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Dynamical simulation of a linear sigma model near the critical point

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The intention of this study is the search for signatures of the chiral phase transition and the impact of non-equilibrium effects.

To investigate the impact of fluctuations, e.g. on the baryon density, near the critical point or the chiral phase transition of QCD, we developed a 3+1D numerical, non-equilibrium simulation of an effective linear sigma model. Chiral fields are approximated as classical fields, quarks are described by quasi-particles via a Vlasov equation. For additional dynamics, kinetic quark-quark and chemical quark-sigma interactions have been implemented. The challenge is the consistent description of hard interactions between particles and classical fields. Therefore a new Monte-Carlo-Langevin-like formalism has been developed and is discussed.

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