

# School of Physics and Astronomy

## COLLOQUIUM

### Status and prospects of neutrino experiments with large water Cherenkov detectors in Japan



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The Super-Kamiokande detector, a 50 kiloton water Cherenkov detector in Japan, has been providing fascinating results over more than 20 years. It played key roles in the study of neutrino oscillation; the first ever evidence for the neutrino oscillations with atmospheric neutrinos (2015 Nobel Prize in Physics), significant contribution to the solution of solar neutrino problem, and the observation of electron neutrino appearance from the muon neutrino beam using J-PARC accelerator, thus provided measurements of all three mixing angles of neutrinos. It also sets the most stringent limits on nucleon decays, and has a broad program with astrophysical neutrinos. We will present, in two parts, the latest results and future prospects of the current experiments, and the next generation project Hyper-Kamiokande.

The first part is titled "Long baseline experiments with the J-PARC neutrino beam." The T2K experiment, using the J-PARC accelerator and Super-Kamiokande 295km apart, has been leading the world study of neutrino oscillations for the past decade and recently reported the first hint of CP violation in the lepton sector. We report the latest results, the planned upgrades of the neutrino beam and near detectors to further enhance the physics capabilities of T2K, and future prospects of the experiment with Hyper-Kamiokande.

The second part, "The Hyper-Kamiokande project," will cover the status and prospects of the Hyper-Kamiokande (Hyper-K), which is expected to start operation in ~2027. As a straightforward extension of the Super-Kamiokande, it will provide major new capabilities to make new discoveries in particle and astroparticle physics thanks to an order of magnitude increase in detector mass and improvements in photon-detection system. In addition to the neutrino oscillation program, Hyper-K will also be the world leader for nucleon decays and neutrino astrophysics.

Date:	Monday 27 May
Time:	2pm
Venue:	L1, Large Seminar Room, 10 College Walk, Clayton

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