

Numerical study of QED finite-volume effects using lattice scalar QED

Wednesday, July 25, 2018 4:30 PM (20 minutes)

Finite-volume (FV) effects are expected to be large in the presence of QED, due to the long range of the electromagnetic interaction. With large efforts under way to include QED effects in lattice calculations, it is important to understand and correct for the associated FV effects. We calculate universal QED FV effects numerically, using an efficient method for lattice simulation of scalar QED. We find good agreement with analytical calculations of power-like FV corrections to the self-energy of scalar particles in moving frames, and to the hadronic vacuum polarisation (HVP), in the widely-used QED_L scheme. We also demonstrate the method of infrared improvement, in which FV effects are suppressed by altering a subset of the photon modes.

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Session Classification: Hadron Spectroscopy and Interactions

Track Classification: Hadron Spectroscopy and Interactions