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Probing emission dynamics with non-identical particle femtoscopy

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Femtoscopy is traditionally used to determine the size of the particle emitting region in heavy-ion collisions. The non-identical particle femtoscopy is additionally able to measure the difference in average emission points (so-called emission asymmetry) between two types of particles. This asymmetry is sensitive to details of the dynamics of the system created in the collision, and depends on the interplay of collective flow, thermal velocity and details of hadronic resonance production, propagation and decay. The sensitivity of the technique to those phenomena will be presented.

The correlations between charged pions and kaons have been the fist measurement of collision dynamics and emission asymmetry at several heavy-ion collision experiments. They provide unique insight into emission asymmetry as well as an interplay between hadronic rescattering and resonance production and decay. These processes naturally strongly depend on the momenta of the particles, as, especially for pions, resonance decays preferably populate the low-p_T part of the spectrum. In this talk we present the first theoretical investigation of the pion-kaon emission asymmetry done deferentially versus pair total transverse momentum. We investigate the interplay between spatial and temporal components of the asymmetry, as well as the dependence of the total system size on this variable. We show how this new type of measurement can shed new light on the understanding of particle production in the soft regime.

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