DAMOP13-2013-000613

Abstract for an Invited Paper
for the DAMOP13 Meeting of
the American Physical Society

The ACME electron electric dipole moment search[1]

DAVID DEMILLE, Yale University

Observation of a non-zero electric dipole moment (EDM) of the electron, d_e, within a few orders of magnitude of the current limit $|d_e| < 1.05 \times 10^{-27}$ e·cm would be an indication of CP violation in physics beyond the Standard Model. Numerous extensions to the Standard Model predict a value of d_e in this range. The ACME Collaboration is searching for an electron EDM, by performing a precision measurement of spin precession signals from electrons in thorium monoxide (ThO) molecules. In this molecule, the EDM experiences a large electric field (~ 100 GV/cm) that amplifies the spin precession. In addition, several properties of the molecular state make it possible to suppress many anticipated sources of systematic error. Our experiment uses a slow and bright cryogenic molecular beam to achieve unprecedented statistical accuracy. We now routinely take data with a 1σ statistical uncertainty of $\delta d_e \approx 1.0 - 1.5 \times 10^{-28}/\sqrt{T}$ e·cm, where T is the running time in days. We will present the current status of the experiment.

[1]Supported by NSF