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Light-flavour identified charged-hadron production in pp and Pb–Pb collisions at the LHC

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Thanks to the unique detector design adopted to fulfil tracking and particle-identification (PID) requirements (e.g. low momentum cut-off and low material budget), the ALICE experiment provides significant information about hadron production both in pp and Pb–Pb collisions. In particular, the spectral shapes and production yields of identified particles play a key role in the study of the collective and thermal properties of the matter formed in high-energy heavy-ion collisions. Furthermore, the production of high-p_T particles provides insights into the density of the medium and the in-medium energy-loss mechanisms.

Transverse momentum spectra of &pi^{plusmn;}, K^{plusmn;}, p and macr;p are measured at mid-rapidity (|y| < 0.5) over a wide momentum range, from ~100 MeV/c up to ~20 GeV/c. The measurements are performed exploiting the dE/dx in silicon (ITS) and gas (TPC), the time-of-flight (TOF) and the ring-imaging Cherenkov (HMPID) particle-identification techniques, which will be briefly reviewed in this report. The current results on light-flavour charged-hadron production will be presented for pp collisions at radic;s = 0.9, 2.76 and 7 TeV and for Pb–Pb collisions at radic;s_{NN} = 2.76 TeV. Production yields, spectral shapes and particle ratios in pp are discussed as a function of the collision energy and compared to previous experiments and commonly-used Monte Carlo models. Pb–Pb collisions at the LHC feature the highest radial flow ever observed and an unexpectedly low p/&pi production ratio. The results are presented as a function of collision centrality and compared to RHIC data in Au–Au collisions at radic;s_{NN} = 200 GeV and predictions from thermal and hydrodynamic models. The nuclear modification factor (R_{AA} of identified hadrons will also be discussed and compared to unidentified charged particles and theoretical predictions. This is observed to be identical for all particle species at high-p_T.

Presentation Type

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