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Search for QCD critical point through fourth moments of net-proton distributions with the STAR experiment XIAOFENG LUO, Nuclear Science Division, Lawrence Berkeley National Laboratory, STAR COLLABORATION — Fluctuations of conserved quantities like net-baryon number are considered to be signatures for the search for Quark Gluon Plasma formation and the QCD critical point. It has been proposed that higher moments of the net-proton distribution are more sensitive to the existence of a critical point compared to measures based on second moments [1]. In Lattice calculations, which assume the system is in thermal equilibrium, the fourth moments of event-by-event net baryon, net charge and net strangeness are related to respective susceptibilities. These susceptibilities become large at the critical temperature and are expected to increase in the presence of the QCD critical point. Recent theoretical calculations suggests that fluctuations in net- proton reflects the fluctuations in net-baryon. We present the energy and centrality dependence of higher moments of the net-proton distribution measured by the STAR experiment at RHIC. The measurement is carried out at mid-rapidity ($|y| < 0.5$) for Au+Au collisions at $\sqrt{s_{NN}} = 19.6$, 62.4 and 200 GeV. The results are compared to calculations from UrQMD, AMPT, HIJING and Therminator models. These results will help to understand the expectations from scenarios where a QCD critical point is not incorporated in the models.

[1] M. A. Stephanov, *Phys. Rev. Lett.* **102**, 032301(2009).

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