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The spectral reconstruction of inclusive rates

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A recently re-discovered variant of the Backus-Gilbert algorithm for spectral reconstruction enables the controlled determination of smeared spectral densities from lattice field theory correlation functions. The particular advantage of this model-independent approach is the *a priori* specification of the kernel with which the underlying spectral density is smeared, allowing for variation of its peak position, smearing width, and functional form. If the unsmeared spectral density is sufficiently smooth in the neighborhood of a particular energy, it can be obtained from an extrapolation to zero smearing kernel width at fixed peak position.

The determination of scattering amplitudes is a natural application. As a proof-of-principle test, an inclusive rate is computed in the two-dimensional O(3) sigma model from a two-point correlation function of conserved currents. The results at finite and zero smearing radius are in good agreement with the known analytic form up to energies at which 40-particle states contribute, and are sensitive to the 4-particle contribution to the inclusive rate. The straight-forward adaptation to compute the R-ratio in lattice QCD from two-point functions of the electromagnetic current is briefly discussed.

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