Abstract Submitted
for the APR21 Meeting of
The American Physical Society

QCD Analysis of $\Delta S = 0$ Hadronic Parity Violation[1] GIRISH MURALIDHARA, SUSAN GARDNER, University of Kentucky — For many years the primary goal of hadronic parity nonconservation studies in nucleons and nuclei has been the identification of the isovector weak force, which has been expected to be dominated by long-range pion exchange. Recent theoretical and experimental developments prompt a broader view, suggesting that isoscalar and isotensor weak forces also play important phenomenological roles. Thus we revisit the QCD analysis of the effective weak Hamiltonian at hadronic energy scales for strangeness-nonchanging ($\Delta S = 0$) hadronic processes. Performing a leading-order renormalization group analysis in QCD from the weak to hadronic energy scales, we derive the pertinent effective Hamiltonian for hadronic parity violation, including the effects of both neutral and charged weak currents at the electroweak scale. We show that the additional four-quark operators that enter at low energy scales from QCD operator mixing effects form a closed set and that they result in a 12×12 anomalous dimension matrix. Employing the factorization *Ansatz* and using recent assessments of the quark axial charges of the nucleon in lattice QCD, we make concrete estimates of the weak meson-nucleon couplings for comparison with existing work.

[1]U.S. Department of Energy under contract DE-FG02-96ER40989

Girish Muralidhara
University of Kentucky

Date submitted: 08 Jan 2021 Electronic form version 1.4