

Nucleon form factors and moments of nucleon generalized parton distributions in twisted mass lattice QCD

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We present results on the nucleon electromagnetic/axial form factors, as well as the lower moments of the nucleon generalized parton distributions, within lattice QCD using two dynamical flavors of degenerate twisted mass fermions. Our simulations are performed on lattices with three different values of the lattice spacings, namely $a=0.089$ fm, $a=0.070$ fm and $a=0.056$ fm, allowing the investigation of cut-off effects. The volume dependence is examined using simulations on two lattices of spatial length $L=2.1$ fm and $L=2.8$ fm. The simulations span pion masses in the range of 260-470 MeV. Our results are renormalized non-perturbatively and the values are given in the MS-scheme at a scale $\mu=2$ GeV. The nucleon axial charge, magnetic moment, Dirac and Pauli radii are obtained in the continuum limit and chirally extrapolated to the physical pion mass allowing for a comparison with experiment. The consequences of our results on the spin carried by the quarks in the nucleon are also investigated.

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