

Abstract for an Invited Paper  
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**Lattice Regularized QCD and the Quark-Gluon Plasma<sup>1</sup>**

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Numerical calculations in the framework of lattice regularized QCD are of particular importance for our understanding of the phase structure of strongly interacting elementary particles at high temperature and non-vanishing baryon number density. The genuine non-perturbative processes and long range correlations that trigger the occurrence of phase transitions and dominate the thermodynamic properties in the vicinity of such transitions require the application of non-perturbative techniques. We will discuss the current understanding of the phase diagram of QCD as it emerges from lattice calculations at vanishing as well as non-vanishing baryon chemical potential. We will present recent results on the QCD equation of state, the transition temperature at vanishing baryon number density and the search for a genuine phase transition point at non-zero values of the baryon number density. We, furthermore, will comment on implications of these results for experimental studies of hot and dense matter in heavy ion collisions and their modeling in hydrodynamic simulations.

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