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Nucleon isovector electromagnetic form factors from $N_f = 2 + 1$ CLS ensembles

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We present progress towards a high-precision lattice QCD study of the nucleon's isovector vector form factors, which encode key aspects of the nucleon's spatial structure and its response to electromagnetic probes. We utilize the Coordinated Lattice Simulations (CLS) ensembles generated with $N_f = 2 + 1$ non-perturbatively $O(a)$ improved Wilson fermions and a tree-level Symanzik-improved gauge action. The over 50 ensembles available provide a wide coverage of the quark mass plane and comprise six lattice spacings, enabling control of both the quark mass and continuum extrapolations. We present a preliminary analysis on a subset of these ensembles. A major challenge in extracting the form factors is the treatment of excited-state contamination, which is addressed by executing multi-state fits stabilized with data-driven priors. The results for the form factors, over all ensembles, are simultaneously fitted, where we utilize the z -expansion to parameterize the dependence on the momentum transfer.

Parallel Session (for talks only)

Structure of hadrons and nuclei

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