## The 34th International Symposium on Lattice Field Theory (Lattice 2016)



Contribution ID: 111

Type: Talk

## Non-equilibration of topological charge and its effects

Tuesday, 26 July 2016 15:40 (20 minutes)

[MILC collaboration]

In QCD simulations at small lattice spacings the topological charge Qevolves very slowly, and if this quantity is not properly equilibrated it could lead to incorrect results for physical quantities, or incorrect estimates of their errors. We use the known relation between the dependence of masses and decay constants on the QCD vacuum angle  $\theta$  and the squared topological charge  $Q^2$  together with chiral perturbation theory results for the dependence of masses and decay constants on  $\theta$  to estimate the size of these effects and suggest strategies for dealing with them. For the partially quenched case, we sketch an alternative derivation of the known  $\chi$ PT results of Aoki and Fukaya, using the nonperturbative correct chiral theory worked out by Golterman, Sharpe and Singleton. With the MILC collaboration's ensembles of lattices with four flavors of HISQ dynamical quarks, we measure the  $Q^2$  dependence of masses and decay constants and compare to the  $\chi$ PT forms. The observed agreement gives us some confidence that we can reliably estimate the errors from slow topology change, and even correct for its leading effects.

Primary authors: BERNARD, Claude (Washington University); TOUSSAINT, Doug (University of Arizona)

Presenter: TOUSSAINT, Doug (University of Arizona)

Session Classification: Standard Model Parameters and Renormalization

Track Classification: Standard Model Parameters and Renormalization