

“ Scale setting: precision lattice QCD for particle and nuclear physics ”

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Abstract: Lattice QCD calculations have reached per-mille-level precision for certain experimentally measurable quantities. Often, the limiting systematic uncertainty of such computations comes from determination of the lattice scale, converting the lattice results to physical units. A number of lattice collaborations carried out determinations of theoretical scales (e.g., a popular choice is the gradient flow scale) that are in slight tension. Lattice scale determination with fully accounted systematic uncertainties is not a purely theoretical question as it influences, for instance, the computation of the hadronic contribution to the anomalous magnetic moment of the muon and the determination of the CKM matrix elements. Thus, the precision of the lattice scale plays a direct role in confirming the Standard Model or differentiating new physics beyond the Standard Model.

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