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The Hyper-Kamiokande project

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The Hyper-Kamiokande, which we are currently developing, is designed to be the next decade's flagship experiment for the study of neutrino oscillations, nucleon decays, and astrophysical neutrinos. The detector is the third generation underground water Cherenkov detector at Kamioka. Holding 1 million ton water target being about 20 times larger than the Super-Kamiokande, the detector will extend the sensitivity to search for baryon-number-violated proton (and bound neutron) decays by one order of magnitude or more to test various grand unified theories. It also aims to explore the full picture of neutrino masses and mixings by using intense accelerator and atmospheric neutrinos. These experimental studies would become windows to see physics at the grand unification scale of $\sim 10^{16}$ GeV which is far beyond the energy scale of accelerator based particle physics. The detector also serves as an astrophysical neutrino observatory aiming to study the explosion mechanism of core-collapse supernova, the history of star formation and heavy element synthesis in the universe, WIMP dark matters trapped in the Sun, Earth, and Galaxy, and other astrophysical neutrino sources.

Physics potential of the Hyper-Kamiokande is estimated based on the well proven water Cherenkov technology and its detector performance. Feasibility of the one megaton size detector has been shown by its baseline design, and the detector design is being optimized at present. By taking into account the production rate of photo-sensors and estimated construction period, the Hyper-Kamiokande is expected to start its operation in 2023.

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