Universität Bielefeld Fakultät für Physik

Kolloquium Physik / TransRegio211 Strong-Interaction Matter under Extreme Conditions

Prof. Claudia Ratti

University of Houston

Properties of strongly interacting matter from first principles

Quantum Chromodynamics (QCD) is the fundamental theory describing the interactions between the ultimate building blocks of matter, namely quarks and gluons. At temperatures as high as trillions of degrees Kelvin and zero net baryon density, first principle Lattice QCD calculations have shown that a smooth crossover transition occurs between hadronic matter and a new state of matter called the quark-gluon plasma. A remaining question in QCD is whether criticality may appear at large baryon densities. In this talk I will review the status of lattice QCD simulations of strongly interacting matter at zero and finite density. I will then discuss novel string-theory-based theoretical developments that have been used to search for the QCD critical point. These theoretical models can provide conclusive signatures for the presence of the QCD critical point, which can be experimentally verified in relativistic heavy ion collisions at Brookhaven National Laboratory.

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