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Determination of freeze-out conditions from fluctuation observables measured at RHIC

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Fluctuations in the conserved charges of the strong interaction are important probes in high-energy heavy-ion collisions, which provide an excellent opportunity for revealing details in the phase structure of QCD matter. Recently, net-electric charge and net-proton fluctuations measured in the beam energy scan program at RHIC were reported by the STAR collaboration. In this talk, we present a new freeze-out curve, which is determined from a combined fit to these fluctuation observables within a phenomenological approach based on the hadron resonance gas model. We also point out that net-strangeness fluctuations may indicate a separate freeze-out behavior of strange hadrons. For a realistic description, we apply the relevant kinematic cuts and systematically include final state effects such as resonance decays and regenerations. The inclusion of the successive regeneration and decay of resonances turns out to be crucial for reconciling calculations of net-proton fluctuations with those of net-baryon number fluctuations and for obtaining reasonable freeze-out conditions.

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