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Encapsulated resistive anode bulk Micromegas detectors for the T2K experiment TPC upgrade

In order to establish accurate leptonic CP violation at 3σ level for a significant fraction of the possible δ_{CP} values, the T2K collaboration plan to upgrade the beam intensity and to upgrade the near detector ND280.

An innovative concept for this neutrino detection system made with a totally active Super-Fine-Grained-Detector (SuperFGD), two High Angle Time Projection Chamber (HA-TPC) and six time of flight planes.

The HA-TPC will be used for 3D track reconstruction, momentum measurement and particle identification. These TPCs, with overall dimensions of $2 \times 2 \times 0.8 \text{ m}^3$, will be equipped with 32 encapsulated resistive anode bulk Micromegas (ERAM) detectors. The thin field cage (3 cm thickness, 4% radiation length) will consist of composite material with a Kapton foil with copper strips as inner layer. The $42 \times 34 \text{ cm}^2$ ERAM detector will use a $400 \text{ k}\Omega/$

square diamond like carbon (DLC) foil to spread the charge over the pad plane, each pad being approximately 1 cm^2 . New front-end cards electronics, based on the AFTER chip, directly mounted on the back of the detector and parallel to its plane have been developed and used for the signal readout.

The first production ERAM detector modules have been tested in a lab using a X-ray bench and a cosmic bench. In July 2021, data have also been taken in a test beam at DESY in 0.2 T magnetic field. Performance characterization and results from these measurement campaign will be shown.

Primary experiment

T2K

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Track Classification: Gaseous Detectors