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High Resolution Muon Tomography using a Portable Prototype Muon Telescope SADMAN AHMED SHANTO, SHUICHI KUNORI, NURAL AKCHURIN, RAUL PEREZ JR, SAMUEL CANO, MOHAMMAD MOOSAJEE, Texas Tech University — We aim to develop a portable muon detector with an excellent spatial resolution that will be able to image large structures in detail. Muons are weakly interacting elementary particles that readily pass through objects, losing some of their energy in the process. Muon tomography is a technique that exploits this phenomenon to construct images of large objects of interest, such as volcanoes, buildings, and pyramids. The present prototype comprises a two-layered system of scintillator bars, optical system with Winston cones, silicon photomultipliers (SiPMs), readout electronics, and a network of Arduinos. The cosmic muons produce scintillations as they pass through the scintillators and the Winston cones transport these photons to the SiPMs where they are converted into electrical signals. These signals, in turn, are digitized and transmitted to a local computer. This system is mounted on a wheeled cart that spans an area of approximately 90 cm by 180 cm and can be rotated 90 degrees to the vertical. We are presently able to reconstruct 2-D images of large objects with an angular resolution of 50 mrads. We are also testing, debugging, and analyzing the data stream and adjusting the parameters for the upgraded detector to vastly improve angular resolution.

Sadman Ahmed Shanto
Texas Tech University

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