

Technical challenges for the new T2K High Angle TPCs

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The Near Detector of the T2K experiment at J-PARC has recently being upgraded in order to reduce the present systematic uncertainties affecting the oscillation parameters measurements and to exploit the increased neutrino beam power of the J-PARC complex.

One of the major improvements to the T2K ND280 detector consisted of the integration of two large size (~3m³ each) new horizontal High -Angle Time-Projection Chambers (HATPC).

The new HATPCs are based on a gaseous active volume contained in a Field Cage made of lightweight composite material, combining optimal mechanical and electrical properties with minimal radiation length and dead volume.

The readout is performed by innovative Resistive Micromegas modules featuring a resistive layer for charge spreading on top of the readout plane to enhance spatial resolution performance. The mentioned technologies have been studied during several test beams and cosmic rays campaigns. After the installation at J-Parc in Fall 2023, a commissioning period of data taking with cosmics and then with a neutrino beam has been performed. In this talk the details about the detector concepts, the design and construction methods are presented within the technological challenges and the solution adopted to cope with the challenging requirements of the upgrade. Furthermore, the results of the characterization and commissioning performance of the HA-TPCs at CERN and J-Parc, including also the first results using beam neutrinos interactions will be illustrated.

Working Group

WG 6: Detectors

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