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Nuclear Matrix Elements from Lattice QCD[1]

JOSEPH WASEM, Lawrence Livermore National Laboratory

Lattice QCD (LQCD) is the only known method for performing fully non-perturbative calculations of nuclear observables directly from the underlying theory of QCD. With the recent emergence of LQCD from a decades-long R&D period, LQCD is now beginning to make precise statements about nuclear processes which, up to now, have been poorly constrained empirically. Such LQCD calculations offer the nuclear physics community information on precision electroweak quantities (such as the QCD correction to the muon g-2), well-known nuclear quantities (such as the nucleon axial charge), as well as first glimpses of poorly understood quantities (such as the parity violating nucleon-pion coupling). I will briefly review the Lattice QCD efforts for calculations of these (and other) nuclear matrix elements, discussing both the promise and the problems that must be overcome. The lattice calculation of the parity violating nucleon-pion coupling will then be examined in more detail, with a discussion of possible future directions.

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