TONG SHEN

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EDUCATION

09/2020 – Present **Department of Physics, Fudan University, China**
Bachelor of Science in Physics (Expected graduation: 06/2024)

RESEARCH INTERESTS

- Experimental High Energy Physics
- The application of machine learning in collider physics
- Standard Model Effective Field Theory and Phenomenology

RESEARCH EXPERIENCE

06/2023 – Now **Machine-Learned Jet Time and Trackless Jet Vertexing**
Advisor: Prof. Zhen Liu, University of Minnesota
We demonstrate that precision timing information of the jet constituents in conjunction with machine learning allows for a more precise definition of jet time and also an independent reconstruction of displaced vertices for trackless jets. This highlights the power and importance of timing information for jets in colliders, which is complementary to tracking information for heavy neutral long-lived particles. Our new definition of jet time performs four times better than the old definition on average. The time-based vertices reconstruction has proved to have considerable precision for trackless jets with large decay radius.

An article detailing this research is currently in preparation and will be submitted for publication soon.

04/2023 – Now **Machine Learning Approach for Top Quark Effective Theory**
Ongoing *Advisor: Prof. Jiayin Gu, Fudan University*
We focus on the effective field theory which may influence the generation and decay of top quarks in future colliders. Machine learning techniques are applied to analyze the data generated by Madgraph and detector simulations. We use the likelihood score as the target function and Fisher information as the evaluation method. This enables us to estimate constraints on the coefficients of effective theory.

02/2022 – 06/2022 **AdS/CFT Duality**
Advisor: Prof. Yang Zhou, Fudan University
Review the correspondence between field theories and string theory. Focus on the relation between compactifications of string theory on Anti-de Sitter spaces and conformal field theories.
Group work for the honors course in Methods of Mathematical Physics. (Grade A)

COURSES & SEMINAR

Advanced Course: (by 03/2024) Gauge Field Theory (Grade A), Quantum Field Theory (Grade A), Particle Physics (Grade A), Advanced Electrodynamics (Grade A), Introduction to Soft Condensed Matter Physics (Grade A), Group Theory in Physics, Introduction to Cosmology, Quantum Computation and Information

Self-learned Course: Machine Learning, Online course by Hung-Yi Lee, National Taiwan University

Seminar: Lecture on Soft-Collinear Effective Theory by Prof. Dingyu Shao, Fudan University
Journal club with faculty in School of Physics and Astronomy, University of Minnesota

LANGUAGE & SKILLS

English: Proficiency, TOEFL: 106
Programming: Python, C/C++, Mathematica, Latex
Skills: Deep learning, Collider Event generation, Numerical simulations Monte Carlo method

AWARDS & HONORS

10/2022 Physics Major Scholarship, Fudan University
12/2019 Bronze Medal, The 33rd Chinese Chemistry Olympiad (Final)