Abstract Submitted
for the NWS14 Meeting of
The American Physical Society

Analysis of the Light Response of Lead Fluoride Crystals for the New (g-2) Experiment KAZIMIR WALL, Univ of Washington — The new (g-2) experiment hopes to test the difference between the experimental and theoretical values of the anomalous magnetic moment of the muon out to a greater statistical precision than has been previously accomplished. Such a discovery would provide strong evidence of new physics such as dark photons, supersymmetry, or possibly something not yet considered. During the experiment, muons are injected into a large superconducting ring. A muon decays to an electron and the electron curls to the inside of the storage ring and strikes an array of lead fluoride crystals. When an electron hits a crystal, it produces light that is proportional in intensity to the energy of the electron. The energy and the time of its arrival help to indicate the direction of the spin which is used in the calculation of (g-2). My research investigates how light is propagated and distributed in these crystals and how different reflective or absorptive wrappings affect this distribution. I measure light yield and pulse width, which correspond to two different extremes of wrapping material. For maximum light yield, I use white Millipore paper, while shorter pulse widths are achieved using black Tedlar. I have developed a 2x2 array of crystals coupled to light sensitive photomultiplier tubes. This setup captures cosmic ray muons that hit the surface of the earth. Capturing these muons simulates the conditions of the experiment. I analyze the resulting data by fitting the pulses and extracting the functional form of the light distribution. The results of this research will ultimately contribute to the development of more complete theories of the fundamental building blocks of the universe.

Kazimir Wall
Univ of Washington

Date submitted: 25 Mar 2014 Electronic form version 1.4