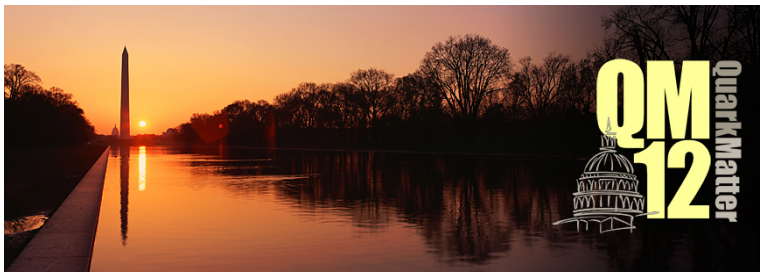


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# Dynamic enhancement of event-by-event fluctuations at the critical point and domain formation at the first order phase transition of QCD

*Friday 17 August 2012 15:40 (20 minutes)*

Strong fluctuations in observables are believed to provide decisive signals for identifying phase transitions of QCD in relativistic heavy-ion collisions. To study this possibility under realistic conditions of the expansion and the cooling of the fireball we performed dynamic simulations within our approach of nonequilibrium chiral fluid dynamics. Based on an effective phase transition model, chiral fields and their fluctuations propagate explicitly within a medium that expands fluid dynamically. The interaction between the fields and the fluid leads to dissipation and noise, which in turn affect the chiral propagation. In this talk we present the consequences of this coupled dynamics for different phase transition scenarios.
In the case of a first order phase transition we observe the development of a highly supercooled state. This leads to the dynamic formation and decay of domains of the chirally-symmetric phase in a chirally-broken environment and can be seen in single event studies. At the critical point, due to large relaxation times, we find that critical slowing down weakens the critical phenomena. However, for the first time we are able to demonstrate in a dynamic and realistic study the basic features of a critical point: the growth of the correlation length and the enhancement of event-by-event fluctuations of the sigma field. It is, therefore, expected that both, the first order phase transition and the critical point develop their characteristic signals in heavy-ion collisions.

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