Contribution ID: **313** Type: **Poster**

Reducing Systematic Uncertainties in Neutrino Detection with the Water Cherenkov Test Experiment (WCTE)

Wednesday 27 August 2025 18:00 (2 hours)

The Water Cherenkov Test Experiment (WCTE) is a 30 ton water Cherenkov detector currently installed in the T9 beamline at CERN. It has been built as a prototype of the Intermediate Water Cherenkov Detector (IWCD) for the Hyper-Kamiokande long-baseline neutrino oscillation experiment. For Hyper-Kamiokande to achieve its physics goals, systematic uncertainties in the detection and reconstruction of neutrino events must be reduced below current levels. WCTE is measuring the interaction of charged particles and photons in a water Cherenkov detector to reduce systematic uncertainties in neutrino detection. Charged electrons, muons, pions and protons between 200 MeV and 1.5 GeV are characterized by an array of beam monitors before entering the water Cherenkov detector. WCTE measures the water Cherenkov detector response to these particles and studies their reconstruction. WCTE can also measure the scattering cross sections of charged leptons and pions in water which can be used to constrain neutrino interaction models and improve neutrino event reconstruction. Additionally, measurements are made with a tagged-gamma beam to study the separation of gamma and electron events in water Cherenkov detectors and gadolinium doped water to study the production and interaction of neutrons in neutrino detectors. This talk will discuss the physics goals of the WCTE experiment and show some preliminary results from data taken in spring 2025.

Collaboration you are representing

WCTE

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Session Classification: Poster session

Track Classification: Neutrino Physics and Astrophysics