Abstract Submitted
for the DAMOP09 Meeting of
The American Physical Society

Nuclear Spin-Dependent Parity Nonconservation in Diatomic Molecules DAVID RAHMLOW, DAVID DEMILLE, SIDNEY CAHN, DENNIS MURPHREE, JOHN BARRY, MATTHEW STEINECKER, CHRISTOPHER YALE, Yale University, EDWARD DEVENEY, Bridgewater State University, RICHARD PAOLINO, United States Coast Guard Academy, MIKHAIL KOZOLV, Petersburg Nuclear Physics Institute — Nuclear spin-dependent parity nonconservation (NSD-PNC) effects arise from couplings of the Z_0 boson (parameterized by the electroweak coupling constants $C_{2P,N}$) and from the interaction of electrons with the nuclear anapole moment, a parity-odd magnetic moment. The latter scales with the nucleon number A of the nucleus as $A^{2/3}$, while the Z_0 coupling is independent of A; the former will be the dominant source of NSD-PNC in nuclei with $A > 20$. The most precise result on NSD-PNC to date comes from a measurement of the hyperfine dependence of atomic PNC in ^{133}Cs, but this effect can be dramatically enhanced in diatomic molecules. We outline an experimental program to take advantage of this enhancement with over ten suitable molecules with which we can extract the relative contributions of the anapole moment and the electroweak Z_0 couplings. This will increase the available data on nuclear anapole moments, as well as reduce the uncertainties in current measurements of C_{2N} and C_{2P}. We report on improvements in the design of our pulsed molecular beam experiment and the current status of our efforts.

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Date submitted: 19 Jan 2009 Electronic form version 1.4