

Precision determination of nucleon iso-vector scalar and tensor charges at the physical point

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We report a high precision calculation of the isospin vector charge $g_{S,T}$ of the nucleon using recently proposed “blending” method which provides a high-precision stochastic estimate of the all-to-all fermion propagator. A spin-1/2, isospin-1/2 projected current-involved basis element is utilized to reduce a particular nucleon-meson type excited state contamination whose coupling to the current operator is enhanced by the lattice spatial volume. Using 16 $N_f = 2 + 1$ lattice ensembles which cover 5 lattice spacing, 5 combinations with the same quark masses and lattice spacing but multiple volumes, including three at the physical pion mass, we report so far most precise lattice QCD prediction with the systematic uncertainties from continuum, infinite volume, chiral extrapolations, excited state contamination and also renormalization.

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