

Shuyang Gong

PhD candidate, School of Mathematical Sciences, Peking University, Beijing, China
gongshuyang@stu.pku.edu.cn
<https://shuyanggong.github.io>

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
<i>Program Associate</i>	January, 2025 — February, 2025
The Fuqua School of Business, Duke University	Durham, United States
Visiting student, hosted by Prof. Jiaming Xu	September, 2024 — January, 2025
Department of Statistics and Data Science, Yale University	New Haven, United States
<i>Visiting Student</i> , hosted by Prof. Yihong Wu	November, 2024
The 2024 CRM-PIMS summer school	Montréal, Canada
<i>Visiting Student</i>	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.**
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
- **On hardness for finding isolated perceptron solutions via stable algorithms.**
In preparation.
Coauthors: Brice Huang, Shuangping Li, Mark Sellke.
- **Fundamental limits of community detection in contextual multi-Layer stochastic block models.**
In preparation.
Coauthors: Dong Huang and Zhangsong Li.
- **The conclave model.**
In preparation.
Coauthors: Itai Benjamini, Zhenhao Cai, Guanyi Chen, Zhangsong Li.

Teaching experience

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| • 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

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| • 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 <i>COLT 2025. Lyon, France</i>	July 3, 2025
A proof of the changepoint detection threshold conjecture in preferential attachment models <i>An international conference on applied probability. Beijing, China</i>	June 3, 2025
Asymptotic diameter of preferential attachment model <i>YMSC probability seminar, Tsinghua University</i>	May 29, 2025
Recent progress on random graph matching and changepoint detection <i>Combinatorics seminar at Shandong University</i>	March 26, 2025
Matching Wishart matrices via Umeyama algorithm <i>Peking University</i>	September 9, 2024
Optimizing the overlap of two independent Erdős–Rényi graphs <i>Probability seminar at Sichuan University</i>	January 15, 2024
Algorithms and phase transitions in random graph alignment problem <i>Peking University</i>	September 11, 2023
A PTAS for the maximal overlap of two independent Erdős–Rényi graphs <i>Probability seminar at Shandong University</i>	November 7, 2022