

KMI Colloquium

A truly experimental study of very early Universe: the new stage of high energy nucleus-nucleus collision experiments



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Abstract:

The Universe has evolved since the Big Bang breaking a number of symmetries. The QCD phase transition from the deconfined partonic phase to the confined hadronic one, accompanied by the spontaneous breaking of chiral symmetry, is unique in the sense that we can experimentally test the paradigm above by reaching the other side of the transition by colliding two heavy nuclei at a sufficiently high energy.

Experimental studies in the field has risen to a new stage since the phase transition was discovered at the first-ever heavy ion collider RHIC at Brookhaven National Laboratory in the U.S., after searches over a quarter century at fixed target experiments at, e.g., the Bevalac, AGS, and SPS accelerators. The LHC at CERN in Switzerland/France, providing nucleus-nucleus collisions at even higher energies, has recently joined to investigate the properties of the new state of QCD matter at an extreme temperature.

A selected recent topics in the field, including knowledges on the quark/gluon matter, unexpected discoveries in p/d+A collisions, and a new approach to search for the most intense U(1) magnetic field, will be reviewed and discussed with a focus on the PHENIX and ALICE experiments the author promotes.

