Ting-Kai, Hsu

Check for Update

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Education

National Taiwan University Taipei, Taiwan
Bachelor of Science in Engineering 2022 - 2026(expected)

- Major: Electrical Engineering
- GPA: 4.23/4.30
- Rank: 7/266

Research Projects

An On-shell Approach to Anomalous Threshold
Department of Physics, National Taiwan University 2024.08 - present

- Research Assistant to Professor Yu-tin Huang.
- Study the analytic structure of amplitudes and the dispersion relation for unstable particles.
- Design an on-shell approach to anomalous threshold.
- Restoration of EFT positivity bound in the unstable region.
- K. Aoki, Y.-t. Huang, T.-K. Hsu, *On-shell Approach to Anomalous Threshold*, under construction.

Reconstruction of B Meson Decay Process via Deep Learning
Department of Physics, National Taiwan University 2023.09 - present

- Mentored by Professor Kai-feng Chen.
- Study the deep learning algorithms and collider physics.
- Training neural networks for capturing non-linear features of collision process.
- Compare CNN model and Transformer model efficiency.

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Internships

n_TOF, CERN | Geneva, Switzerland 2025.07 - 2025.08

- Mentored by Professor Alberto Mengoi.
- Developed an online nuclear cross-section database for astrophysical simulations.
- Supported experimental analysis and data organization for the n_TOF facility.
- The modular design allows extension, as more measurements become available.
- T.-K. Hsu, *CERN n_TOF Database of Maxwellian-Averaged Cross Sections (MACS)*, CERN, 2025. `https://doi.org/10.17181/9vj1x-arb77` and `https://ntofdb.web.cern.ch/`.

Institute of Physics, Academia Sinica | Taipei, Taiwan 2024.07 - 2024.08

- Mentored by Professor Wen-Chen Chang.
- Participated in the design and construction of a fixed-target cosmic-ray detector.
- Built automation programs for data acquisition and monitoring of cosmic rays.
- Project Presentation

Awards

- **Best Maker Prize**, MAKENTU Makerthon Contest, 2024.05
- **Outstanding Academic Achievement Awards**, National Taiwan University, 2023.09
- **Outstanding Academic Achievement Awards**, National Taiwan University, 2023.06

Academic & Leadership Experience

Teaching Assistant | Classical Mechanics, under Professor Yu-tin Huang — Fall, 2025

Research Assistant | Theoretical Physics, under Professor Yu-tin Huang — Spring, 2025

Host | MAKENTU Makerthon Contest — Spring, 2025

Head of R&D Department | NTU Learning Optimization Club — Spring, 2024

Course Projects

A Brief Introduction to Integrable Systems in Statistical Mechanics
Statistical Physics (II) — Fall, 2025

- First introduced the Bethe ansatz for integrable spins, and then discussed its applications in statistical mechanics.

A Brief Introduction to Black Hole Entropy
Advanced Topics in Gravity — Spring, 2025

- Introduced two methods for calculating the entropy of Schwarzschild black holes and discussed the concept of microstates.

Anisotropic Transmission of Quantum Information through Quantum Fields
Quantum Information and Computation — Spring, 2025

- Studied quantum information transmission, combining the non-perturbative quantum field theory with the Unruh-De Witt model, and tried some approaches to the anisotropic transmission.

A Brief Introduction to the Effective Theory of Binary Inspirals
Special Topics on Effective Field Theory and Scattering Amplitudes — Fall, 2024

- Introduced the EFT framework, the hierarchy of scales, and the power counting rules for binary inspirals, and calculated the gravitational potential using Feynman diagrams.

A Brief Introduction to Conformal Bootstrap
Quantum Field Theory (II) — Fall, 2024

- First introduced the basic concepts of conformal group, and then explained the algorithm of primary spectrum from the OPE associativity in Euclidean signature.

Languages & Skills

Languages: English (TOEFL iBT 106 : 29/28/22/27), Chinese

Programming: `Mathematica`, `ROOT`, `MadGraph`, `Python`, `C++`, LaTeX.

RELEVANT COURSE-WORK

Basic: Quantum Field Theory (I) & (II) (A+), Classical Mechanics (A+), Electromagnetics (I) & (II) (A+), General Relativity (A), Quantum Mechanics (I), Statistical Physics (II).

Advanced: Special Topics on Effective Field Theory and Scattering Amplitudes (A+), Quantum Information and Computation (A+), Advanced Topics in Gravity (A+), Basics of String Theory: from conformal field theory to supersymmetry (A+), Quantum Fields in Cosmology (A).