Contribution ID: **327**

Type: **Talk**

A novel computational paradigm for a precise determination of the hadronic contribution to (g-2)_mu from lattice QCD

Friday, 31 July 2020 12:44 (15 minutes)

Current lattice determinations of the hadronic contribution to the muon anomalous magnetic moment a_mu have uncertainties of a few percent. This translates into an overall error on the Standard Model prediction of a_mu which is one order of magnitude larger than the expected final uncertainty from the ongoing E989 experiment. The bottleneck is the large statistical error in the Monte Carlo evaluation of the required correlation functions which can hardly be tamed by brute force. Here we propose to solve the problem by using multi-level Monte Carlo integration. This way the decrease of the statistical error of correlation functions with the cost of the simulation is accelerated with respect to the standard inverse square-root dependence. We test our proposal in two-flavour QCD by simulating a lattice with linear extension of 3.0 fm, lattice spacing of 0.065 fm and a pion mass of approximately 270 MeV. By using a two-level integration scheme we show that the statistical error scales de-facto with the inverse of the cost of the simulation rather than with its squared root, allowing us to reach a precision of a few per mille for the Hadron Vacuum Polarization with a moderate computational cost. This result opens the way for a sub-percent precision determination of a_mu from first principle lattice calculations.

I read the instructions

Secondary track (number)

06

Primary author: GIUSTI, Leonardo (Universita & INFN, Milano-Bicocca (IT))

Co-authors: DALLA BRIDA, Mattia; HARRIS, Tim; PEPE, Michele

Presenter: GIUSTI, Leonardo (Universita & INFN, Milano-Bicocca (IT))

Session Classification: Quark and Lepton Flavour Physics

Track Classification: 05. Quark and Lepton Flavour Physics