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Recent Results from a Search for the Permanent Electric Dipole Moment of Mercury Atoms

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Observation of a nonzero EDM would imply CP violation beyond the Standard Model. Additional sources of CP violation are expected to help explain the matter-antimatter asymmetry observed in our universe and naturally arise in extensions to the standard model such as supersymmetry.

Our group has recently reported a new upper limit: $|d_{\text{Hg}}| < 3.1 \times 10^{-29}$ e-cm for the EDM of ^{199}Hg . The experiment compared the spin precession frequencies in four spin-polarized Hg vapor cells: two cells lie in parallel magnetic and anti-parallel electric fields, resulting in EDM-sensitive spin precession while the remaining two cells, at zero electric field, serve to cancel noise generated by magnetic field gradients and test for systematic errors. A frequency shift, linear in the applied electric field, due to the Stark mixing of atomic states has been identified and measured. A description of the EDM experiment and measurements that led to our recent result will be presented.

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