

Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

High precision measurement of T-symmetry violation in an atomic nucleus: Initial progress. KONRAD WENZ, Columbia University, ERIC B. NORRGARD, DAVID DEMILLE, Yale University, DAVID KAWALL, University of Massachusetts Amherst, TANYA ZELEVINSKY, Columbia University, CENTREX COLLABORATION — We discuss the plans and initial progress of an experimental search for an electric dipole moment (EDM) of a thallium nucleus by exploiting its Schiff moment. Our experiment relies on optical and microwave quantum-state manipulation and interrogation of a cold molecular beam. The sensitivity to the QCD θ parameter in the first generation is projected to be 30-fold improved compared to previous measurements. The apparatus being designed by our CENTREX collaboration relies on a cryogenic source that provides an intense, cold beam of thallium fluoride. The EDM measurement will utilize the molecular ground state, enabling us to take advantage of a long interaction region, where an applied electric field will strongly polarize the molecules and cause precession of the EDM. Recent progress includes construction and testing of ultraviolet light sources for optical manipulations of TlF, as well as designing the detection region with applied microwaves, detection light, and a high collection efficiency of cycling optical photons. We also simulate a molecule “lens” that focuses the molecular beam in the detection region using a quadrupole electric field and the $J=3$ rotational state of the molecules.

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Date submitted: 25 Jan 2017

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