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PHENIX Levy analysis of Bose-Einstein correlation functions

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The importance of the RHIC beam energy scan program is that comparing results at different energies (varied in the region where the transition from hadronic to quark matter is expected to occur) allows us to investigate the structure of QCD matter, and the quark-hadron transition. One of the best tools to gain information about the (soft) particle-emitting source is the measurement of Bose-Einstein or HBT correlations of identical bosons. Today, high energy physics experiments measure the scale parameter of these correlation functions (often called HBT radii) as a function of particle type, transverse momentum, azimuthal angle, collision energy, collision geometry. In this talk I present results from the RHIC PHENIX experiment, related to Bose-Einstein correlations and the search for the critical point. In our latest measurements, we utilize Levy-type sources, whose index of stability α may also yield information on the nature of the quark-hadron phase transition. I will discuss what the beam energy dependence of the pion source tells us about the critical point, then I present the latest status of the analysis of the Levy source parameters as a function of transverse momentum, and explain how the non-Gaussian shape of correlation functions is related to one of the critical exponents.

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