Contribution ID: 186

Type: Parallel

The Nucleon Axial Coupling from Quantum Chromodynamics

Thursday, 31 May 2018 16:10 (30 minutes)

The axial coupling of the nucleon, g_A , is the strength of its coupling to the weak axial current of the Standard Model, much as the electric charge is the strength of the coupling to the electromagnetic current. This axial coupling dictates, for example, the rate of β -decay of neutrons to protons and the strength of the attractive long-range force between nucleons. Precision tests of the Standard Model in nuclear environments require a quantitative understanding of nuclear physics rooted in Quantum Chromodynamics, a pillar of this theory. The prominence of g_A makes it a benchmark quantity to determine theoretically, a difficult task as the theory is non-perturbative. Lattice QCD provides a rigorous, non-perturbative definition of the theory which can be numerically implemented. In order to determine g_A , the lattice QCD community has identified two challenges which must be overcome to achieve a 2% precision by 2020: the excited state contamination must be controlled and the statistical precision must be markedly improved. Here we report a calculation of $g_A^{\text{QCD}} = 1.271 \pm 0.013$ using an unconventional method that overcomes these challenges.

E-mail

chiachang@lbl.gov

Collaboration name

CalLat

Funding source

DOE

Primary author: Dr CHANG, Chia Cheng (LBL)

Presenter: Dr CHANG, Chia Cheng (LBL)

Session Classification: Nuclear Forces and Structure, NN Correlations, and Medium Effects

Track Classification: NFS