HK 50 Theorie

Zeit: Donnerstag 17:00–18:30 Raum: G

HK 50.1 Do 17:00 G

Color-superconductivity within a Dyson-Schwinger approach — •Dominik Nickel[1,2], Reinhard Alkofer[2], and Jochen Wambach[1] — [1]TU Darmstadt — [2]KFU Graz

Color-superconductivity is usually investigated at asymptotically large densities in a weak coupling expansion and around nuclear saturation density within phenomenological models.

To bridge this gap between the weak coupling and the strongly coupled regime, we extend a truncation scheme of Dyson-Schwinger equations, which is in quantitative and qualitative agreement with lattice calculations for the vacuum, to finite densities. We present results for the quasiparticle pairing in different phases, estimate the pressure via the Cornwall-Jackiw-Tomboulis formalism and study the importance of the strange quark mass for the color-flavor unlocking.

HK 50.2 Do 17:15 G

Study of "Bottom-Up" thermalization scenario within a full pQCD based cascade model — •Andrej El, Zhe Xu, and Carsten Greiner — Institut für Theoretische Physik, Johann Wolfgang Goethe Universität Frankfurt

Starting with the initial condition of color glas condensate we use the full pQCD parton cascade introduced recently to verify the "Bottom-Up" Thermalization scenario of a quark gluon plasma proposed by Baier, Mueller, Schiff and Son. This is important for understanding the very early stage of ultrarelativistic heavy ion collisions.

HK 50.3 Do 17:30 G

Lessons on confinement from G(2) gauge theory — •Kurt Langfeld[1], Jeff Greensite[2], Hugo Reinhardt[1], Stefan Olejnik[3], and Torsten Tok[1] — [1]University of Tübingen — [2]San Francisco State University — [3]Bratislava Institute of Physics

Over the recent past, it has turned out that in SU(3), SU(2) gauge theories center degrees of freedom, the so-called center vortices, play a major role for the confinement mechanism. Numerical simulations showed that the G(2) gauge theory shares the properties "asymptotic freedom" and "intermediate linear confinement" with QCD. On the other hand, the group G(2) does not possess a non-trivial center implying that the center vortex picture of confinement, which operates in SU(2) and SU(3), cannot be realized. Indeed, G(2) gauge theory does not possess asymptotic confinement, but nevertheless a linear rising confinement potential at intermediate distances. In order to explore the mechanism for confinement at intermediate distances, we study by means of lattice gauge simulations the Polyakov line of G(2) below and above the critical temperature. Furthermore, we investigate the role of the SU(3) subgroup of G(2) and, in particular, the role of the corresponding Z3 center vortices.

HK 50.4 Do 17:45 G

The QCD phase diagram: NJL model with diquarks — •Simon Rössner, Claudia Ratti, and Wolfram Weise — Physik Department, Technische Universität München, 85747 Garching, Germany

We present calculations on QCD-based thermodynamics at finite temperature and finite chemical potential, using an extended Nambu and Jona-Lasinio model with inclusion of Polyakov loop dynamics. This model combines features of both chiral symmetry restoration and deconfinement, and incorporates diquark degrees of freedom, promoting insights into regions of large quark chemical potential. Parameters of the Polyakov loop effective potential are fixed to reproduce pure gauge lattice QCD results. Covering wide ranges in the temperature-chemical potential plane this so called PNJL model allows for the computation of the phase diagram. We extract the position of the tri-critical point and discuss its variation with the quark mass.

Work supported in part by BMBF and GSI.

HK 50.5 Do 18:00 G

QCD thermodynamics with three flavors: field-theoretical model — •Michael Thaler, Claudia Ratti, and Wolfram Weise — Institute of Theoretical Physics T39, Technical University Munich

We extend a novel field-theoretical model based on two key properties of QCD, confinement and chiral symmetry breaking, to three quark flavors. In this generalized Nambu–Jona-Lasinio model quarks couple simultaneously to the chiral condensate and to a background temporal gauge field representing Polyakov loop dynamics. We calculate the equation of state, the (scaled) pressure difference and the baryon number density at finite quark chemical and compare our results with corresponding data from 2+1 flavor lattice QCD simulations. Excellent agreement for baryon chemical potentials up to $\mu_B = 530$ MeV is found. Work supported in part by BMBF and GSI.

HK 50.6 Do 18:15 G

Transport coefficients of a quark-gluon plasma calculated within a parton cascade description — •Jens Fiedler, Zhe Xu, and Carsten Greiner — Institut für Theoretische Physik, Johann Wolfgang Goethe Universität Frankfurt

We calculate heat conductivity and shear viscosity coefficient within a pQCD parton cascade. In our simulation it is possible to include particle creation and annihilation processes for gluons and quarks. In comparison with theoretical results based on the Chapman-Enskog method, we investigate the influences on these transport coefficients by changing various parameters, like the number of testparticles, grid- and box size.