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A new method for suppressing excited-state contaminations on the nucleon form factors

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One of the most challenging tasks in lattice calculations of hadronic form factors is the analysis and control of excited-state contaminations. Taking the isovector form factors of the nucleon as an example, a simple calculation in chiral effective field theory shows that the excited-state contributions become dominant when the axial current is spatially distant from the nucleon source location. In this case, the distance of the propagating pions, which have been created at the source (or sink), is comparable to the distance of the equal time pion propagation, which corresponds to the ground state contribution of the form factor including the pion pole. We investigate a method on a $N_f = 2 + 1$ flavor CLS ensemble ($\beta = 3.55$, $a = 0.064\,\text{fm}$) with a pion mass of $m_\pi = 200\,\text{MeV}$ using Wilson fermions to address this issue.

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