

Enhanced Event Reconstruction at Hyper-Kamiokande and WCTE using Graph Neural Networks

Tuesday, 18 June 2024 17:30 (2 hours)

The precise measurement of neutrino properties is a top priority in fundamental particle physics. Accelerator-based neutrino experiments provide a unique framework for such studies, offering oscillation measurements and insights into CP violation in the leptonic sector. The next-generations experiments aim to establish mass ordering and possibly discover charge-parity violation with 5σ significance, as well as measure the CP-parameterizing phase (δCP) with unprecedented precision.

The successor to Super-Kamiokande (SK), Hyper-Kamiokande (HK), is a next-generation Water Cherenkov detector with an eightfold increase in target volume, enhanced photodetector capacity, and precise calibration devices. To fully leverage HK's capabilities, we need to develop reliable and precise analysis tools. In this effort, the Water Cherenkov Test Experiment (WCTE) has been specifically designed to provide accurate measurements that help understand detector responses and test the performance of event-reconstruction algorithms.

This poster introduces GRANT, a graph neural network-based software for particle reconstruction in Hyper-Kamiokande. We first discuss its adaptation for WCTE, emphasizing the upcoming data-taking phase in autumn as an opportunity to validate our algorithm under real conditions. We will then present the initial and promising results, demonstrating GRANT's potential to enhance HK's physics capabilities in the CP violation discovery range at the GeV scale.

Poster prize

Yes

Given name

Surname

First affiliation

Second affiliation

Institutional email

Gender

Collaboration (if any)

WCTE, HK, SK, T2K

Primary authors: ERSHOVA, Anna (École polytechnique); QUACH, Christine (LLR)

Presenters: ERSHOVA, Anna (École polytechnique); QUACH, Christine (LLR)

Session Classification: Poster session and reception 1

Track Classification: New technologies for neutrino physics