Contribution ID: **224** Type: **Oral**

First results from a 10bar Xe-TPC with 1kg fiducial mass, read out with Micro-Pattern Gas Detectors

Friday 6 June 2014 15:00 (20 minutes)

Microbulk-Micromegas constitutes a new generation of Micromegas (MICRO MEsh GAseous Structure) used for the detection and tracking of particles. Its simplicity, inherited from its constituent element –a double copper-clad kapton foil–, enhances its radiopurity, making it particularly well suited for Rare Event searches. The energy resolution is amongst the best obtained with Micro-Pattern Gaseous Detectors (MPGD), with potential for an extremely fine segmentation, at the 100um scale or better. Within the R&D framework of the NEXT-100 ββ0ν experiment, we have commissioned a medium-size 70-liter, 700cm2(readout) x 38cm(drift) Xenon TPC with an 8mm x 8mm pixelated-readout (dubbed NEXT-MM) and operated it up to 10bar pressure (1kg fiducial mass).

We will present a full 3D characterization of the system at 1, 3 and 10bar pressure for point-like electron tracks stemming from low-energy X-rays (30keV), as well as extended ones from gamma-ray interactions (511keV), of interest in the most appealing next generation Xenon-based experiments. Emphasis will be put on the achievable energy resolution, energy threshold and topological capabilities.

Xenon has been doped with a mild 1-2% content of TMA. Ionization-wise Xe-TMA forms a convenient Penning mixture while TMA is known to exhibit fluorescence in the near-visible range thus eventually allowing for S1 (primary scintillation) sensitivity.

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Session Classification: II.c Neutrino

Track Classification: Experiments: 2c) Detectors for neutrino physics