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Critical dynamics with the aFRG

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Euclidean approaches such as the functional renormalization group (FRG) have been abundantly and successfully used to study the universal static critical behavior of various physical systems near continuous phase transitions. For the study of critical dynamics, on the other hand, one usually relies on real-time methods. Our research aims to connect and relate the two approaches by comparing analytically continued (aRG) and real-time FRG on the closed time path. In particular, we investigate the dynamic critical behavior of a dissipative open quantum system near equilibrium in the spirit of the Caldeira-Leggett model with the aFRG and compare that with real-time results for the dynamic universality class of the corresponding Model A (according to the classification by Halperin and Hohenberg). The long-term goal of this project is to understand the merits and limitations of studying more complicated critical dynamics, including conservation laws and reversible mode couplings as relevant for QCD, with analytically continued Euclidean versus real-time approaches.

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