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Estimation of CP violating EDMs from known mechanisms in the SM

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New sources of CP violation, beyond the known sources in the standard model (SM), are required to explain the baryon asymmetry of the universe. Measurement of a non-zero permanent electric dipole moment (EDM) of fundamental particles, such as in an electron or a neutron, or nuclei or atoms can help us gain a handle on the sources of CP violation, both in SM and beyond. Multiple mechanisms within the SM can generate CP violating EDMs, viz. through the CKM matrix in the weak sector or through the QCD θ_s parameter in the strong sector. We will estimate the maximum possible EDMs of leptons, certain baryons, select atoms and molecules in the $(\text{CKM} \bigoplus \theta_s)$ framework, assuming that the EDM wholly originates from either of the two SM mechanisms, independently. These estimates have been presented in light of the current experimental upper limits on the EDMs. Particularly to drive home the point that EDMs in different systems constraint CP-violating interactions differently, such that the same constraint on EDM in two different systems may not actually be equally constraining on CP violating parameters. We will also show the systems in which the experimental constraints are closest to the SM EDM, and the systems in which an EDM measurement would effectively be SM background free.

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