

HAW14-2014-000982

Abstract for an Invited Paper  
for the HAW14 Meeting of  
the American Physical Society

### **QCD Phase Diagram – What can we learn from Lattice and Experimental data<sup>1</sup>**

ATSUSHI NAKAMURA, Hiroshima University

QCD phase diagram is an interesting target for high energy nuclear physics because we can understand the rich insights of QCD, and can get fundamental information for compact stars. There have been long struggle and at finite temperature we are now at satisfactory stage, but at finite density still many researches and trials are continuing. In this report, we present a new approach based on the canonical partition functions,  $Z_n$ , where  $n$  is net baryon numbers. We point out that the canonical partition functions can be obtained from high energy heavy ion collider experiments, and from the lattice QCD simulation. We present the canonical partition functions obtained from RHIC data, and recent lattice simulations. We construct higher moments, such as Kurtosis, and the Lee-Yang zeros, and discuss the QCD phase diagram.

<sup>1</sup>for Zn Collaboration