Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Progress Toward Measurement of the Electron's Electric Dipole Moment Using the PbF Molecule[1] NEIL SHAFER-RAY, CHRISTOPHER MCRAVEN, POOPALASINGAM SIVAKUMAR, MILINDA RUPASINGHE, University of Oklahoma — The PbF molecule is particularly suited to a search for the electron's electric dipole moment (e-EDM.) In addition to its sensitivity to an e-EDM, its $^2\Pi_{1/2}$ ground state provides for a small magnetic moment. Furthermore, this small magnetic moment vanishes at a magic value of electric field. This vanishing point has an experimentally observable signature: When a beam of suitably aligned ground state PbF molecules is allowed to traverse a region of electric and magnetic fields, the polarization is conserved when the electric field matches this magic value. By measuring the (molecular-frame)magnitude of this magic electric field for the case that the electric field is parallel or antiparallel to the magnetic field, sensitivity to the e-EDM is achieved. Progress toward this measurement, including the development of a continuous molecular beam source of PbF, characterization of the electronic, rotational, and hyperfine structure of the molecule, the achievement of an ultra-sensitive continuous ionization detection scheme, and the construction of a Ramsey- resonance machine are briefly summarized.

[1]This research is supported by the National Science Foundation (PHY0602490) and Department of Energy (DE-FG02-07ER46361.)

Neil Shafer-Ray
University of Oklahoma

Date submitted: 23 Jan 2009 Electronic form version 1.4