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Use of Inverse Methods for Reconstructing the Hadronic Tensor from Euclidean Correlators

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While Wick rotation to Euclidean spacetime is necessary for lattice QCD calculations, the subsequent rotation back to Minkowski spacetime from discrete correlator data is an ill-posed problem. In this proof-of-concept calculation, we compute correlation functions necessary for computing the hadronic tensor of the pion using existing ensembles generated by the MILC collaboration and $N_f = 2 + 1 + 1$ dynamical HISQ-like fermions at the physical point. Using a modification of the Backus-Gilbert method developed by Hansen, Lupo, and Tantalo (HLT), we apply the HLT method to the Euclidean lattice correlators to extract smeared finite-volume spectral functions. Our future goal is to apply these techniques to more complicated systems such as the nucleon.

Topical area

Hadronic and Nuclear Spectrum and Interactions

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