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Pion, kaon and (anti-)proton production in pp, p-Pb and Pb-Pb collisions at the highest LHC energies with ALICE

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In ultra-relativistic nucleus-nucleus collisions a new state of matter where quarks and gluons are not confined into hadrons, the Quark-Gloun Plasma (QGP), is created. The ALICE experiment at the LHC is dedicated to the study of the properties of the QGP. In addition, proton-proton collisions are used as the high energy QCD reference while the study of proton-nucleus collisions provides a fundamental benchmark for the initial state and cold nuclear matter effects. In recent years the multiplicity-dependent results on particle production in pp and p–Pb collisions allowed the discovery of collective–like behavior in small systems at LHC energies. Exploiting its optimal particle identification capabilities, the ALICE experiment is able to measure pion, kaon and (anti-)proton transverse momentum spectra from hundreds of MeV/c up to 20 GeV/c. Measurements of the production of pions, kaons and (anti-)protons in pp, p–Pb and Pb–Pb collisions at the highest center of mass energies provided during the LHC Run 2 data taking period, are reported. Results are presented as a function of the collision centrality or multiplicity and include transverse momentum spectra, particle ratios, integrated yields and nuclear modification factors. In addition, particle abundances are discussed in the context of underlying event. Finally, an extensive comparison to statistical hadronization and hydrodynamic model predictions is presented.

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