

Exploring Chiral Phase Transitions & Strong Magnetic Fields in Lattice QCD

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The transition of strong-interaction matter from the hadronic phase to the quark-gluon plasma phase is a rapid crossover rather than a true phase transition in nature. A true phase transition in strong-interaction matter is expected to exist only under certain conditions, such as the chiral limit of massless quarks.

In this talk, I will present our recent studies on the true phase transition of strong-interaction matter in the chiral limit of massless quarks, along with its microscopic origin. Our research is based on (2+1)-flavor lattice QCD simulations using highly improved staggered fermions, with pion masses ranging from 160 MeV down to 55 MeV. Additionally, I will discuss baryon electric charge correlation, which can serve as a magnetometer of QCD.

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