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Electric Dipole Moment Results from Lattice QCD

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We utilize the gradient flow to define and calculate electric dipole moments (EDMs) induced by the strong QCD θ-term.
Since the EDM is highly sensitive to the CP-violating operator induced in the action, the Euclidean time dependence of the topological charge is utilized to improve the signal to noise.

The results of the nucleon EDMs are calculated on PACS-CS gauge fields (available from the ILDG) using $N_f = 2 + 1$.
These gauge fields use a renormalization-group improved gauge action and a non-perturbatively $O(a)$ improved clover quark action.

The main calculation was performed on a $32^3 \times 64$ lattice with lattice spacing $a \simeq 0.09$ fm ($\beta = 1.90$), with pion masses of $m_\pi \simeq 411, 570, 701$ MeV to perform a chiral extrapolation (with $c_{SW} = 1.715$).
A second set of calculations were performed with $a \simeq 0.1215, 0.0980, 0.0685$ fm at $L \approx 1.9$ fm for continuum limit studies.

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