

FAKULTÄT für PHYSIK  
LUDWIG-MAXIMILIANS-UNIVERSITÄT  
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT  
TECHNISCHE UNIVERSITÄT MÜNCHEN  
MÜNCHEN/GARCHING

## MLL-KOLLOQUIUM

Donnerstag, 11.07.2013, 16<sup>15</sup> Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1  
Treffen zum gemeinsamen Kaffee 16 Uhr

**Dr. Jens Braun**

(Inst. f. Kernphysik, TU Darmstadt)

### **From quarks and gluons to ultracold gases and back – Sharing tools to explore the phase diagrams**

The theory of the strong interaction describes the appearance of the fundamental building blocks of nuclei, and the state of matter during the early stages of the universe. This state is currently probed in relativistic heavy-ion collision experiments. In these experiments we encounter temperatures that are much larger than the temperatures in any other experiment. As a complement, experiments with fermionic atoms in the nano-Kelvin regime provide a remarkably clean and versatile environment to test our understanding of a broad range of phenomena: from superconductivity and the formation of condensates to the generation of bound states in strongly coupled systems.

Interestingly, studies of ultracold atomic gases and the theory of the strong interaction at high temperatures are similar in various ways. However, providing a consistent first-principles description of the experimental data is challenging. We give an overview of some of the most intriguing open questions concerning the finite-temperature phase diagrams of the theory of the strong interaction and ultracold gases, and discuss how a recently proposed exchange of techniques between these fields may help to provide us with a better understanding of collective phenomena underlying strongly coupled matter.

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