



Contribution ID: 14

Type: **Oral presentation**

Beam Test Results from a GEM-based Combination TPC-Cherenkov Detector

Monday 22 May 2017 17:10 (20 minutes)

A combination Time Projection Chamber-Cherenkov prototype detector has been developed for consideration at a future Electron Ion Collider and was tested at the Fermilab test beam facility in April 2016. The purpose of the test was to provide a proof of principle, demonstrating that the detector is able to measure particle tracks and provide particle identification within a common volume. The TPC portion consists of a $10 \times 10 \times 10 \text{ cm}^3$ field cage, which delivers charge from tracks to a $10 \times 10 \text{ cm}^2$ quadruple GEM readout. Tracks are reconstructed by interpolating the hit position of clusters on an array of $2 \times 10 \text{ mm}^2$ zigzag pads, which can significantly enhance charge sharing across the active area of the readout. The Cherenkov component consists of a $10 \times 10 \text{ cm}^2$ readout plane segmented into 3×3 square pads, also coupled to a quadruple GEM. As tracks pass through the drift volume of the TPC, the generated Cherenkov light is able to escape through sparsely arranged wires making up one side of the field cage, facing the CsI photocathode of the Cherenkov detector. The Cherenkov detector is thus operated in a windowless, proximity focussed configuration for high efficiency. Pure CF_4 is used as the working gas for both detector components, mainly due to its transparency into the deep UV, as well as its high N_0 . Results from the beam test as well as the applicability for such a detector at a future Electron Ion Collider will be discussed.

Authors: AZMOUN, Bob (Physics Dept., Brookhaven National Lab); Prof. HEMMICK, Thomas (Physics Dept., Stony Brook University); Dr MAJKA, Richard (Physics Dept., Yale University); Mr PHIPPS, Michael (Physics Dept., University of Illinois); Dr PURSCHKE, Martin (Physics Dept., Brookhaven National Lab); Dr SMIRNOV, Nikolai (Physics Dept., Yale University); Dr WOODY, Craig (Physics Dept., Brookhaven National Lab); Dr ZHANG, Aiwu (Florida Institute of Technology (US))

Presenter: AZMOUN, Bob (Physics Dept., Brookhaven National Lab)

Session Classification: MPGD detector technologies - 4 (Chair: Matt Posik)