

Abstract Submitted
for the DNP10 Meeting of
The American Physical Society

Measurement of Neutron Reflectivity from a Silicon Crystal: Preparation for an nMDM Measurement¹ BENJAMIN BARBER, DONALD KOETKE, Valparaiso University, MUHAMMAD ARIF, MICHAEL HUBER, NIST — Physicists from ANL, Valparaiso University, University of Hawaii, and NIST have designed an experiment to use the known neutron magnetic dipole moment (nMDM) to measure Schwinger scattering in Si, a process whereby the orientation of the magnetic dipole polarization is altered by interactions with the atomic electric fields in a Si crystal. This measurement is intended to be a precursor to a search for a neutron electric dipole moment (nEDM) employing a similar spin rotation via a different interaction. Both measurements depend on neutron Bragg reflections down a slotted Si crystal. For a successful measurement, the neutron beam has to reflect approximately 150 times, without a large loss of beam intensity. This requires a high reflectivity, on the order of 99% reflective. In order to make an accurate measurement of the Schwinger scattering, both the incident neutron beam and the crystal's reflectivity need to be well understood. This summer we have characterized the newly commissioned "nMDM Experiment" neutron beamline at the NIST Center for Neutron Research, and have measured the reflectivity of the slotted Si single crystal intended for the experiment. These measurements lay the groundwork for the coming nMDM Schwinger scattering measurement.

¹Research part of the NIST SURF program.

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Date submitted: 02 Aug 2010

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