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Electroweak vector-boson production in hadronic collisions with ALICE

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Electroweak W and Z bosons, produced in hard-scattering processes at the early stage of hadronic collisions, are excellent probes of their initial state. The W and Z measurements in pp collisions represent a stringent test of perturbative QCD calculations, and provide important input for the determination of parton distribution functions (PDFs). In p-Pb and Pb-Pb collisions, these measurements can constrain the nuclear PDFs and test the binary-scaling for hard processes.

Electroweak W and Z bosons are studied with ALICE in pp, p-Pb, and Pb-Pb collisions via their leptonic decays in the muon and electron channels at forward rapidity ($-4.0 < \eta < -2.5$) and midrapidity ($|\eta| < 0.8$), respectively. The measurements in p-Pb and Pb-Pb collisions at forward rapidity give access to low Bjorken-x values, a phase-space region poorly constrained by other heavy-ion experiments.

A review of the W- and Z-boson results and their comparison to model calculations are presented, with particular emphasis on those recently obtained in pp collisions at midrapidity. That concerns differential measurements of the production cross sections, nuclear modification factors and lepton-charge asymmetry as a function of rapidity, transverse momentum, collision centrality and charged-particle multiplicity. The production of W bosons in association with hadrons as a function of the charged-particle multiplicity in pp collisions is discussed as well.

Category

Experiment

Collaboration

ALICE

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