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Characterizing system dynamics with short- and long-range correlations in pp, p-Pb, and Pb-Pb collisions at ALICE

Tuesday 12 January 2021 17:00 (20 minutes)

In this contribution we will present the latest results on two-particle number and transverse momentum correlations from the ALICE Collaboration in order to study the initial stages and dynamic evolution of nucleus-nucleus collisions from small to large systems.

In pp and p-Pb collisions, the physical origin of long-range flow-like correlations remains an open question, with implications for our understanding of collective dynamics in both small and large systems. We will present recent measurements of the second Fourier harmonic v_2 as a function of multiplicity in pp collisions using the Forward Multiplicity Detector, which makes it possible to measure the correlations between particles which are separated by up to eight units of pseudorapidity, the largest $\Delta\eta$ gap at the LHC. To further probe the origin of long-range correlations in small systems, we will present a quantitative study of the ridge in high-multiplicity pp collisions which contain a high-momentum charged particle or reconstructed jet, in order to determine whether long-range correlations are correlated with hard processes. The experimental results are compared to the Pythia and EPOS Monte Carlo models which employ different mechanisms to generate ridge-like features, in order to draw conclusions about the underlying physical processes that produce long-range correlations.

We will also present new measurements of the transverse momentum correlator G_2 in pp and p-Pb collisions, and discuss the evolution of the correlation function with multiplicity from small to large collision systems. Measurements of these correlations in Pb-Pb collisions have been recently published by the ALICE Collaboration, and demonstrate features attributed to radial flow, delayed hadronization, momentum transfer due to viscous effects, and system properties like η/s. It is thus of high interest to elucidate how those transverse momentum correlators behave in small collision systems.

Author: KIM, Junlee (Jeonbuk National University (KR))

Presenter: KIM, Junlee (Jeonbuk National University (KR))

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