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The quenched glueball spectrum from smeared spectral densities

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Standard lattice calculations of the glueball spectrum rely on effective mass plots and asymptotic exponential fits of two-point correlators, and involve various numerical challenges.
In this work, we propose an alternative procedure to extract glueball masses, based on the computation of the smeared spectral densities that encode information about the towers of states with given quantum numbers. While the exact calculation of spectral densities from lattice correlators is an ill-posed inverse problem, we use a recently developed numerical method, based on the Backus-Gilbert regularisation, that allows one to evaluate a smeared version of the spectral densities, without any a priori assumptions, and with controlled uncertainties.
After introducing the formalism to reconstruct the smeared spectral densities and highlighting its main strengths, we will present the novel results that we obtained for the masses of the lightest states in the glueball spectrum of the $SU(3)$ lattice gauge theory at finite values of the lattice spacing and volume. Finally, we will discuss the future steps towards a systematic investigation of the glueball spectrum using spectral-reconstruction methods.

Topical area

Hadronic and Nuclear Spectrum and Interactions

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