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T2K near detector tracker

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Tokai to Kamioka (T2K) is a new generation neutrino oscillation experiment that started collecting data in 2009 in Japan. A ν_μ beam produced by an intense proton beam colliding onto a target is directed from J-PARC (Tokai) to the 50kt water Cerenkov detector Super Kamiokande at a distance of 295 km. T2K's main goals are measuring one of the last unknown parameters of the PMNS matrix θ_{13} by using ν_e appearance in the beam, and measuring precisely Δm^2_{23} and θ_{23} by using ν_μ disappearance.

A near detector (ND280) placed in a 0.2 T magnetic field is located at 280m from the target to allow the characterisation of the neutrino beam before oscillation. In particular, the detector measures the neutrino energy spectra, beam flavor composition, background and cross-sections. ND280 started taking data at the end of 2009. An essential element of ND280 is the tracker, composed of two fine grained detectors (FGD) to serve as targets for neutrino interactions and measure cross-sections, and three time projection chambers (TPC) to track and identify charged particles. The TPCs' readout planes are equipped with Micromegas micro-pattern detectors, achieving a total active surface of 9m². The first FGD is made of scintillator bars only whereas the second one includes water targets. The performance of the tracker with cosmic ray and neutrino data will be presented.

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