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Spectral functions from machine learning

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The spectral function is the key for understanding the in-medium hadron properties as well as the transport properties of the medium.
Such as the dissociation temperatures of quarkonia, diffusion coefficients, dilepton emission rates as well as viscosities can be read-off
from various corresponding spectral functions. As well-known that the spectral function is hidden in the lattice-computable correlation
functions and has to be extracted from correlators, many methods, e.g. Maximum Entropy Methods and its variants, and stochastic methods
have been discussed and applied to solve this ill-posed inversion problem.

Here we will present a machine learning approach to extract spectral functions from temporal correlation functions.
This approach, unlike others, can build in the true answer in the algorithm. We will start discussing the applicability and advantages of this approach
by showing some mock data tests mimicking the physical situation at serval temperatures below and above the transition temperature,
in particular the applicability to extract transport peaks is stressed. We will then proceed to apply the method to real lattice data of temporal correlators.
These correlators have been obtained on very fine isotropic lattices in quenched QCD using clover-improved Wilson fermions. The inverse lattice spacing is around 23 GeV and the spatial extent is 192 with aspect ratios ranging from 2 to 4 corresponding to the temperature region from 0.75 Tc to 1.5Tc.

Primary authors: Dr TOMIYA, Akio (CCNU); Mr LIU, De-Ji (Central China Normal University); Prof. DING, Heng-Tong (Central China Normal University); Mr CHEN, Shi-Yang (Central China Normal University)

Presenter: Prof. DING, Heng-Tong (Central China Normal University)

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