Contribution ID: **54** Type: **Talk**

Characterisation of the ERAM detectors for the High Angle TPC of the T2K ND upgrade

Friday, August 5, 2022 11:35 AM (20 minutes)

The High-Angle Time Projection Chambers (HA-TPCs) are a new set of detectors that will equip the off-axis near detector (ND280) of the T2K long-baseline neutrino oscillation experiment. These detectors will be installed below and above a new Super Fine-Grained Scintillator detector (FGD) in 2023 as part of the upgrade of ND280.

The HATPCs operate at atmospheric pressure with the "T2K gas" mixture contained in a Field Cage with a central cathode splitting the active volume (2.0×1.8×0.8 m3) into two halves (1m long in drift direction).
The thin wall (3cm) Field Cages are built by exploiting composite material techniques with lightweight and low-Z materials.

The readout is done with Resistive Micromegas readout modules (ERAM) that utilizes a resistive foil covering the reading pads, acting as a 2D RC network and allowing a better determination of the deposited charges position. A prototype of the Field Cage instrumented with one ERAM detector has been recently exposed at the DESY electron beam and spatial resolution better than 0.6 mm and dE/dx resolution In order to ensure that the HA-TPCs satisfy the required performances for the ND280 Upgrade (space point resolution better than 600 μm and dE/dx resolution smaller than 10%), the ERAM detectors have been characterized with X-rays sources and by exposing them to the DESY electron beam.
In addition, we have developed a detailed a simulation of the charge spreading phenomenon and of the electronic response, along with new reconstruction methods that exploit both charge and time information from the main and neighboring pads. In this talk we will present the physics associated with such novel technology, the status of simulation and reconstruction efforts, and the performances observed with the DESY Test beam.

Attendance type

Virtual presentation

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Session Classification: WG6: Detectors

Track Classification: WG6: Detectors