Gemeinsame Veranstaltung von
Humboldt-Universität zu Berlin, Institut für Physik
(Theorie der Elementarteilchen / Computerorientierte Theoretische Physik)
DESY, Zeuthen

SEMINAR
Feldtheorie auf dem Gitter und Phänomenologie der Elementarteilchen

Am Dienstag, dem **18 Juli, um 15:30 Uhr s.t.** spricht

Prof. **Simon Hands**

University of Wales – Swansea

zum Thema

Two color matters

Abstract

We study SU(2) lattice gauge theory with two flavors of Wilson fermion at non-zero chemical potential μ and low temperature on a $8^3 \times 16$ system. We identify three regimes along the μ-axis. For $\mu \lesssim m_\pi/2$ the system remains in the vacuum phase, and all physical observables considered remain essentially unchanged. The intermediate regime is characterised by a non-zero diquark condensate and an associated increase in the baryon density, consistent with what is expected for Bose-Einstein condensation of tightly bound diquarks. We also observe screening of the static quark potential here. In the high-density deconfined regime we find a non-zero Polyakov loop and a strong modification of the gluon propagator, including significant screening in the magnetic sector in the static limit, which must have a non-perturbative origin. The behaviour of thermodynamic observables and the superfluid order parameter are consistent with a Fermi surface disrupted by a BCS diquark condensate. The energy per baryon as a function of μ exhibits a minimum in the deconfined regime, implying that macroscopic objects such as stars formed in this theory are largely composed of quark matter.

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(Lageplan: `http://linde.physik.hu-berlin.de/images/lageplan_neu.gif`)

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