

Abstract Submitted
for the DNP15 Meeting of
The American Physical Society

Multiple Scattering in Beam-line Detectors of the MUSE Experiment HEATHER GARLAND, Gettysburg College, CLAY ROBINETTE, University of North Georgia, STEFFEN STRAUCH, University of South Carolina, THE MUON SCATTERING EXPERIMENT (MUSE) COLLABORATION — The charge radius of the proton has been obtained precisely from elastic electron-scattering data and spectroscopy of atomic hydrogen. However, a recent experiment using muonic hydrogen, designed for high-precision, presented a charge radius significantly smaller than the accepted value. This discrepancy certainly prompts a discussion of topics ranging from experimental methods to physics beyond the Standard Model. The MUon Scattering Experiment (MUSE) collaboration at the Paul Scherrer Institute, Switzerland, is planning an experiment to measure the charge radius of the proton in elastic scattering of electrons and muons of positive and negative charge off protons. In the layout for the proposed experiment, detectors will be placed in the beam line upstream of a hydrogen target. Using Geant4 simulations, we studied the effect of multiple scattering due to these detectors and determined the fraction of primary particles that hit the target for a muon beam at each beam momentum. Of the studied detectors, a quartz Cherenkov detector caused the largest multiple scattering. Our results will guide further optimization of the detector setup. Supported in parts by the U.S. National Science Foundation: NSF PHY-1205782

Heather Garland
Gettysburg College

Date submitted: 28 Jul 2015

Electronic form version 1.4