

# Spectral reconstruction in lattice QCD for inclusive rates and exclusive scattering amplitudes

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The spectral reconstruction of Euclidean correlation functions is an alternative to standard lattice QCD analyses. Using this approach, inclusive hadronic decays are determined directly from first principles, including the  $R$ -ratio and hadronic decays of the tau-lepton. The computed decay rates are smeared with a known kernel, the achievable resolution of which is related to the spatial volume of the simulations. In this regard, the novel ‘masterfield’ simulation paradigm enables larger volumes and correspondingly increased resolution. Finally, a novel variant of the spectral reconstruction approach is presented which improves upon traditional lattice QCD spectroscopy. This is exemplified by the finite-volume energies of two nucleons used to infer exclusive scattering amplitudes.

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