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Calculations of nucleon EDMs on a lattice

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Electric dipole moments of the nucleons would be evidence of CP violation due to the QCD theta term or effective quark-gluon interactions induced by symmetry-breaking physics beyond the Standard Model. Upcoming experiments will improve precision of neutron EDM measurements by 1-2 orders of magnitude within the next decade. Corresponding improved constraints on (and eventual observation of) nucleon EDMs will have to be traced back to the quark-gluon level to be used as constraints on new particles and interactions. While low-energy theories and nucleon models provide ballpark estimates of nEDMs that can be produced by different kinds of CP violation in quark-gluon interactions, nonperturbative QCD calculations on a lattice are necessary to find precise and model-independent relations between them. Lattice QCD has reached a respectable level of statistical and systematic precision for hadron spectrum and simple nucleon structure observables with physical quark masses, and on the verge of producing reliable results for nucleon EDMs induced by quark-gluon operators starting from the lowest-order operators. In this talk, I will overview the current status of such calculations as well as show some recent results.