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Axial Vector Form Factors of the Nucleon using lattice QCD

Friday, 28 February 2020 10:00 (20 minutes)

The success of experiments such as DUNE require the determination of neutrino flux and cross-section with nuclear targets with unprecedented accuracy. A crucial input in the calculations of these is the axial form factor. Starting from the standard model that defines the interaction of the axial current with quarks, one needs to include both QCD corrections that bind quarks into nucleons and nuclear effects that arise in heavy nuclear targets such as argon. Experimental access to the first, QCD corrections for nucleons, is prevented by safety concerns posed by liquid hydrogen targets. Axial and electromagnetic form factors of the nucleon can be calculated from first principles using lattice QCD. This talk will show that we now have control over all sources of systematic errors that arise in lattice QCD calculations and the axial form factors satisfy the PCAC relation, an essential and non-trivial check [see arXiv:1905.06470]. Finally, I will present state-of-the-art results at the physical pion mass and in the continuum limit and compare them with phenomenology. Prospects for reaching 1–2% accuracy will be discussed.

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