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Stochastic approaches to extract spectral functions from Euclidean correlators

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The spectral functions provide us the knowledge to understand the in-medium hadron and transport properties of the QCD medium. For instance, quantities like thermal dilepton production and photon emission rates of QGP can be obtained from the vector spectral functions. Though spectral functions are important, they can not be obtained directly from Euclidean lattice QCD calculations. Analytic continuations to real time are needed to extract spectral functions from Euclidean correlation functions. Currently the most commonly used method is the Maximum Entropy Method (MEM). To investigate the systematic uncertainties in spectral function reconstructions we study two stochastic approaches, i.e. Stochastic Optimization Method (SOM) and Stochastic Analytical Inference (SAI). SOM has advantage that it does not need any prior information. SAI is more generalized method, which reduces to the MEM in the mean-field limit. We compare results obtained from these two methods with those from MEM by investigating various model correlation functions.

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