Asia-Pacific Symposium for Lattice Field Theory (APLAT 2020)

Contribution ID: 76

Type: not specified

First-principles calculation of electroweak box diagrams from lattice QCD

Wednesday, 5 August 2020 14:00 (20 minutes)

We present the first realistic lattice QCD calculation of the γ W-box diagrams relevant for beta decays. The nonperturbative low-momentum integral of the γ W loop is calculated using a lattice QCD simulation, complemented by the perturbative QCD result at high momenta. Using the pion semileptonic decay as an example, we demonstrate the feasibility of the method. By using domain wall fermions at the physical pion mass with multiple lattice spacings and volumes, we obtain the axial γ W-box correction to the semileptonic pion decay, $\Box\gamma$ WVA| π =2.830(11)stat(26)sys×10–3, with the total uncertainty controlled at the level of ~1%. This study sheds light on the first-principles computation of the γ W-box correction to the neutron decay, which plays a decisive role in the determination of |Vud|.

Primary author: MA (*), Pengxiang (Peking University)
Co-authors: FENG, Xu; GORCHTEIN, Mikhail; JIN, Lu-Chang; SENG, Chien-Yeah
Presenter: MA (*), Pengxiang (Peking University)
Session Classification: Weak Decays and Matrix Elements

Track Classification: Weak Decays and Matrix Elements