



Contribution ID: 62

Type: **Oral presentation**

Preliminary Results of GEM based Transition Radiation Detector/ Tracker in Test Beam at JLab

Monday, 22 May 2017 13:20 (20 minutes)

A high luminosity polarized Electron Ion Collider (EIC) is envisioned as a next-generation US facility, as recommended by US Nuclear Science Advisory Committee in its 2015 Long Range Plan.

An intensive and comprehensive detector R&D is currently being carried out to address the experimental challenges of future physics programs of EIC. One such challenge is the electron identification, especially in the forward hadron-endcap region, where large QCD hadron background is expected. Transition radiation detectors are used for electron identification in various particle physics experiments. The high granularity GEM detectors provide precise tracking information for the charged particles when used in the micro-drift or micro-TPC configuration. Combined with a transition radiation options and taking into account low material and low cost of GEM detector technologies, GEM based transition radiation detector/tracker is the ideal candidate for large area end-cap detectors.

A small prototype GEM-TRD with an ionization gap of 20 mm was built and tested in an electron beam in Hall D at Jefferson Lab. We present the preliminary results from the test beam data and the proof of concept for GEM-TRD. Finally, we will discuss the future plan for GEM-TRD R&D including GEANT4 simulation for the motivation in the context of an EIC detector.

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Session Classification: MPGD detector technologies - 3 (Chair: Matt Posik)