UNIVERSITÄT BIELEFELD

Fakultät für Physik

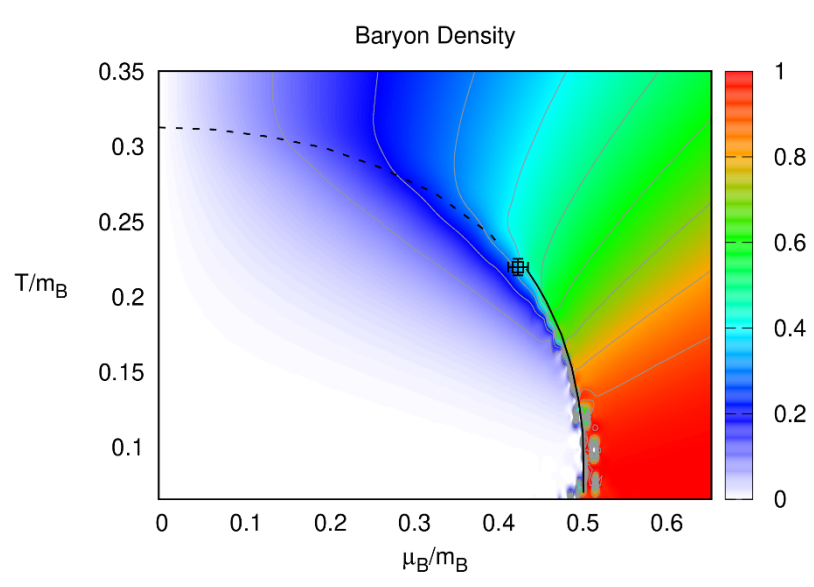
Physikalisches Kolloquium
Antrittsvorlesung

Dr. Wolfgang Unger

Bielefeld University

Strong Coupling Approach to the QCD Phase Diagram

Quantum Chromodynamics (QCD) is the fundamental theory of the strong interactions, which confine the quarks and gluons into hadrons. At high temperatures similar to those in the early universe, a new state of QCD matter - the quark gluon plasma - exists. However, it is an open question what features the phase diagram has at non-zero baryon densities, and in particular whether there exists a critical point.
Since QCD is non-perturbative in this regime, lattice QCD is the method of choice to unravel the phase structure at non-zero temperatures and densities from first principles via Monte Carlo simulations. However, due to the numerical “sign problem”, no direct simulations at non-zero baryon density can be performed.
An alternative method to address lattice QCD at finite density is via the strong coupling expansion, which gives rise to Quantum Monte Carlo simulations in a world-line representation.
I will summarize the results that have been obtained with this approach.



Monday, May 23, 2022, 4:15 p.m.

H6 and via zoom