

Kolloquium Physik / TransRegio211

Strong-Interaction Matter under Extreme Conditions

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Phases of QCD: a lattice perspective

Quantum chromodynamics (QCD) is established as the fundamental underlying theory of the strong interaction, yet there are only few firmly established aspects when it comes to its rich phase diagram. There are, though, systems which did/may happen to wander around in the QCD phase diagram within environments that are so extreme, in terms of temperature and/or density, as to accommodate other QCD phases than the hadronic one that we are more familiar with. These systems are our Universe, in the first microseconds after the “Big Bang”, Neutron Stars (even more so in their mergers), heavy ions in their collisions and, theoretically rather than practically speaking, a large part of modern supercomputers around the globe. We can, indeed, use supercomputers to simulate strong interaction matter under extreme conditions thanks to an almost 50-years-old numerical framework for describing non perturbative phenomena in QCD via Monte Carlo simulations: lattice QCD. In this talk we will discuss how lattice QCD simulations allow us to explore, from a theoretical perspective, some rather interesting portions of the QCD phase diagram (in temperature and nonzero net isospin density directions). We will also discuss how we try to learn about interesting regimes, like that of nonzero net baryon densities, that lattice QCD fails accessing, by extending our parameter space even further (varying i.e. the microscopic parameters of the theory away from their physical value) and then exploiting the universal features of continuous phase transitions.

Monday, 01.02.2021, 16:15 Uhr

place: cyberspace

**zoom-link will be communicated
on the day of the colloquium**