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(I) The T2K, Super-Kamiokande, and Hyper-Kamiokande Experiments

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T2K and Super-Kamiokande (Super-K) in Japan represent the current generation of successful campaigns to understand the properties of neutrino mixing, using detectors whose physics reach also extends to studies of astrophysical neutrinos and searches for new physics through processes such as nucleon decay or dark matter annihilation. T2K utilizes Super-K as the far detector in a long-baseline neutrino experiment to study oscillations with accelerator-produced muon neutrino or antineutrino beams. This resulted in the discovery of the ν_μ to ν_e oscillation channel and following hints of CP violation in neutrino oscillations.

Hyper-Kamiokande (Hyper-K) is a next-generation experiment informed by the success of T2K and Super-K. It utilizes a water Cherenkov far detector, whose site construction is underway, 8 times larger than Super-K, and will benefit from an upgraded 2.5 times higher intensity beam than T2K. An Intermediate (distance) Water Cherenkov Detector (IWCD) will help mitigate systematic uncertainties to a level commensurate with this unprecedented statistical precision, affording significant discovery potential of leptonic CP violation. In this talk, I will describe the status of the T2K, Super-K, and Hyper-K projects, and highlight planned Canadian contributions to the water Cherenkov detectors, including new photosensors, new methods of calibration and deep learning event reconstruction, and a prototype water Cherenkov test beam experiment (WCTE) at CERN.

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