Abstract Submitted
for the DNP20 Meeting of
The American Physical Society

**Towards Matching the Double-$\beta$ Decay Amplitude in Effective Field Theory to Lattice QCD**[1] SAURABH KADAM, ZOHREH DAVOUDI, University of Maryland, College Park — The ongoing search for neutrinoless double $\beta$ process ($0\nu\beta\beta$) is crucial for determining the Majorana nature of neutrinos. To relate the rate of these processes with the underlying standard model and beyond standard model interactions, the corresponding nuclear matrix elements must be constrained reliably from theory. As an effort in that direction, we present here a way to constrain the two-neutrino $\beta$ decay amplitude, a process closely related to $0\nu\beta\beta$, using lattice quantum chromodynamics (LQCD). The Minkowski infinite volume amplitude of two-hadrons with two-weak current insertions is constructed in the pionless effective field theory at the next-to-leading order. A formalism is then provided to constrain this two-hadron amplitude using a LQCD four-point correlation function in Euclidean and finite-volume spacetime, similar to the work done earlier for single hadron amplitudes. This formalism can be extended to allow the determination of the important $0\nu\beta\beta$ decay amplitude with LQCD input in upcoming years.

[1]Supported by Alfred P. Sloan Fellowship and Department of Energy's Office of Science Early Career Award under award no. DE-SC0020271.

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Date submitted: 25 Jun 2020 Electronic form version 1.4