

EXPERIMENTAL RESEARCH ON QUARK GLUON PLASMA WITH RELATIVISTIC HEAVY-ION COLLISIONS AT RHIC

ShinIchi Esumi¹

¹Center for Integrated Research in Fundamental Science and Engineering (CiRFSE),
Institute of Physics, Faculty of Pure and Applied Sciences, University of Tsukuba

An extreme high- temperature and density state of matter called as Quark Gluon Plasma (QGP) is supposed to exist in early universe or inside neutron stars. This new state of matter is being investigated with Relativistic Heavy-Ion Collider (RHIC) at Brookhaven National Laboratory (BNL) and with Large Hadron Collider (LHC) at European Organization for Nuclear Research (CERN). Two major discoveries on the QGP formation in the heavy-ion collisions at RHIC energies are (1) large elliptic event anisotropy, which is driven by the collective flow of quarks and gluons during partonic phase and (2) jet quenching, which is given by the energy loss of parton traveling through the extreme matter observed as high p_T hadron suppression. The recent experimental results at RHIC experiments will be presented and discussed together with the future programs at RHIC/BNL including the Beam Energy Scan (BES) program. Critical End Point (CEP) is expected to exist in the QCD phase diagram as an end point of first order phase transition around the phase boundary of the QGP, where behavior of the phase transition between hadronic and partonic phases should change drastically close to the end point. The experimental searches of the CEP are being carried out around higher Baryon density region in the phase diagram by lowering the colliding beam energy. The recent experimental progress in the BES program will also be discussed.