

Measurement of W- and Z-boson production in p-Pb collisions with ALICE at the LHC

The high collision energies available at the LHC allow for an abundant production of hard probes, such as quarkonia, high- p_T jets and vector bosons (W, Z), which are produced in initial hard parton scattering processes. The latter decay before the formation of the Quark-Gluon Plasma (QGP), which is a deconfined phase of QCD matter produced in high-energy heavy-ion collisions. Furthermore, their leptonic decay products do not interact strongly with the QGP. The electroweak bosons introduce a way for benchmarking in-medium modifications to coloured probes. In Pb-Pb and p-Pb collisions, precise measurements of W- and Z-boson production can constrain the nuclear Parton Distribution Functions (nPDFs), which could be modified with respect to the nucleon due to shadowing or gluon saturation, and they can be used to test the scaling of hard particle production with the number of binary nucleon-nucleon collisions. Especially in p-Pb collisions, the measurement of W yields at forward and backward rapidity allows us to probe the modification of nPDFs at small and large Bjorken- x , respectively. Such measurements can be benchmarked in pp collisions, where W- and Z-boson production is theoretically known with good precision. Also, the charge asymmetry of leptons from W-boson decays is a sensitive probe of up and down quark densities in a nucleon inside a nucleus.

The production of W- and Z-boson in p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV is measured with the ALICE muon spectrometer via the inclusive p_T -differential muon yield and the invariant mass of opposite-sign muon pairs, respectively. The results will be presented at forward rapidity (p-going direction, $2.03 < y_{cms}^\mu < 3.53$) and backward rapidity (Pb-going direction, $-4.46 < y_{cms}^\mu < -2.96$), this rapidity region being complementary to the one of ATLAS and CMS. Comparisons with model calculations accounting for the nuclear modification of the PDFs and the W production as a function of the event activity will be discussed.

Summary

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