



EDUCATIONAL BACKGROUND

Shanghai Jiao Tong University

2018 – 2022

Bachelor — Major: Mathematics and Applied Mathematics (Wen-Tsun Wu's class)
Minor: Computer Science and Technology

Shanghai Jiao Tong University

2022 – Now

Ph.D. Candidate (Combined Master and Doctoral) — Computational Mathematics (Advisor: Zhenli Xu)

ACADEMIC GRADE

- GPA: 4.00/4.00
- Rank **1** over **82** students.
- Graduate courses (Courses in bold received a full mark):
 - *General Fundamental Courses*: English for Academic Purposes (A), Scientific Writing, Integrity and Ethics (A), Specialized English (A+).
 - *Core Courses*: **Analysis (A+)**, **Scientific Computing (A+)**, **Partial Differential Equations (A+)**, Measure Theory and Probability (A+).
 - *Elective Courses*: **Algebraic Combinatorics (A+)**, Integrability and Bifurcation Theory of Dynamical Systems (A+), **Advanced Computation Methods (A+)**, Applied Mathematical Methods (A+), Variational Methods and Degree Theory (A+).
 - *Frontier Courses*: Additive Combinatorics in Number Theory (A+), High-Performance Computation for Differential Equations (A+).

RESEARCH INTEREST AND PUBLICATIONS

I am currently interested in fast algorithms of molecular dynamics (MD) simulation, especially scalable algorithms for general interaction kernels. Also, I consider the design of specialized MD hardware and supercomputers and the application of new algorithms, expected to approach the SOTA. I am also interested in other fast algorithms such as convolution equations and non-local interactions. Publications are listed as follows:

1. (Alphabetic order) J. Liang, Z. Xu and **Q. Zhou**, Random batch sum-of-Gaussians method for molecular dynamics simulations of particle systems, *SIAM J. Sci. Comput.*, 45 (2023), B591-B617.
2. (Alphabetic order) J. Liang, Z. Xu and **Q. Zhou**, Error estimate of the u-series method in molecular dynamics simulations, *Appl. Comput. Harmon. Anal.*, in press. arXiv:2305.05369.
3. W. Gao, T. Zhao, Y. Guo, J. Liang, H. Liu, M. Luo, Z. Luo, W. Qin, Y. Wang, **Q. Zhou**, S. Jin and Z. Xu, RBMD: A molecular dynamics package enabling to simulate 10 million all-atom particles in a single graphics processing unit, *Comm. Comp. Phys.*, in press. arxiv:2407.09315.
4. (Alphabetic order) Z. Xu, Y. Zhao and **Q. Zhou**, Variance-reduced random batch Langevin dynamics, *J. Chem. Phys.*, 161(2024), 244110.
5. (Alphabetic order) X. Gao, S. Jiang, J. Liang, Z. Xu and **Q. Zhou**, A fast spectral sum-of-Gaussians method for electrostatic summation in quasi-2D systems, arXiv:2412.04595.
6. (Alphabetic order) Y. Lin, Z. Xu, Y. Zhang and **Q. Zhou**, Weighted balanced truncation method for approximating kernel functions by exponentials, arXiv:2503.03183.

PATENT

1. Co-inventor, "A Random batch sum-of-Gaussians method for molecular dynamics simulations of particle systems", Patent number: ZL 2022 1 0449795.9.

AWARD AND SCHOLARSHIPS

| | |
|--|------------|
| Zhiyuan honorary scholarship | Apr. 2019 |
| Honorable mentioned in 2019 MCM/ICM | Apr. 2019 |
| The third prize (provincial level) in 2019 CUMCM | Oct. 2019 |
| The first prize (national level) of the 11-th Chinese mathematics competition, qualified for final | Nov. 2019 |
| Finalist in 2020 MCM/ICM | Apr. 2020 |
| Distinguished prize in 2nd Alibaba international mathematics competition | July 2020 |
| Chia-Chiao Lin bronze medal in 11-th Yau's mathematics competition | Oct. 2020 |
| Distinguished prize in 11-th Yau's mathematics competition (Analysis) | Nov. 2020 |
| The second prize (provincial level) in 2020 CUMCM | Nov. 2020 |
| The first prize (national level) of the 12-th Chinese mathematics competition | Dec. 2020 |
| The second prize of the 11-th final Chinese mathematics competitions | Apr. 2021 |
| Outstanding winner, COMAP scholarship and SIAM award in 2021 MCM/ICM | Apr. 2021 |
| Chia-Chiao Lin silver medal in 12-th Yau's mathematics competition | May 2021 |
| Baosteel outstanding student scholarship | Sept. 2021 |
| The 5-th Sensetime scholarship | Nov. 2021 |
| The third prize (collegiate level) of 3rd SJTU life science innovation competition | Dec. 2021 |
| The second scholarship of outstanding undergraduate in SJTU | Dec. 2021 |
| Distinguished prize in 13-th Yau's mathematics competition (Analysis) | Aug. 2022 |
| Distinguished prize in 13-th Yau's mathematics competition (Applied Math) | Aug. 2022 |
| First-class graduate scholarship | Dec. 2022 |
| National scholarship for graduate | Sept. 2023 |
| SJTU merit student | Oct. 2023 |
| First-class graduate scholarship | Dec. 2023 |
| Bonditech spark scholarship | May 2024 |
| Excellent oral presentation in the 8-th CSIAM Student Forum | Oct. 2024 |
| Huatai securities technology scholarship | Nov. 2024 |
| Best oral presentation in the 6-th greater bay area symposium on soft and living matter | Jan. 2025 |

