Shuyang Gong

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About me

My research interest is probability theory, and its applications in statistics, statistical physics and theoretical computer science.

Education

School of Mathematical Sciences, Peking University, Beijing, China — September, 2021 — June, 2026(expected)
PhD in Mathematics. Advisor: Prof. Dayue Chen.

Department of Mathematics, Shandong University, Jinan, China — September, 2017 — June, 2021
Bachelor in Statistics (with honor): GPA ranked 1st/132

Academic Experience

Simons Laufer Mathematical Sciences Institute(MSRI) — Berkeley, United States
Program Associate — Janurary, 2025 — February, 2025
The Fuqua School of Business, Duke University — Durham, United States
Visiting student, hosted by Prof. Jiaming Xu — September, 2024 — Janurary, 2025
Department of Statistics and Data Science, Yale University — New Haven, United States
Visiting Student, hosted by Prof. Yihong Wu — November, 2024
The 2024 CRM-PIMS summer school — Montréal, Canada
Visiting Student — July, 2024

Publications and Preprints

Journal Publications

- **A computational transition for detecting correlated stochastic block models by low-degree polynomials.**
  To appear in *Annals of Statistics*.
  Coauthors: Guanyi Chen, Jian Ding, Zhangsong Li.

- **The algorithmic phase transition of random graph alignment problem**.
  Probability Theory and Related Fields **191** (2025), 1233–1288.
  Coauthors: Hang Du and Rundong Huang.

- **A polynomial-time approximation scheme for the maximal overlap of two independent Erdős–Rényi graphs**.
  Random Structures and Algorithms **65**(1) (2024), 220–257.
  Coauthors: Jian Ding and Hang Du.

Conference Papers

- **Detecting correlation efficiently in very supercritical stochastic block models: breaking the Otter's threshold barrier.**
  To appear at *SODA 2026*.
  Coauthors: Guanyi Chen, Jian Ding, Zhangsong Li.

- **A proof of the changepoint detection threshold conjecture in preferential attachment models**.
  Proceedings of the 38th Conference on Learning Theory (COLT 2025), PMLR 291:1559–1563.
  Minor revision at Annals of Applied Probability.
  Coauthors: Hang Du and Jiaming Xu.

Preprints

- **Detecting correlation efficiently in stochastic block models: breaking Otter's threshold in the entire supercritical regime.**
  arXiv:2503.06464.
  Coauthors: Guanyi Chen, Jian Ding, Zhangsong Li.

- **Finding a dense submatrix of a random matrix. Sharp bounds for online algorithms.**
  arXiv:2507.19259.
  Coauthors: Shankar Bhamidi and David Gamarnik.

- **Detection and reconstruction of a random hypergraph from noisy graph projection.**
  arXiv:2506.17527.
  Coauthors: Zhangsong Li and Qiheng Xu.

- **Asymptotic diameter of preferential attachment model.**
  arXiv:2504.21741.
  Coauthors: Hang Du, Zhangsong Li, Haodong Zhu.

- **The Umeyama algorithm for matching correlated Gaussian geometric models in the low-dimensional regime.**
  arXiv:2402.15095.
  Coauthor: Zhangsong Li.

- **The broken-sample problem revisited II: Detecting hidden linear dependencies.**
  In preparation.
  Coauthors: Yihong Wu and Jiaming Xu

Teaching experience

- Calculus (B) — Spring 2025
- Stochastic Processes and Statistical Physics — Spring 2024
- Advanced Probability Theory — Fall 2023
- Measure Theory — Spring 2023
- Stochastic Processes — Spring and Fall 2022
- Calculus (C) — Fall 2021

Awards

- Elite Program — May, 2025/Peking University
- President Scholarship — May, 2024/Peking University
- Schlumberger Scholarship — October, 2023/Peking University
- President Scholarship (Top award for undergraduates) — October, 2020/Shandong University
- National Scholarship — October, 2020/Shandong University
- National Scholarship — October, 2019/Shandong University

Talks

A proof of the changepoint detection threshold conjecture in preferential attachment models — July 3, 2025
COLT 2025. Lyon, France

A proof of the changepoint detection threshold conjecture in preferential attachment models — June 3, 2025
An international conference on applied probability. Beijing, China

Asymptotic diameter of preferential attachment model — May 29, 2025
YMSC probability seminar, Tsinghua University

Recent progress on random graph matching and changepoint detection — March 26, 2025
Combinatorics seminar at Shandong University

Matching Wishart matrices via Umeyama algorithm — September 9, 2024
Peking University

Optimizing the overlap of two independent Erdős–Rényi graphs — January 15, 2024
Probability seminar at Sichuan University

Algorithms and phase transitions in random graph alignment problem September 11, 2023
Peking University

A PTAS for the maximal overlap of two independent Erdős–Rényi graphs November 7, 2022
Probability seminar at Shandong University