Contribution ID: **532** Type: **Parallel**

Net-baryon-, net-proton-, and net-charged particle kurtosis in heavy-ion collisions within a relativistic transport approach

Friday, May 27, 2011 7:10 PM (20 minutes)

We explore the potential of net-baryon, net-proton and net-charge kurtosis measurements to investigate the properties of hot and dense matter created in relativistic heavy-ion collisions. Contrary to calculations in a grand canonical ensemble we explicitly take into account exact electric and baryon charge conservation on an event-by-event basis. This drastically limits the width of baryon fluctuations.
A simple model to account for this is to assume Poisson distributions with a sharp cut-off at the tails.
We present baseline predictions of the energy dependence of the net-baryon, net-proton and net-charge kurtosis for central ($b \leq 2.75$˜fm) Pb+Pb/Au+Au collisions from $E_{lab} = 2A$˜GeV to $\sqrt{s_{NN}} = 200$˜GeV from the UrQMD model. While the net-charge kurtosis is compatible with values around zero, the net-baryon number decreases to large negative values with decreasing beam energy. The net-proton kurtosis becomes only slightly negative for low $\sqrt{s_{NN}}$.

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Session Classification: Energy scan

Track Classification: QCD phase diagram