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Investigating the excitation function of HBT radii for Lévy-stable sources

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One of the main goals of today's heavy-ion physics research is to explore the phase diagram of strongly interacting matter and search for signs of the possible critical endpoint on the QCD phase diagram. Femtoscopy is among the important tools used for this endeavor; there have been indications that combinations of femtoscopic radii parameters (referred to as HBT radii for identical boson pairs) can be related to the system's emission duration. An apparent non-monotonic behavior in their excitation function thus might signal the location of the critical point. In this paper, we show that conclusions drawn from the results obtained with a Gaussian approximation for the pion source shape might be altered if one utilizes a more general Lévy-stable source description. We find that the characteristic size of the pion source function is strongly connected to the shape of the source and its possible power-law behavior. Taking this into account properly changes the observed behavior of the excitation function.

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