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

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In ultra-relativistic heavy-ion collisions, the formation of a hot and dense strongly-interacting medium, a Quark-Gluon Plasma (QGP), is expected. To characterize the QGP, one must disentangle genuine QGP effects from the ones due to the nuclear medium presence known as Cold Nuclear Matter (CNM) effects. One of the important CNM effects is the modification of the parton distribution function in the nucleus (nPDF) with respect to the nucleon one (PDF). In hadronic collisions, the production of the Z-boson is dominated by the quark anti-quark annihilation process. Due to the large Z-boson mass, those quarks are probably a valence (u or d) quark and a corresponding anti-quark from the sea. Hence, the measurement of the Z-boson production in proton-nucleus or nucleus-nucleus collisions can constrain the corresponding nPDF.

The Z-boson production is measured with ALICE in p-Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV. Z-boson candidates are reconstructed from pairs of opposite sign muons with transverse momenta larger than $20 \text{ GeV}/c$ and $-4 < \eta < -2.5$.

The Z-boson production cross section will be presented in the forward (p-going direction) and backward (Pb-going direction) center-of-mass rapidity regions, corresponding to $2.03 < y_{cms} < 3.53$ and $-4.46 < y_{cms} < -2.96$, respectively. The results will be compared to the measurement from the LHCb experiment and to theoretical calculations from different theoretical models.

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