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Mass estimates of the SU(2) scalar glueball from spectral methods

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The estimation of the Källén-Lehmann spectral density from gauge invariant lattice QCD two point correlation functions is proposed, and explored via an inversion strategy based on Tikhonov regularisation. As proof of concept the SU(2) glueball spectrum for the quantum numbers $J^{PC} = 0^{++}$ is investigated, for various values of the lattice spacing, using the published data of arXiv:1910.07756. Our estimates for the ground state mass are in good agreement with the traditional approach, which is based on the large time exponential behaviour of the correlation functions. Furthermore, the spectral density also contains hints of excited states in the spectrum and is able to estimate their mass values. Spectroscopic analysis of glueball two-point functions therefore provides a straightforward and insightful alternative to the traditional method based on the large time exponential behaviour of the correlation functions.

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