EPS-HEP2023 conference



Contribution ID: 391

Type: Parallel session talk

Inclusive and in-jet measurements of neutral mesons across collision systems with ALICE

Wednesday 23 August 2023 18:10 (15 minutes)

Measurements of neutral meson production with ALICE provide a precise determination of the production cross section over a wide range of transverse momentum across all collision systems available at the LHC. The measurements combine results from several reconstruction techniques, including the use of two different calorimeters and the reconstruction of conversion photons via their e^+e^- pairs. In pp collisions such measurements are used to constrain the parton distribution functions (PDF) and the fragmentation functions (FF) while comparisons to the p–-Pb collision system allow the study of cold nuclear matter effects over a large range in transverse momentum. In Pb–Pb collisions the p_T spectra can be used to study energy loss mechanisms in the QGP and provide vital input for direct-photon analyses. Recent results from the LHC show similar observations for high-multiplicity pp and p–Pb collisions to those in heavy-ion collisions. Measured identified particle spectra in collisions with high charged-particle multiplicities give further insight into the hadron chemistry in such events. Moreover, the correlation of neutral mesons and jets measured in pp collisions provides direct access to the FF.

In this talk, detailed measurements of neutral pion, eta, and omega mesons in several multiplicity classes in pp collisions at $\sqrt{s} = 13$ TeV and in pp and p–Pb collisions at $\sqrt{s_{\rm NN}} = 5.02$ TeV will be presented, including $R_{\rm pA}$. Furthermore, the measurement of π^0 and η hadrons inside of jets and the resulting FFs as a function of jet and meson momentum in pp collisions will be shown. Finally, the status of the Run 3 analyses, together with future perspectives, will be discussed.

Collaboration / Activity

ALICE

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Track Classification: QCD and Hadronic Physics