

# Shuyang Gong

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<https://shuyanggong.github.io>

## About me

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

## Education

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**School of Mathematical Sciences, Peking University**, Beijing, China      September, 2021 — June, 2026(expected)  
PhD in Mathematics

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

## Academic Experience

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

## Publications and Preprints

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### 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.  
Coauthors: Hang Du and Jiaming Xu.

### Preprints

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

- **Detecting correlation efficiently in stochastic block models: breaking Otter’s threshold in the entire supercritical Regime**  
arXiv:2503.06464, *submitted to Annals of Statistics*.  
Coauthors: Guanyi Chen, Jian Ding, Zhangsong Li.
- **Finding a dense submatrix of a random matrix. Sharp bounds for online algorithms.**  
arXiv:2507.19259, *submitted to Electronic Communications in Probability*.  
Coauthors: Shankar Bhamidi and David Gamarnik.
- **Detection and reconstruction of a random hypergraph from noisy graph projection.**  
arXiv:2506.17527, *to be submitted to ISIT*.  
Coauthors: Zhangsong Li and Qiheng Xu.
- **Asymptotic diameter of preferential attachment model.**  
arXiv:2504.21741, *submitted to Electronic Communications in Probability*.  
Coauthors: Hang Du, Zhangsong Li, Haodong Zhu.
- **The Umeyama algorithm for matching correlated Gaussian geometric models in the low-dimensional regime.**  
arXiv:2402.15095, *submitted to IEEE Transactions on Information Theory*.  
Coauthor: 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            |

## 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

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### Conference Talks

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|---|--------------|
| <b>A proof of the changepoint detection threshold conjecture in preferential attachment models</b><br><i>COLT 2025. Lyon, France</i>  | July 3, 2025 |
| <b>A proof of the changepoint detection threshold conjecture in preferential attachment models</b><br><i>An international conference on applied probability. Beijing, China</i> | June 3, 2025 |

### Invited Talks

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|--|-------------------|
| <b>Asymptotic diameter of preferential attachment model</b><br><i>YMSC probability seminar, Tsinghua University</i>              | May 29, 2025      |
| <b>Recent progress on random graph matching and changepoint detection</b><br><i>Combinatorics seminar at Shandong University</i> | March 26, 2025    |
| <b>Matching Wishart matrices via Umeyama algorithm</b><br><i>Peking University</i>   | September 9, 2024 |
| <b>Optimizing the overlap of two independent Erdős–Rényi graphs</b><br><i>Probability seminar at Sichuan University</i>          | January 15, 2024  |

**Algorithms and phase transitions in random graph alignment problem**

*Peking University*

September 11, 2023

**A PTAS for the maximal overlap of two independent Erdős–Rényi graphs**

*Probability seminar at Shandong University*

November 7, 2022