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Progress Towards a New Measurement of the Permanent Electric Dipole Moment (EDM) of ^{199}Hg T.H. LOFTUS, M.D. SWALLOWS, B.R. HECKEL, E.N. FORTSON, University of Washington, W.C. GRIFFITH, NIST, M.V. ROMALIS, Princeton University — Observation of a nonzero EDM would imply CP violation beyond the Standard Model. The most precise EDM limit, established by our group several years ago for ^{199}Hg, is $|d_{Hg}| < 2.1\times10^{-28}$ e cm. To further refine these measurements, we recently switched from two to four spin- polarized Hg vapor cells: two lie in parallel magnetic and anti- parallel electric fields, resulting in EDM-sensitive spin precession; the remaining cells, at zero electric field, serve to cancel magnetic gradient noise and limit systematics due to charging and leakage currents. To date, the statistical uncertainty for the new EDM data is $\pm$ 1.7×10^{-29} e cm, a 3$\times$ improvement over our previous measurement. Constraining systematics at similar levels requires mitigating Stark interference, an EDM-mimicking vector light shift that is linear in the electric field. To this end, we have explored averaging data at two probe wavelengths where the Stark interference light shift is equal but opposite. Alternatively, this effect can be eliminated by determining the Larmor frequency "in the dark" between two probe pulses that establish the Larmor phase at the beginning and end of the dark period. We are currently implementing this latter scheme. We will discuss progress on an improved measurement of the ^{199}Hg EDM.

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