Shuyang Gong

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About me

My research interest is the intersection of probability theory, theoretical computer science and high-dimensional statistics.

Education

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

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

- **Finding a dense submatrix of a random matrix. Sharp bounds for online algorithms.**
  Electronic Communications in Probability (to appear).
  Coauthors: Shankar Bhamidi and David Gamarnik.

- **A computational transition for detecting correlated stochastic block models by low-degree polynomials.**
  Annals of Statistics (to appear).
  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.**
  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.
  Best Poster Award at *the 2026 Joint Workshop of RMTA & SNAB*.
  Minor revision at Annals of Applied Probability.
  Coauthors: Hang Du and Jiaming Xu.

Preprints

- **Fundamental limits of community detection in contextual multi-layer stochastic block models.**
  arXiv:2602.08173.
  Coauthors: Dong Huang and Zhangsong Li.

- **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.

- **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

- **On hardness for finding isolated perceptron solutions via stable algorithms.**
  In preparation.
  Coauthors: Brice Huang, Shuangping Li, Mark Sellke.

- **The conclave model.**
  In preparation.
  Coauthors: Itai Benjamini, Zhenhao Cai, Guanyi Chen, Zhangsong Li.

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

Services

Journal Reviewing: *Annals of Applied Probability, Operations Research.*

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