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Investigating the interplay between initial hard processes and final-state effects measuring prompt and non-prompt J/ψ with ALICE

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Quarkonium production in high-energy hadronic collisions is sensitive to both perturbative and non-perturbative aspects of quantum chromodynamics (QCD) calculations. In fact, the production of the heavy-quark pair is described by perturbative QCD while the formation of the bound state is a non-perturbative process, treated in different ways by available theoretical models. Charmonia cross section can be split into a prompt component, corresponding to the quarkonia directly produced by the charm (anti-charm) quarks, and a non-prompt one, corresponding to the quarkonia originating from the decay of beauty hadrons. The latter can be identified experimentally thanks to its displaced topology and plays an important role in the estimation of the beauty-hadron production cross section. Moreover, non-prompt charmonia is also a valuable tool to investigate the properties of the strongly interacting medium produced in ultra-relativistic heavy-ion collisions. In particular, J/ψ produced in the decay of beauty hadrons can be used to study the mass dependence of heavy-quarks in-medium energy loss mechanism. In this contribution the recent measurement of prompt and non-prompt J/ψ carried out by the ALICE Collaboration in pp and Pb-Pb collisions at midrapidity ($|y| < 0.8$), at $\sqrt{s} = 13$ TeV and $\sqrt{s_{NN}} = 5.02$ TeV respectively, will be presented. Moreover, thanks to the installation of the new muon forward tracker (MFT), the prompt/non-prompt charmonia separation will be possible in LHC Run 3 also at forward rapidity ($2.5 < y < 4$). The status of the new measurements at $\sqrt{s} = 13.6$ TeV will be also presented and compared with the existing measurements and the available models.

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