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The new Time Projection Chambers of the T2K upgraded Near Detector

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The Near Detector (ND280) of the T2K experiment at JPARC was recently upgraded to reduce systematic uncertainties affecting the measurement of oscillation parameters. Two large horizontal Time-Projection Chambers were added to measure charged particles produced at high azimuthal angle from the central active target. Each High-Angle TPC (HATPC) has an active gaseous volume of approximately 3mˆ3 enclosed within a lightweight Field Cage, designed to provide optimal mechanical and electrical properties while material budget and dead volume.
The readout system uses innovative Micromegas, which incorporate a resistive layer on top of the pad plane to improve spatial resolution thanks to the charge "spreading"effect. These technologies were tested in Beam Tests and Cosmic Ray measurement campaigns.
The installation at J-PARC was carried out in two stages, during the fall of 2023 and spring of 2024, followed by commissioning phases using cosmic ray data and neutrino beam. In June 2024, T2K had a 1st cycle (1 month) of data-taking with the fully upgraded ND280. A 2nd cycle is scheduled for the end of 2024.
This talk will summarize detector design, construction methods, and solutions developed to overcome the several technical challenges involved. Results from the characterization and commissioning of the HATPCs will be highlighted, including the first results from neutrino beam data, along with the detector's basic performance concerning energy loss, spatial, and momentum resolution.

Primary experiment

T2K Experiment

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