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What can we learn from femtoscopic and angular correlations of identified particles in ALICE?

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Two-particle correlations have proven to be a robust tool which allow the exploration of many physics phenomena present in high-energy particle collisions. In this talk we would like to focus on two techniques, namely femtoscopy and angular correlations, covering their most recent results from the ALICE experiment.

Femtoscopic correlations which arise from quantum statistics and final-state interactions, probe the space-time characteristics of particle production. Typically, these measurements for pions, kaons, and protons are used to measure the size and test the hydrodynamic evolution of the system. However, the femtoscopic formalism is also sensitive to the amplitude of the wave function for a particle pair, which is directly related to the, in some cases poorly known, interaction cross section. In this talk we review recent results from ALICE femtoscopy studies including the following combinations of particles: $\mathrm{K}^0_\mathrm{S}\mathrm{K}^\pm$, all combinations of Λ and $\bar{\Lambda}$ with K^+, K^- and K^0_S, all combinations of proton (antiproton) and Λ ($\overline{\Lambda}$) baryons.

In this talk, we also report the measurements of angular correlations of identified particles (for pions, kaons, protons, Λ, and respective antiparticles) in the relative pseudorapidity ($\Delta\eta$) and azimuthal angle ($\Delta\varphi$) space in pp collisions at $\sqrt{s} = 7$ TeV. The first look at other collision systems and energies will also be shown. Surprisingly, for baryon pairs where both particles have the same baryon number, a near-side anti-correlation structure is observed instead of a typical near-side peak originating from mini-jets. This surprising effect is also present for other collision systems and energies. We will also present how those correlations are connected to the femtoscopic measurements described above.

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