

# The quest for the dense matter phase diagram and EoS

*Friday 10 September 2010 11:00 (1 hour)*

After a short introduction to modern observations of compact stars, which concern different astrophysical objects such as pulsars, double neutron stars, accreting low-mass X-ray binaries etc., we explain how to extract from mass and radius measurements the cold dense equation of state (EoS). In the near future the NASA International X-ray Observatory (IXO) project shall deliver such data with 5% accuracy and thus provide a benchmark for the  $T=0$  EoS which will play a similar role as the zero-density EoS from Lattice QCD.

In the main body of the talk, we will outline a quantum field theoretical approach to the EoS of dense quark matter with special emphasis on color superconducting quark matter phases and their importance for understanding the phenomenology of compact stars.

An outlook is given to the problem of generalizing the EoS to a wide enough range of densities, temperatures and isospin asymmetries in order to apply it for both, supernova collapse simulations and heavy-ion collisions from FAIR-CBM and JINR-NICA to BNL-RHIC and CERN-LHC. This is one of the tasks attacked within the research networking programme “The New Physics of Compact Stars - CompStar” (2008-2013) of the European Science Foundation.

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