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High statistic analysis of nucleon form factors and charges in lattice QCD

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I present our recent analysis of isovector nucleon electromagnetic form factors, as well as the axial, scalar and tensor charges with high statistics in lattice QCD. By applying the all-mode-averaging technique to two flavors of Wilson-Clover fermions, we obtain precise lattice results of form factors at various lattice spacings and pion masses in the range 200–500 MeV for $m_{\pi}L > 4$. An extensive numerical study of excited state contamination suggests that large effects persist for source-sink separations of less than 1.3 fm when the standard plateau method is used. In order to reduce it to less than a few percent uncertainty, separations of more than 1.5 fm are required. I present the results from several analyses including the first excited state and perform a consistency check with the region where the ground state dominates. I also discuss the chiral behaviour and systematic uncertainties arising from finite size effects and lattice artifacts.

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