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Spectral functions of the O(N) model from the functional renormalization group approach

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Due to the substantial progress in the development of functional approaches for the computation real-time correlation functions, new prospects have arisen to investigate diverse collective physical phenomena in the systems in a strong coupling regime. At the same time, the main problem with computations directly in Minkowski space is a complex analytical structure of correlation functions.
We will discuss the computation of spectral functions of bound states using the real-time formulation of a functional renormalization group (FRG) approach on the example of the O(4)-symmetric model. The computation is based on the Kallen-Lehmann spectral representation of dressed propagators used in the Wetterich equation – the flow equation of the effective action. As a first approximation, we solely consider momentum-independent vertices, the so called propagator approximation. Such an approach gives analytic access to the emergent singularities and brunch cuts, which opens the way for the numerical solution of a system of the FRG equations for the spectral functions corresponding to dressed retarded propagators.

Primary authors: LEBEDEV, Nikita (N.N. Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research); KALAGOV, Georgii (BLTP JINR); PAWLOWSKI, Jan M. (University of Heidelberg)

Presenter: LEBEDEV, Nikita (N.N. Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research)

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