

Nucleon electromagnetic form factors at high momentum transfer from Wilson-clover fermions

Thursday, July 26, 2018 10:10 AM (20 minutes)

The electromagnetic (EM) form factors of the nucleon are fundamental quantities probing its structure. They have been precisely determined from electron scattering experiments as well as extensively studied in lattice QCD calculations. Experiments seeking to explore the behavior of the EM form factors at high momentum transfer, such as the physics program of the CEBAF at JLab which will allow measurements up to $Q^2 \sim 18 \text{ GeV}^2$, further increase the motivation for a precise lattice evaluation to this high momentum transfer.

In this talk, we present high statistics results on the nucleon EM form factors at Q^2 up to 12 GeV^2 . We analyze two gauge ensembles of Wilson-clover fermions with the same lattice spacing value of about $a = 0.094 \text{ fm}$, pion masses $m_\pi = 270 \text{ MeV}$ and $m_\pi = 180 \text{ MeV}$, and lattice volumes $L = 3 \text{ fm}$ and $L = 4.5 \text{ fm}$, respectively. In our calculations we employ the momentum smearing method in order to increase the signal at high momentum transfer. Various choices of the boost momentum as well as the momentum carried by the quarks at the source and sink are tested. We consider several values of the source-sink time separation and apply a set of techniques in order to examine excited state effects. In this first study, we consider the contributions arising from only connected diagrams and compare our results with phenomenology.

Primary author: Dr KALLIDONIS, Christos (Stony Brook University)

Co-authors: POCHINSKY, Andrew (MIT); Dr GREEN, Jeremy (DESY, Zeuthen); Prof. NEGELE, John Negele (MIT); ENGELHARDT, Michael (NMSU); Prof. SYRITSYN, Sergey (Stony Brook University (SUNY)); MEINEL, Stefan (University of Arizona)

Presenter: Dr KALLIDONIS, Christos (Stony Brook University)

Session Classification: Hadron Structure

Track Classification: Hadron Structure