Mriganka Basu Roy Chowdhury

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Education

University of California at Berkeley Berkeley, California
Ph.D. in Statistics Fall 2021 –

- 4th year PhD candidate working on probability and theoretical statistics, **Current GPA:** 4.0
- Research interests: *Random graphs and their spectra, Gibbs measures and random interface models, spin systems,* and *statistical-physics techniques in machine learning*

Indian Institute of Technology, Guwahati Guwahati, Assam, India
B.Tech. in Mathematics and Computing, **GPA:** 9.96/10 2017–2021

Publications

Gaussian to log-normal transition for independent sets on a percolated hypercube Berkeley, CA
draft manuscript available upon request, joint work with: **Shirshendu Ganguly, Vilas Winstein** 2024

- A long line of combinatorial research investigates independent sets on various graphs (i.e., vertex subsets which don't share an edge). Of particular interest has been the hypercube $\{0, 1\}^d$ and, more recently, its random subgraphs. Several properties of the (random) number of independent sets in the latter have been conjectured in the recent work of Kronenberg and Spinka, while also predicting a phase transition.
- While previous works rely solely on algebraic tools, we develop a probabilistic picture, allowing us to establish a comprehensive framework from which we can prove several of the open problems posed earlier, as well as precisely describe the behavior at the predicted critical point.

Characterizing Gibbs states for area-tilted Brownian lines Berkeley, CA
https://arxiv.org/abs/2310.06817, joint work with: **Pietro Caputo, Shirshendu Ganguly** 2023

- Area-tilted ensembles have been the focus of a wealth of recent research since they are expected to be the scaling limit of entropically repulsed Ising level curves. These ensembles are specified by their local behavior, called a *Gibbs property*.
- Our work produces a complete characterization of all possible Gibbs states with the area-tilted Gibbs property, uncovering a parametric infinite family of area-tilted ensembles.

Regular subgraph counts in sparse Erdős–Rényi graphs Berkeley, CA
https://arxiv.org/abs/2304.01162 2022-23

- Tail behavior of triangle counts in sparse ($p_n = c/n$) Erdős–Rényi graphs have been the focus of a lot of recent activity.
- My paper extends these achievements to the case of arbitrary regular graphs (for the appropriate choice of p_n), using several novel techniques which completely bypass the need for special properties satisfied by the triangle.

Professional Work

Sprinklr Work from Home
Product Engineering Intern Summer 2020

- Developed algorithms for auto-completion and phrase prediction, using ideas from linguistics. My implementation has been deployed by the company for real-time usage. **Github:** https://github.com/mbrc12/auto-suggest/

Google Summer of Code *with* Typelead Remote
Intern Summer 2018

- Developed and implemented algorithms in Haskell to analyze real-world code and predict functional purity / nullability properties using smart heuristics and control-flow analysis. **Github:** https://github.com/mbrc12/etanol/

Academic Achievements

- Received the **President of India Gold Medal**, which is awarded to the student with the highest cumulative grade point (CGPA) amongst all students graduating that year from all departments with the degree of Bachelor of Technology or Bachelor of Design.
- Selected to represent IIT Guwahati at the **44th ICPC World Finals** held in Moscow, Russia (ICPC 2019-2020), team **I_See_AC**. **Rank 6** in online round, **3** in Kanpur regionals, **5** in Amritapuri regionals in India.
- Cleared the **Indian National Mathematical Olympiad** (invited for the IMO Training Camp, ∼ 35 students are selected each year across classes 8-12) in **2015**.
- Ranked **64**th in **Asia-Pacific Informatics Olympiad** in **2015 (Bronze Medal)**.
- Cleared the **Indian National Olympiad in Informatics** (invited for the IOI Training Camp, ∼ 35 students are selected each year across classes 8-12) in **2014, 2015, 2016**.
- Ranked **345** (out of ∼ 1.3 million) in **JEE Mains, 2017** (All India Engineering Entrance Examination), and **1012** (out of ∼ 0.22 million) in **JEE Advanced, 2017** (next stage after JEE Mains, all India entrance examination for the IITs).

Other Achievements

- Ranked **287** in **Round 2** of **Google CodeJam (2019)**, an annual global algorithmic competition organized by Google. Ranked **423** in **Round 3** in **2018**.
- Ranked **15** and **1** (globally) in **Microsoft Q# Contest** (finals and warmup, respectively), a **Quantum Computing** competition. See https://codeforces.com/contest/1002/standings and https://codeforces.com/contest/1001/standings. Username: **mbrc**
- Ranked **8**th in **Codechef Snackdown 2015** (an annual algorithmic competition organized by Codechef), among both highschool and college participants, and selected to appear for the **Snackdown World Finals**.

Coursework and Events

Some of the more advanced classes I took:

- **Probability**: STAT 205B (Graduate probability), STAT 206 (Topics in probability: Statics and dynamics of random interface models), MATH 279 (Topics in PDEs: Stochastic PDEs and Regularity structures), CS 271 (Randomness and computation)
- **Statistics**: STAT 210A and STAT 210B (Graduate sequence in theoretical statistics), STAT 241B (Topics in statistical learning).
- **Mathematics**: STAT 222A (Graduate PDEs).

Some research events/conferences I attended:

- **Princeton Machine Learning Theory Summer School:** https://mlschool.princeton.edu/. Selected among 80 students out of approximately 500 applicants.
- **The Mathematics of Data:** https://ims.nus.edu.sg/events/the-mathematics-of-data/.
- **Topics in High-Dimensional Probability:** https://www.icts.res.in/program/THDP.