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Fluctuation signatures of the QCD critical point

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Locating the QCD critical point is the goal of several major heavy ion collision experiments, and it may be possible to see signatures of critical behaviour in event-by-event fluctuations of conserved charges. We show characteristic peaks in the third χ_3 and fourth χ_4 fluctuation moments of baryon number as a function of chemical potential (or center of mass energy) and how they depend on proximity of freeze out to the critical point. In a model independent analysis, we explain qualitative features of the moments' dependence on chemical potential and temperature near the critical point, and we identify a few signatures, such as relative location of the χ_3 and χ_4 peaks, expected to be robust. Using the Gross Neveu model we provide a quantitative example of these predictions, which may support experimental observations of a peak in χ_4 as a signature of the critical point.

Auteurs principaux: Dr DENG, Jian (Shandong University); Dr CHEN, Jiunn-Wei (National Taiwan University); Dr LABUN, Lance (University of Texas, Austin)

Orateur: Dr LABUN, Lance (University of Texas, Austin)

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