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The electric dipole moment of the neutron from N_f=2+1+1 twisted mass fermions

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We extract the neutron electric dipole moment (nEDM) |d_n| on configurations produced with N_f=2+1+1 twisted mass
fermions with lattice spacing of a=0.082fm and a light quark mass that corresponds to M_{\pi}=370 MeV. We do so by
evaluating the CP-odd form factor F_3 for small values of the vacuum angle \theta at the limit of zero momentum
transfer. This limit is taken using a parametrization of the momentum dependence and performing a fit as well as
using the position space methods we refer to as “continuum derivative” and “direct computation”. The extraction of the
CP-odd form factor F_3 requires the evaluation of the field theoretical topological charge. We measure the
topological charge via cooling and gradient flow using the ordinary Wilson, Symanzik tree-level improved and Iwasaki
actions for smoothing. We obtain consistent results for all choices of smoothing actions, smoothing procedures and
momentum dependence treating techniques. We report an nEDM of |d_n|/ \theta = -0.036(11)(7) e fm.

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