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Bottomonia production and polarization in pp collisions with ALICE

Quarkonium production in high-energy hadronic collisions is sensitive to both perturbative and non-perturbative aspects of quantum chromodynamics (QCD) calculations. From a theoretical point of view, 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 the available theoretical models. In this context, quarkonium polarization measurements represent a powerful tool to discriminate among the different theoretical predictions. In particular, the study of the anisotropies in the angular distribution of the decay production with respect to a given quantization axis is sensitive to the quarkonium hadronization mechanism, even if the very small values measured at the LHC have been challenging the commonly-used theoretical models. Moreover, the possibility to investigate effects related to the formation of a strongly interacting medium in ultra-relativistic heavy-ion collisions requires a precise determination of the proton-proton reference cross section and polarization. The ALICE collaboration has measured the $\Upsilon(1S)$ cross section and polarization at different center-of-mass energies and in this contribution we will present the recent measurements in pp collisions at $\sqrt{s} = 13$ TeV at forward rapidity (2.5 < y < 4) in the dimuon channel. In addition, thanks to the upgraded detector and the large data sample collected in LHC Run 3 the preliminary measurement of $\Upsilon(2S)$-to-$\Upsilon(1S)$ ratio both at mid (|y| < 0.9) and forward rapidity (2.5 < y < 4) will be presented for the first time at $\sqrt{s} = 13.6$ TeV in the e^+e^- and $\mu^+\mu^-$ decay channel respectively.

Category

Experiment

Collaboration (if applicable)

ALICE

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