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Charmonium production in p-Pb collisions with ALICE at the LHC

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Charmonium states play an important role as probes of the phase transition between hadronic and deconfined matter. In high-energy nucleus-nucleus collisions, where the formation of a plasma of quarks and gluons is expected, the charmonium production yields are modified by mechanisms as color screening and/or (re)combination of c and $\bar{c}$ quarks. However, charmonium production is influenced also by cold nuclear matter effects as nuclear shadowing, gluon saturation, energy loss or the cc break-up in the medium. These mechanisms are studied in p-A collisions and their assessment is fundamental to evaluate the size of hot matter effects on charmonia.

ALICE measures charmonium states, in p-Pb collisions, down to zero transverse momentum at backward (-4.46< $y_{\rm cms}$ <-2.96) and forward (2.03< $y_{\rm cms}$ <3.53) rapidities in the dimuon decay channel and at mid-rapidity (-1.37< $y_{\rm cms}$ <0.43) in the dielectron one.

J/ψ and ψ(2S) Run-1 results obtained in p-Pb collisions at $\sqrt{s_{\rm NN}}$= 5.02 TeV will be discussed. The J/ψ nuclear modification factor ($R_{\rm pA}$), measured as a function of transverse momentum, rapidity and centrality, shows a sizeable kinematic dependence and its behaviour is in fair agreement with theoretical models including nuclear shadowing and energy loss. On the contrary, additional mechanisms related to final state interactions, are needed to describe the stronger suppression observed in the production of the loosely bound ψ(2S) state.

Preliminary Run-2 results on the J/ψ and ψ(2S) production in p-Pb collisions at $\sqrt{s_{\rm NN}}$= 8.16 TeV, at forward and backward rapidities, will be presented, together with new mid-rapidity J/ψ results at $\sqrt{s_{\rm NN}}$= 5.02 TeV. The charmonium $R_{\rm pA}$ will be compared to Run-1 results and to theoretical calculations.

Experimental Collaboration

ALICE Collaboration

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