# Zitong Tian

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## Education

2023 – 2028 PhD (Mathematics) at Qiuzhen College, **Tsinghua University** (GPA: 3.99/4.0)
Advisor: Prof. Juncai He

2023.02 – 2023.06 Enhanced Program for Graduate Study at Beijing International Center for Mathematical Research, **Peking University**

2019 – 2023 Bachelor's Degree in Mathematics at School of Mathematics Science, **Shanghai Jiao Tong University**
(GPA: 4.05/4.3, Rank: 1/18)

## Research Experience

**Scientific Computing and Machine Learning [Math]** May 2025 – Present

Propose an explainable framework to solve a class of PDE with conservation law with high accuracy. The paper is submitting.

Develop $L^p$ space theory and approximation of shallow neural netwokrs via micro local The paper is submitting.

**Molecule and Piptide Generation [AI for Science]** Dec 2024 – Feb 2026

Develop a fixed-length autoencoder for molecular structures to enable molecular editing and optimization. This work is accepted to NeurIPS 2025.

Propose Axial Feature Injection for chirality peptide design with interesting theoretical insights. This work is accepted to ICML 2026.

## Internship

**Research Intern at Sapient Intelligence** Apr 2026 – Present

- Research on the HRM model for PDE solver, together with PDE foundation models and new neural operators.
- Research on new generative models for images.
- Develop a Agent system for Alpha mining from scratch, Mem-Alpha-v1.0.

**Research Intern of AI for Science at AIR** Dec 2024 – Feb 2026

Research on the generation of molecules and peptides.

## Teaching

Teaching Assistant, Machine Learning and Differential Equations Sep 2025 – Jan 2026
Teaching Assistant, Probability II Sep 2024 – Jan 2025
Teaching Assistant, Analysis II Feb 2024 – Jun 2024
Teaching Assistant, Ordinary Differential Equations Sep 2023 – Jan 2024

## Publications

$(\alpha - \beta)$ denotes alphabetical authorship; * denotes equal contribution.

Juncai He and **Zitong Tian** $(\alpha - \beta)$ (2026). *Sharp Sobolev Sandwich and Approximation Rates of Radon-Domain $L^p$ Ridge Integral Spaces for ReLU$^k$ Networks*. arXiv: 2606.24795 [math.NA].

Juncai He, Xinliang Liu, and **Zitong Tian** $(\alpha - \beta)$ (2026). *Divergence-Free Linearized Neural Networks: Integral Representation and Optimal Approximation Rates*. arXiv: 2603.28638 [math].

Ziyi Yang*, **Zitong Tian***, Yinjun Jia*, Tianyi Zhang, Jiqing Zheng, Hao Wang, Yubu Su, Juncai He, Lei Liu, and Yanyan Lan (2026). "Cross-Chirality Generalization by Axial Vectors for Hetero-Chiral Protein-Peptide Interaction Design". In: *ICML, 2026*. URL: https://arxiv.org/abs/2602.20176.

Zitao Chen*, Yinjun Jia*, **Zitong Tian***, Wei-Ying Ma, and Yanyan Lan (2025). "Manipulating 3D Molecules in a Fixed-Dimensional E(3)-Equivariant Latent Space". In: *NeurIPS, 2025*. URL: https://arxiv.org/abs/2506.00771.

## Awards

**Ph.D. Period**

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| Outstanding Student Leader of Tsinghua University | 2026 |
| The Comprehensive First-Class Scholarship of Tsinghua University | 2025 |
| Outstanding Communist Youth League Member | 2024 |

**Undergraduate Period**

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| Outstanding Graduate of Shanghai Municipality | 2023 |
| Academic Excellence Scholarship, Dong Scholarship, Liu Yongling Scholarship | 2020-2023 |
| Outstanding Communist Youth League Member, "Three Goods" Student | 2020-2022 |
| Men's 400m, University Track and Field Games | 6th Place |
| Men's 1500m, University Track and Field Games | 9th Place |

**Middle School Period**

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| China National Mathematics Olympiad | First Prize |
| China Southeast Mathematical Olympiad | Golden Medal |
| President's Cup Football Tournament | Champion |
| Men's 800m, Track and Field Games | 3rd Place |
| Provincial-Level "Three Goods" Student | |

## Skills

Solid math and machine learning theory background, Python Coding skills.