

Electric Dipole Moments From Dark Sectors

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We examine the sensitivity of electric dipole moments (EDMs) as precision observables for new CP -violating physics in a dark sector. Assuming that the dominant mediation channel is via one or more of the vector, Higgs or neutrino portals, we examine the leading EDM contributions. The dominant contributions arise at two-loop order, and EDMs can provide sensitivity to portal couplings that is complementary to direct probes at the intensity frontier or high energy colliders. In particular, we identify a significant two-loop contribution to the electron EDM, mediated through the singlet (Higgs plus neutrino) portal, for which EDMs already provide new and complementary sensitivity in the regime of large singlet neutrino masses.

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