Particle Interferometry of Expanding Nuclei

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Exploring the statistical and dynamical evolution of an hot expanding source, we have measured correlation functions of light charged particles. Fragments from the interaction zone in central Au+Au collisions between 50 and 200 AMeV, which are subject of increasing collective outward motion, were detected in three high-resolution hodoscopes within the ALADIN setup at GSI. The particular importance of the temporal evolution of the reaction process is evident from the differences of temperatures obtained from isotopic yields and from populations of particle-unstable resonances [1]. Exploiting the final state interaction between proton pairs and between pairs of composite fragments [2, 3], we determined freeze out radii which reveal the expansion of the source. The extracted values were corrected for sequential feeding, Coulomb distortions of the emitting zone, and initial correlations caused by the radial flow. The obtained radius parameters from p-a and d-a correlations are large, indicating breakup densities of about one third of normal nuclear density. However, extracted breakup radii from proton-proton pairs show a strong dependence on the beam energy and will be discussed in terms of freeze out conditions.

References

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