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Energy scan results with Lévy type femtoscopy at NA61/SHINE

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In the recent decades of high-energy physics research, it was demonstrated that strongly interacting quark-gluon plasma (sQGP) is created in ultra-relativistic nucleus-nucleus collisions. Investigation and understanding of the properties of the hadronic matter are among the important goals of the NA61/SHINE Collaboration at CERN SPS. Mapping of the phase diagram is achieved by varying the collision energy ($5 \text{ GeV} < \sqrt{s_{\text{NN}}} < 17 \text{ GeV}$) and by changing the collision system (p+p, p+Pb, Be+Be, Ar+Sc, Xe+La, Pb+Pb). Femtoscopic correlations reveal the space-time structure of the hadron emitting source.

In this talk, we report on the measurement of femtoscopic correlations in the whole available energy range of NA61/SHINE in intermediate collision systems. Comparing the measurements to calculations based on symmetric Lévy sources, we discuss the results on Lévy source parameters as a function of average pair transverse mass. One of the physical parameters is particularly important, the Lévy exponent α , which describes the shape of the source and may be related to the critical exponent η in the proximity of the critical point. Therefore, measuring it may shed light on the location of the critical endpoint of the QCD phase diagram as well as the shape of the particle emitting source.

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