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# The QCD phase transition in a fully dynamical model of heavy-ion collisions

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Experimental signals for a possible QCD critial point and first-order phase transition are strongly influenced by the rapid nonequilibrium dynamics during a heavy-ion collision. In order to estimate and understand these effects we study the cooling through the phase transition within a nonequilibrium chiral fluid dynamics model. The order parameters for the chiral and deconfinement transition are explicitly propagated, taking into account dissipation and fluctuation stemming from the interaction with a quark-antiquark fluid. In studies of single events, we demonstrate for the first time in a realistic dynamical study the formation of domains in net-baryon density at the first-order transition. This shows that nonequilibrium effects are strong enough to favor spinodal decomposition. As a possible experimental signal we find a clear enhancement of higher flow harmonics. For the detection of the critical point it is crucial that the relevant signal survives the rapid dynamics. Critical slowing down is manifestly incorporated in our model and influences the growth of the correlation length. We demonstrate in an event-by-event analysis that fluctuations of the volume-averaged order parameters develop a clear peak around the critical point in a dynamical system like a heavy-ion collision.

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