Abstract Submitted
for the DAMOP18 Meeting of
The American Physical Society

Progress Towards Measurement of the Nuclear Anapole Moment of ^{137}Ba Using BaF Molecules SIDNEY CAHN, EMINE ALTUNTAS[1], Yale University, JEFFREY AMMON, Lincoln Laboratory, MIT, JAI-MIN CHOI, Chonbuk National University, DAVID DEMILLE, Yale University — Weak interactions inside the nucleus produce a toroidal current distribution around the axis of nuclear spin. This current distribution, known as the nuclear anapole moment, is the dominant source of nuclear spin-dependent parity violation (NSD-PV) effects for nuclei with mass number A$\geq$20.We discuss ongoing work to measure the anapole moment of the ^{137}Ba nucleus, by measuring parity-violating state mixing in the molecule BaF. Our experiment amplifies the NSD-PV effect by Zeeman-shifting rotational/hyperfine levels of opposite parity to near degeneracy. We recently demonstrated unprecedented sensitivity to NSD-PV effects, using the abundant isotopologue ^{138}Ba^{19}F. Here, the NSD-PV effect (due only to the ^{19}F nucleus) is known to be negligibly small, so that systematic errors could be definitively evaluated. Here, we describe this demonstration measurement, including an extensive study of systematic errors that should be essentially the same in ^{137}BaF. We also discuss planned improvements to our apparatus needed to make an NSD-PV measurement using ^{137}BaF.

[1]Current position: JQI/NIST and University of Maryland, Gaithersburg, MD 20899

Emine Altuntas
Univ of Maryland-College Park

Date submitted: 26 Jan 2018 Electronic form version 1.4