

# Commissioning and beam test a high pressure time projection chamber

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Due to their large active volume and low energy threshold for particle detection Time Projection Chambers (TPCs) are promising candidates to characterise neutrino beams at the next generation long baseline neutrino oscillation experiments such as DUNE and Hyper-K, the successor of the T2K experiment. The higher target density for the incoming neutrino beam of a TPC filled with gas at High Pressure (HPTPC), will potentially allow a better neutrino-nucleus interaction measurements as compared to a TPCs at 1 atm.

Our HPTPC has about  $0.5 \text{ m}^3$  active volume which is embedded into a pressure vessel rated up to 5 barA. A cascade of meshes amplifies the primary ionisations. The induced charge on each mesh is read out. In addition the photons emitted during the gas amplification are read out by four CCD cameras focused on the readout plane, which thus image the 2D projection of particle's tracks on the transverse plane. The third coordinate is reconstructed from the charge signal.

We report on the commissioning of the HPTPC and on its performance during a four week long beam test at the CERN PS, measuring low momentum protons ( $\leq 0.5 \text{ GeV}$ ) interactions with the counting gas. Several mixtures with Argon predominance have been tested for their light yield and gas gain. Eventually, the proton Ar cross section will be calculated from the data sample, which will enter the calculations of final state interactions in neutrino Ar scattering.

**Primary author:** DEISTING, Alexander (Ruprecht-Karls-Universitaet Heidelberg (DE))

**Presenter:** DEISTING, Alexander (Ruprecht-Karls-Universitaet Heidelberg (DE))

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