

JIANGHAO LIU

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EDUCATION BACKGROUND

SHANGHAI JIAO TONG UNIVERSITY

Shanghai, China 09/2022 - present

Bachelor of science in Mathematics and Applied Mathematics(Zhiyuan Honors Program)

GPA: 3.73

KTH ROYAL INSTITUTE OF TECHNOLOGY

Stockholm, Sweden 01/2025 - 06/2025

Exchange Student in Mathematics

Grade: A

Notable Courses Studied: Mathematical Analysis; Advanced Algebra; Numerical Analysis and scientific Computing; Real Analysis; Complex Analysis; Abstract Algebra; Numerical Methods in ODE and PDE; Methods of Mathematical Physics; Stochastic process.

Awards and Scholarships: Mathematical Contest In Modeling, Honorable Mention (Feb.2023); Zhiyuan Honors Scholarship (Dec.2022/Dec.2023/Dec.2024); Undergraduate Merit Scholarship (Dec.2023/Dec.2024); Second Place in the Science Group of the China University Honors College Science Innovation Competition (Oct.2024).

Research Interests:

- Neural network methods for high dimensional partial differential equations
- Numerical methods for differential equations

RESEARCH EXPERIENCE

Researcher, Tensor Neural Networks for Solving Schrödinger Equation

Chinese Academy of Sciences Advisor: Hehu Xie

Beijing, China 07/2024 - 09/2024

- Proposed a discrete Tensor Neural Network (TNN) approach to model the electron-electron Coulomb potential, achieving an improvement in computational accuracy by three orders of magnitude compared to previous methods.
- Developed an efficient algorithm for solving the eigenvalue problem of the Schrödinger equation, integrating the TNN interpolation technique with the associated Legendre polynomial expansion to enhance numerical stability and computational performance.

Researcher, Sum-of-Gaussians Tensor Neural Networks for High-dimensional Schrödinger Equation

Zhiyuan Future Scholar Program, SJTU Advisor: Zhenli Xu

Shanghai, China 12/2024 - present

- Developed an innovative algorithm combining the Sum-of-Gaussians method with Tensor Neural Networks to improve the computational efficiency and precision of Coulomb potential calculations in many-body Schrödinger equations.
- Implemented low-rank tensor expansions for Coulomb potentials to reduce computational complexity while maintaining high accuracy, overcoming the challenges of high-dimensional integration.
- Conducted preliminary comparisons with traditional methods, showing promising results in reducing computational costs while achieving higher accuracy and efficiency.

Researcher, Development of Deep Learning Methods Based on Function Representations

Nanyang Technological University Advisor: Li-lian Wang

Singapore 07/2025 - 09/2025

- Explicitly constructed an approximate version of the Kolmogorov-Arnold superpositions.
- Explored the application of Kolmogorov-Arnold Networks (KANs) to image processing.

PREPRINTS & PUBLICATIONS

- Q. Zhou, T. Wu, J. Liu, Q. Sun, H. Xie, & Z. Xu. *Sum-of-Gaussians tensor neural networks for high-dimensional Schrödinger equation*. arXiv:2508.10454 (submitted)

- Y. Liao, Z. Lin, **J. Liu**, Q. Sun, Y. Wang, T. Wu, & H. Xie. *Solving Schrödinger Equation Using Tensor Neural Network*. arXiv:2209.12572

EXTRACURRICULAR ACTIVITIES

Deputy Leader of Volunteer Service Team, Student Union, Zhiyuan College	09/2023 - 09/2024
Volunteer Teacher, Shangrao, Shanglu Center Primary School	08/2023

SKILLS

- **Computer Skills:** Matlab, Python, C++