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Search for the critical point in hot QCD matter

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Heavy-ion collision experiments at the Relativistic Heavy Ion Collider (RHIC) and Large Hadron Collider (LHC) create QCD matter with temperatures in the trillions of degrees and provide unique opportunities to understand the phase diagram of QCD matter under extreme conditions. The critical point is one of the main features of the phase diagram of strongly interacting quark-gluon matter and locating the critical point will provide insight into the strong force that binds nuclear matter. Finding this critical point experimentally will require describing the bulk evolution of the QCD matter near the critical point and an understanding of the possible experimental signatures.

In this talk, I will present recent theoretical development on attacking those challenges by knitting insights and developments from high energy physics and condensed matter physics . In particular, I will show the application of effective field theory to describe the bulk evolution of QCD matter. I will also demonstrate that the key elements of the Kibble-Zurek framework, which was initially developed in the context of cosmology, can be employed to identify the patterns of experimental signature of the QCD critical point.

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