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## Neutrino Oscillation Physics Potential of A Possible Extension of The T2K Experiment

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T2K (Tokai to Kamioka) is the world's first off-axis designed long-baseline experiment that was built for precision measurement of neutrino oscillations. The T2K experiment uses a high intensity, highly pure beam of muon (anti)neutrinos produced at J-PARC in Tokai, Japan. A Near Detector complex, 280 m downstream of the target, is operated to monitor and characterize the (anti)neutrino beam before the neutrinos oscillate. Neutrino oscillation patterns are observed at the Super-Kamiokande detector, which is located 295 km away from the neutrino production point at an angular offset of 2.5 degrees from the average beam direction. In 2013, with  $6.6 \times 10^{20}$  protons-on-target (POT), just 8.4% of the total approved proton exposure,  $\nu_\mu \rightarrow \nu_e$  appearance, a primary goal of T2K, was discovered with  $7.3\sigma$  significance. This result leads us to re-evaluate the physics potential and possibility for extension of the T2K experiment. In this report, T2K neutrino oscillation sensitivities are studied with a total exposure of  $20 \times 10^{21}$  POT, which can be achieved by 2026 with a possible upgrade of the J-PARC beam power. This amount of data exposure, along with T2K hardware upgrades and analysis improvement, allows us to intensively explore CP violation in the lepton sector, to precisely measure neutrino oscillation parameters, and to positively search for unknown physics.

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