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Three-Dimensional measurements of pion HBT correlations and their Lévy parameters in $\sqrt{s_{NN}} = 200$ GeV Au+Au collisions at STAR

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In this work, we present new results on the three-dimensional pion-pion femtoscopic correlation measurements and their Lévy parameters in heavy-ion collisions, utilizing data from the STAR experiment at RHIC in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV. These measurements aim to deepen our understanding on the space-time structure of hadron emission sources and their role in the behavior of the strongly interacting quark-gluon plasma. The three-dimensional approach enables a more comprehensive investigation of the emission source properties. We focus on analyzing the transverse mass (m_T) dependence of the Lévy source parameters, including the Lévy scale parameters in the Bertsch-Pratt frame, R_{out} , R_{side} , R_{long} , the correlation strength parameter λ , and the Lévy exponent α . The Lévy scale parameters provide insights into the homogeneity structure of the source, while the parameters λ and α offer information about the correlation strength and source shape, respectively. In this talk, our 3D results are compared with previous one-dimensional studies, highlighting the differences and potential implications for understanding the space-time evolution of the system.

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