Abstract Submitted
for the SES11 Meeting of
The American Physical Society

A Muon Tomography Station with GEM Detectors for Nuclear Threat Detection[1] MICHAEL STAIB, KONDO GNANVO, LEONARD GRASSO, MARCUS HOHLMANN, JUDSON LOCKE, Florida Institute of Technology, FILIPPO COSTA, SORIN MARTOIU, HANS MULLER, CERN — Muon tomography for homeland security aims at detecting well-shielded nuclear contraband in cargo and imaging it in 3D. The technique exploits multiple scattering of atmospheric cosmic ray muons, which is stronger in dense, high-Z nuclear materials, e.g. enriched uranium, than in low-Z and medium-Z shielding materials. We have constructed and operated a compact Muon Tomography Station (MTS) that tracks muons with six to ten 30 cm $\times$ 30 cm Triple Gas Electron Multiplier (GEM) detectors placed on the sides of a 27-liter cubic imaging volume. The 2D strip readouts of the GEMs achieve a spatial resolution of $\sim$130 μm in both dimensions and the station is operated at a muon trigger rate of $\sim$20 Hz. The 1,536 strips per GEM detector are read out with the first medium-size implementation of the Scalable Readout System (SRS) developed specifically for Micro-Pattern Gas Detectors by the RD51 collaboration at CERN. We discuss the performance of this MTS prototype and present experimental results on tomographic imaging of high-Z objects with and without shielding.

[1]Research supported in part by the U.S. Department of Homeland Security under Grant No. 2007-DN-077-ER0006-02.

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Date submitted: 24 Aug 2011 Electronic form version 1.4