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Detailed studies of prompt J/ψ and $\psi(2S)$ production in pp, pPb and PbPb collisions at $\sqrt{s_{NN}} = 5.02$ TeV

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The understanding of charmonium production in PbPb collisions requires the inclusion of many phenomena such as dissociation in the QGP, partonic energy loss, statistical recombination, on top of cold nuclear matter effects (modifications of nPDFs, initial-state energy loss, nuclear break-up). Final results on prompt J/ψ and $\psi(2S)$ production, based on the pp and PbPb data collected at 5.02 TeV by CMS in 2015, are reported, showing a stronger suppression of the excited state as compared to the ground state in all measured bins, as well as a hint for a weaker J/ψ suppression at low pt (possibly due to regeneration) and at high pt (possibly due to partonic energy loss). Final results on prompt J/ψ and $\psi(2S)$ production in pPb data at 5.02 TeV are also reported, showing a different modification of the ground and excited state already in this smaller system, especially in the Pb-going direction, hinting to a possible breakup of the weaker bound excited states from interactions with final state particles. Finally, fully unfolded results of J/ψ production inside jets in pp collisions show that production models are unable to properly model this topology.

Summary

Presenter: DIAB, Batoul (Centre National de la Recherche Scientifique (FR))

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