Abstract Submitted
for the DAMOP12 Meeting of
The American Physical Society

A Search for Nonstandard Neutron Spin Interactions using Dual Species Xenon Nuclear Magnetic Resonance MICHAEL BULATOWICZ, MICHAEL LARSEN, JAMES MIRIJANIAN, Northrop Grumman - Navigation Systems Division, CHANGBO FU, HAIYANG YAN, ERICK SMITH, MIKE SNOW, Indiana University, THAD WALKER, University of Wisconsin — NMR measurements using polarized noble gases can constrain possible exotic spin-dependent interactions involving nucleons. A differential measurement insensitive to magnetic field fluctuations can be performed using a mixture of two polarized species with different ratios of nucleon spin to magnetic moment. We used the NMR cell test station at Northrop Grumman Corporation (NGC) (developed to evaluate dual species xenon vapor cells for the Nuclear Magnetic Resonance Gyroscope) to search for NMR frequency shifts of xenon-129 and xenon-131 when a non-magnetic zirconia rod is modulated near the NMR cell. We simultaneously excited both Xe isotopes and detected free-induction-decay transients. In combination with theoretical calculations of the neutron spin contribution to the nuclear angular momentum, the measurements put a new upper bound on possible monopole-dipole interactions of the neutron for ranges around 1mm. This work is supported by the NGC Internal Research and Development (IRAD) funding, the Department of Energy, and the NSF.

Michael Larsen
Northrop Grumman - Navigation Systems Division

Date submitted: 26 Jan 2012 Electronic form version 1.4