Abstract Submitted
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Molecular Probe for Electroweak Physics E.F. DEVENEY, Bridgewater St. Coll., R. PAOLINO, U.S. Coast Guard Acad., S.B. CAHN, D. MURPHREE, D.A. RAHMLOW, D. DEMILLE, Yale Univ., M.G. KOZLOV, Petersburg Nuc. Phys. Inst. — Parity nonconservation (PNC) arises in atoms and molecules due to neutral current electroweak (EW) interactions. Our experiment is sensitive to nuclear spin-dependent (NSD)-PNC including electron-vector times nucleon-axial (VeAn) interaction due to Z^0exchange. VeAn terms are suppressed in the Standard Model (SM) making NSD radiative corrections from weak interactions within the nucleus, known as nuclear anapole moments, significant to the overall NSD-PNC signal. We report on our experiment using rotational hyperfine (HF) levels of well understood diatomic molecules to study NSD-PNC. Initially, one state, B, of a pair of opposite parity HF ground states, A and B, of the molecule is depleted. In the interaction region (IR), A and B are Zeeman shifted to near degeneracy in order to amplify perturbative state mixing caused by NSD-PNC interactions. Interference with Stark-induced mixing is revealed using laser-induced fluorescence from B emerging from the IR. This technique is applicable to a wide class of molecules and the variety of nuclei within so that VeAn and anapole contributions to NSD-PNC can be deciphered. This will yield new anapole results and constrain VeAn coupling constants to up and down quarks which are at present poorly characterized SM parameters.

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