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Quarkonia as probe of the initial stages of the pp, pPb and PbPb collisions with ALICE

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Quarkonia are considered a distinguished tool to study the strongly-interacting medium formed in ultrarelativistic heavy-ion collisions and they are sensitive to the dense gluonic system at low-x in the initial state of heavy-ion collisions. This can be investigated in photonuclear or proton-nuclear collisions. Furthermore a modification of the quarkonium vector states polarization in heavy-ion collisions with respect to pp collisions may give insights on QGP dynamics. Moreover, quarkonium measurements in high-multiplicity proton-proton (pp) collisions can shed light on the role of multiparton interactions (MPI) which are expected to be relevant for the production of heavy quarks at the LHC energies. ALICE measures quarkonium production down to zero transverse momentum, at forward rapidity (2.5 < y < 4) and midrapidity (|y| < 0.9). In this contribution, we will report on the first measurement of J/ψ polarization in Pb-Pb collisions at the LHC as a function of transverse momentum and centrality. The coherent J/ψ photoproduction cross section measurement in Pb-Pb collisions with nuclear overlap at $\sqrt{s_{\rm NN}} = 5.02$ TeV will be shown for the first time considering the full Run 2 data sample, and extended towards most central collisions. Final results on the nuclear modification factor for ψ(2S),Υ(1S) and Υ(2S) at forward and backward center-of-mass rapidities in p-Pb collisions at $\sqrt{s_{\rm NN}} = 8.16$ TeV will be shown, with a focus on the new centrality dependent ψ(2S) results. A broad collection of multiplicity-dependent quarkonium measurements in pp at $\sqrt{s} = 13$ TeV at mid- and forward-rapidity will be also presented. This includes, among others, recent results on the inclusive ψ(2S) and bottomonium production at forward rapidity.

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