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Disconnected contribution to the nucleon charges from N_f = 2+1+1 lattice QCD

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We calculate the disconnected contribution to the nucleon isoscalar charges of the scalar, axial and tensor channels of light quarks. The calculation has been done by using the Clover valence quarks on the MILC N_f=2+1+1 HISQ lattice at a lattice spacing of 0.12 fm and light quark mass corresponding to the pion mass of 310 MeV. Two-point correlators are evaluated from 60 sources distributed in four timeslices. Disconnected quark loops are estimated by using the truncated solver method with 5000 Gaussian random noise sources. Multigrid inverter is used both for the two-point correlators and the disconnected quark loops. Contamination from the excited states is removed by simultaneously fitting the results of various source-sink separations and operator insertions to the formula including the first excited state. These are applicable to the calculation of other physical observables such as the neutron electric dipole moment and the transverse momentum distribution functions.

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