

TU GUO

Phone: (+86) 198 2104 1108 · Email: guitrij_sjtu@outlook.com

RESEARCH PROFILE

Incoming Ph.D. student in astrophysics with research experience spanning high-energy physics, theoretical astrophysics, and the development and evaluation of AI agents and benchmarks for frontier physics research.

EDUCATION

Shanghai Jiao Tong University, Tsung-Dao Lee Institute 2026.09 - 2031.06 (expected)

Incoming Ph.D. Student in Astrophysics

- **Research Interests:** High-energy astrophysics (black holes, neutron stars, and tidal disruption events); Exoplanet (formation, dynamical evolution, and steady states); Astrophysical dynamics (gravitational N-body dynamics, nonlinear dynamics and chaos, three-body dynamics, hydrodynamics, and tidal interactions).

Shanghai Jiao Tong University, School of Physics and Astronomy, **B.S. in Physics** 2022.08 - 2026.06

- **Program:** Qiang-Ji Program
- **GPA / Academic Score:** 3.86 / 90.2 **Rank:** 8 / 43
- **Research Areas:** High-energy physics phenomenology (quantum field theory, lattice QCD, heavy-quark effective theory, and Feynman integrals); theoretical astrophysics (magnetars, black holes, planetary dynamics, and tidal disruption events); AI for physics (frontier AI agents and benchmarks for theoretical physics research).

AI FOR SCIENCE RESEARCH

AI Agents and Benchmarks for Frontier Physics Research 2025.11 - 2026.03

- **Advisor:** Siheng Chen, School of Artificial Intelligence, SJTU.
- **Industry Sponsor:** DeepSight Technology, Shanghai.
- T. Miao et al. (including **T. Guo**). *PhysMaster: Building an Autonomous AI Physicist for Theoretical and Computational Physics Research*. **arXiv:2512.19799**.
- T. Miao et al. (including **T. Guo**). *PRL-Bench: A Comprehensive Benchmark Evaluating LLMs' Capabilities in Frontier Physics Research*. **arXiv:2604.15411**.
- T. Miao et al. (including **T. Guo**). *Advancing and Evaluating AI Agent for Frontier Physics Research*. **ICML 2026 Workshop on AI for Physics**.

SELECTED HONORS AND AWARDS

- **2026.09 (expected):** Tsung-Dao Lee Doctoral Fellowship, Shanghai Jiao Tong University.
- **2026.06:** Outstanding Graduate, Shanghai Jiao Tong University.
- **2026.06:** SJTU Best Bachelor's Thesis Award (top 1% of all graduates).
- **2026.06:** Best Bachelor's Thesis, School of Physics and Astronomy, SJTU (ranked 1st among all physics graduates).
- **2021.12:** 38th Chinese Physics Olympiad Finals: National Second Prize (Silver Medal).
- **2021.09:** 38th Chinese Physics Olympiad Semifinals: First Prize; selected for the Hebei provincial team.
- **2019.09 / 2020.09:** 36th and 37th Chinese Physics Olympiad Semifinals: Second Prize.

PHYSICS RESEARCH & PUBLICATIONS

Dynamics of Repeating Partial Tidal Disruption Events

2026.03 - Present

- **Advisor:** Dong Lai, Cornell University and Tsung-Dao Lee Institute.
- **T. Guo** and D. Lai. *Dynamics of Repeating Partial Tidal Disruption Events I: Long-Term Orbital Evolution with Loss-Cone Scattering and Dynamical Tides. (In preparation for ApJ.)*
- T.-S. Chen, **T. Guo**, and D. Lai. *Dynamics of Repeating Partial Tidal Disruption Events II: Stellar Structure Evolution and Orbital Feedback from Dynamical Tides and Mass Loss. (In preparation for ApJ.)*
- **T. Guo** and D. Lai. *Dynamics of Repeating Partial Tidal Disruption Events III: Long-Term Binary Evolution, Hills Disruption, and the Formation of Hypervelocity Stars. (In preparation for ApJ.)*

Dynamics of Super-Earth Obliquity

2025.10 - 2026.02

- **Advisor:** Dong Lai, Cornell University and Tsung-Dao Lee Institute.
- **T. Guo** and D. Lai. *Beyond Cassini States: Analytical Framework for Nontrivial Obliquity Steady States in Multiplanet Super-Earth Systems. (In preparation for ApJ.)*

Polarized X-Ray Radiation from Magnetars

2025.05 - 2025.10

- **Advisor:** Dong Lai, Cornell University and Tsung-Dao Lee Institute.
- **Presentations:** “Polarized X-Rays from a Magnetar” (KITP, UC Santa Barbara, USA, 2025.08; IAS, Princeton, USA, 2026.02).
- **T. Guo** and D. Lai. *Impact of Resonant Compton Scattering on Magnetar X-Ray Polarization with QED Vacuum Resonance. (Accepted for publication in ApJ.)*

Nonperturbative Matching Between QCD and HQET

2024.11 - 2025.02

- **Advisor:** Wei Wang, School of Physics and Astronomy, SJTU.
- **T. Guo**, C. Han, W. Wang, and J.-L. Zhang. *Power Corrections in the Determination of Heavy Meson Light-Cone Distribution Amplitudes: A Renormalon-Based Estimation. **Phys. Rev. D** **112**, 016013 (2025).*

Multiloop Feynman Integrals

2023.09 - 2025.05

- **Advisor:** Wei Wang, School of Physics and Astronomy, SJTU.