional meeting: Special sessions on Stochastic Evolution of Discrete Structures Percolation, Random Graphs, and Random Geometry
May 2018	Workshop on algorithms and randomness, GA Tech
June 2017	AIM workshop on phase transitions in random computational problems
Jan 2017	JMM of the AMS: Special session on spin glasses and disordered media
June 2016	AIM workshop on Markov chain mixing times

Teaching Experience

Fall 2017	TA for Theory of Probability
Spring 2017	TA for Complex Analysis
Fall 2016	TA for Analysis I (two sections)

Professional Services

July 2020–present	Miller Institute's diversity, equity, inclusion (DEI) working group Coordinator of the climate survey sub-group.
Oct 2021	Miller Institute Symposium Committee

Refereed for *Annals of Probability*, *Probability Theory and Related Fields*, *Annals of Applied Probability*, *SODA*, *STACS*, *APPROX-RANDOM*, *Electronic Journal of Probability*, *Annales de l'Institut Henri Poincaré (B)*, *Random Structures and Algorithms*, *Journal of Statistical Physics*, and *Markov Processes and Related Fields*.