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Searches for pion condensation in pp and Xe-Xe collisions at the LHC with the ALICE Inner Tracking System

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Most hydrodynamical models have problems with the correct prediction of very low transverse-momentum (p_T) spectra of pions. The problem may be solved by assuming that the matter at LHC energies is produced out of chemical equilibrium. The chemical non-equilibrium model predicts that the pion abundances are characterized by the non-zero value of the chemical potential which is very close to the critical value for the Bose-Einstein condensation. The crucial point is the measurement of pions at very low p_T (< 200 MeV/ c), as the onset of pion condensation would manifest itself as an excess in the low p_T pion yield while the spectra of kaons and protons remain unaltered.

In October 2017, the ALICE Collaboration at the CERN Large Hadron Collider collected for the first time data in Xe-Xe collisions at $\sqrt{s_{NN}} = 5.44$ TeV with low magnetic field ($B = 0.2$ T). Thanks to this, the pion spectra can be measured down to 100 MeV/ c and below with the Inner Tracking System (ITS), allowing the search for pion condensation effects.

The search for an enhancement of pions at very low p_T is carried out also in very high multiplicity pp events. In this contribution we compare the performance of the ALICE ITS with low and nominal magnetic field and we present the first results on the measurement of pion, kaon and proton spectra down to the lowest p_T possible with the ALICE detector.

Content type

Experiment

Collaboration

ALICE

Centralised submission by Collaboration

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