

T2K Status and plans

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T2K is a long baseline experiment providing world-leading measurements of the parameters governing neutrino oscillation. T2K data enable the first 3 sigma exclusion for some intervals of the CP-violating phase δ_{CP} and precision measurements of the atmospheric parameters Δm^2_{32} , $\sin^2(\theta_{23})$.

T2K exploits a beam of muon neutrinos and antineutrinos at the Japan Particle Accelerator Research Centre (JPARC) and it measures oscillations by comparing neutrino rates and spectra at a near detector complex, located at JPARC, and at the water-Cherenkov detector Super Kamiokande, located 295 Km away. The T2K beam will be upgraded with increased power in 2022 and an upgrade of the ND280 near detector, located 2.5 degrees off-axis, is being assembled to exploit the increased statistics. Moreover, the Super Kamiokande detector has been loaded with 0.02% of Gadolinium in 2020, enabling enhanced neutron tagging.

In preparation for the exploitation of such data, the T2K collaboration is working on an updated oscillation analysis to improve the control of systematic uncertainties. A new beam tuning has been developed, based on an improved NA61/SHINE measurements on a copy of the T2K target and including a refined modelling of the beam line materials. New selections are being developed at ND280, with proton and photon tagging, and at Super Kamiokande, extending pion tagging to muon neutrino samples. After reviewing the latest measurements of oscillation parameters, the status of such new analysis developments and the plan to deploy the beam and ND280 upgrade will be presented.

Reference to paper (DOI or arXiv)

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