

Abstract Submitted
for the APR14 Meeting of
The American Physical Society

Beam test results for a large-area GEM detector read out with radial zigzag strips¹ AIWU ZHANG, VALLARY BHOPATKAR, MARCUS HOHLMANN, ERIC HANSEN, NICHOLAS LOWING, MIKE PHIPPS, ELIZABETH STARLING, JESSIE TWIGGER, KIMBERLY WALTON, Florida Institute of Technology — The FLYSUB consortium conducted a beam test at the Fermilab Test Beam Facility in October 2013 to study performances of several Gas Electron Multiplier (GEM) prototype detectors that are being considered for forward tracking and particle identification in an experiment at a future Electron Ion Collider (EIC) in the US. Our group operated five GEM tracking detectors with different areas including one of the two largest GEM detectors built and operated in the US to-date. This detector, a trapezoidal 1m-long Triple-GEM with 22-45 cm width, was designed with a readout using radial zigzag strips. This allows a substantial reduction of the total number of strips and electronics channel - and consequently system cost - while preserving good spatial resolution for tracking purposes. The design and manufacturing of the readout board with 1,024 zigzag strips is briefly described. We find that this detector performed well in the beam. The charged-particle detection efficiency is $\sim 98\%$, strip cluster charge distributions closely follow a Landau shape, and measured spatial resolution is ~ 0.5 mm using charge sharing among adjacent zigzag strips with 2.5 mm pitch. We discuss how the details of the interleaving of adjacent zigzag strips could be further improved in a re-designed readout board to get even better spatial resolution.

¹The authors would like to acknowledge the Brookhaven National Laboratory for supporting this research, and we also appreciate the experts from the Fermilab Test Beam Facility for their great help.

Aiwu Zhang
Florida Inst of Tech

Date submitted: 09 Jan 2014

Electronic form version 1.4