Liu Hanqing

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Education

The University of Tokyo — Tokyo, Japan
M.Sc. in Precision Engineering — *Apr 2026 – Present (Expected Mar 2028)*
Research Interests: Deep Learning Theory, Generative Models

Tsinghua University — Beijing, China
M.Sc. in History of Science — *Sep 2023 – Apr 2026*
Selected Coursework: Deep Learning (4.0/4.0), Physics-Based Simulation (4.0/4.0), Computer Vision, Machine Learning Theory, Natural Language Processing, Network Science

Tsinghua University — Beijing, China
B.Sc. in Physics — *Sep 2019 – Jun 2023*

Publications

Grokking or Glitching? How Low-Precision Drives Slingshot Loss Spikes — *NeurIPS 2026*
Liu Hanqing, Jianjun Cao, Yuanze Li, Zijian Zhou

- Identified finite-precision loss computation as a numerical mechanism behind Slingshot loss spikes in long-term neural network training. Provided a testable account of abnormal parameter and logit growth in late-stage training, clarifying a numerical source of instability in low-precision deep learning.

Research Experience

The University of Tokyo — Tokyo, Japan
Graduate Researcher — *Apr 2026 – Present*

- Studying generalization and memorization in diffusion and flow-based generative models, with a focus on geometric and statistical characterizations of learned score/velocity fields.

Tsinghua University — Beijing, China
Graduate Researcher — *Sep 2023 – Mar 2026*

- Led an independent deep learning theory project, covering literature review, problem formulation, theoretical analysis, experiment implementation, and manuscript writing. Proposed and validated the mechanism of Slingshot loss spikes; the work has been accepted to NeurIPS 2026.

Tsinghua University — Beijing, China
Undergraduate Researcher — *Feb 2020 – Jun 2022*

- Developed machine learning methods for neutrino detection. Applied signal preprocessing, feature engineering, gradient-boosted decision trees, CNN, LSTM models, and achieved first place in the competition ranking.
- Researched electron–phonon coupling in strongly correlated quantum systems. Studied complex physical systems through computational modeling, numerical simulation, variational methods, and exact diagonalization.

Awards & Achievements

Outstanding Award, Roland Berger Case Competition (National Top 6) — 2023

- Conducted business case analysis and proposed consulting-style strategic solutions.

XueTang Scholarship, Tsinghua University — 2022

- Awarded for outstanding academic and research performance in the Tsinghua XueTang Physics Program.

First Prize, Ghost-Hunter Neutrino Data Analysis Competition (Global 1st) — 2020

- Built machine learning models to classify high-energy particle events collected from the China Jinping Underground Laboratory, achieving first place in the ranking.

Skills

Technical Skills: Python, C++, PyTorch, JAX, scikit-learn, MuJoCo

ML/DL: Training Dynamics, Numerical Analysis, Diffusion Models, Flow Matching, Physics-Based Simulation