Abstract Submitted
for the APR17 Meeting of
The American Physical Society

Simulation and Digitization of a Gas Electron Multiplier Detector Using Geant4 and an Object-Oriented Digitization Program TIMOTHY MCMULLEN, NILANGA LIYANAGE, Univ of Virginia, WEIZHI XIONG, ZHIWEN ZHAO, Duke University, Thomas Jefferson National Accelerator Facility — Our research has focused on simulating the response of a Gas Electron Multiplier (GEM) detector using computational methods. GEM detectors provide a cost effective solution for radiation detection in high rate environments. A detailed simulation of GEM detector response to radiation is essential for the successful adaption of these detectors to different applications. Using Geant4 Monte Carlo (GEMC), a wrapper around Geant4 which has been successfully used to simulate the Solenoidal Large Intensity Device (SoLID) at Jefferson Lab, we are developing a simulation of a GEM chamber similar to the detectors currently used in our lab. We are also refining an object-oriented digitization program, which translates energy deposition information from GEMC into electronic readout which resembles the readout from our physical detectors. We have run the simulation with beta particles produced by the simulated decay of a ^{90}Sr source, as well as with a simulated bremsstrahlung spectrum. Comparing the simulation data with real GEM data taken under similar conditions is used to refine the simulation parameters. Comparisons between results from the simulations and results from detector tests will be presented.

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Date submitted: 30 Sep 2016 Electronic form version 1.4