

**Beam test of a large-area GEM detector prototype for the upgrade of the CMS muon endcap system** VALLARY BHOPATKAR, Florida Institute of Technology (FOR THE CMS GEM COLLABORATION) – Gas Electron Multiplier (GEM) technology is being considered for the forward muon upgrade of the CMS experiment in Phase 2 of the CERN LHC. The first such implementation is planned for the GE1/1 system in the  $1.6 < |\eta| < 2.1$  region of the muon endcap. With precise tracking and fast trigger information, this system can significantly improve the CMS muon trigger as shown previously in simulations. We assembled a 1m full-size prototype of a GE1/1 triple-GEM detector with 3,072 radial readout strips at Florida Tech and tested it in hadron beams at Fermilab in October 2013. Construction of this largest GEM detector type built to-date is briefly described. Strip cluster parameters, detection efficiency, and spatial resolution for charged particles are studied with position and high voltage scans and at different inclination angles. Strip cluster sizes increase linearly with high voltage. We find a plateau detection efficiency of  $(97.7 \pm 0.2)\%$ . All eight eta sectors of the prototype detector show similar high efficiencies. Results of response uniformity and spatial resolution studies using four GEM-based reference tracking detectors will be presented.