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Dynamic critical behavior for the relativistic O(N) model in the framework of the real-time functional renormalization group and applications to QCD

Tuesday 29 September 2015 16:30 (2 hours)

We investigate the transition from unitary to dissipative dynamics in the relativistic $O(N)$ model with a $\lambda(\varphi^2)^2$ interaction using the nonperturbative functional renormalization group in the real-time formalism. We quantify the dynamic properties of the model in $2 \leq d \leq 4$ dimensions in terms of the scale-dependent dynamic critical exponent z, which controls the phenomenon of critical slowing down - with an important effect: For QCD it characterizes the maximal achievable correlation length in the process of the rapid cooling of the quark-gluon plasma through the critical region and thereby sets the typical strength of event-by-event fluctuations in heavy ion collisions probed at RHIC or the LHC. We provide an outlook on what one may conclude from low-energy effective models as the $O(N)$ theory for the dynamics of fluctuations close to the chiral phase transition in the phase diagram of QCD.

On behalf of collaboration:

NONE

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