Abstract Submitted
for the DAMOP16 Meeting of
The American Physical Society

Increasing measurement sensitivity for the electron's electric dipole moment using trapped molecular ions YAN ZHOU, DANIEL GRESH, WILLIAM CAIRNCROSS, MATT GRAU, KIA BOON NG, YIQI NI, ERIC CORNELL, JUN YE, JILA, NIST and University of Colorado, and Department of Physics, University of Colorado, Boulder CO 80309-0440, USA — Based on our latest measurements of the electron's electric dipole moment (eEDM) using trapped HfF^+ ions, after 100 hours of data collection, the statistical error still dominates in our overall uncertainty budget [1]. Overcoming the bottleneck of limited statistical sensitivity can increase the precision of the eEDM measurement directly. Here, we present the progress of three ongoing experiments: (1) applying STImulated Raman Adiabatic Passage (STIRAP) with rotating linear polarization for increased coherent population transfer from the ground $X^1\Sigma^+$ state to the eEDM-sensitive $^3\Delta_1$ state; (2) implementing a new ion-counting detector toward shot-noise limited sensitivity with significant suppression technical noise; (3) exploring the possibility of using the ground $^3\Delta_1$ state of ThF^+ ions to realize a larger effective electric field and a longer coherence time. These experiments provide a route towards an order of magnitude increase in statistical sensitivity in the second generation of measurements.

[1]Daniel N Gresh's presentation

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Date submitted: 21 Mar 2016 Electronic form version 1.4