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Searching for the electron electric dipole moment in an electrostatic storage ring DAVID KAWALL, University of Massachusetts — A non-zero permanent electric dipole moment (EDM) of an electron would violate parity and time-reversal symmetries. Non-zero EDMs are predicted in the standard model, but are unobservably small. New physics incorporating new particles and new CP-violating phases can lead, through radiative corrections, to dramatic enhancements of the electron EDM, to within a few orders of magnitude of the current experimental limit. A new approach to electron EDM searches using molecular ions stored in a table-top electrostatic storage ring is described. Molecular ions with long-lived paramagnetic states such as WN^+ can be injected and stored in larger numbers and with longer coherence times than competing experiments, leading to high sensitivity to an electron EDM. Systematic effects mimicking an EDM such as those due to motional magnetic fields and geometric phases are found not to limit the approach in the short term. Sensitivities of $\delta|d_e| \approx 10^{-30}$ e·cm/day, an improvement by three orders of magnitude, appear possible under conservative conditions.

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