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Measurements of inclusive J/ψ and $\psi(2S)$ production at midrapidity in pp collisions at $\sqrt{s} = 13.6$ TeV with ALICE

Quarkonium production in high-energy proton-proton (pp) collisions is an important tool for studying perturbative and non-perturbative aspects of quantum chromodynamics (QCD). Charmonia are bound states of charm and anti-charm quarks and their production process can be factorized into two stages: the heavy quark production and the formation of the bound state. The former happens within initial hard parton-parton scatterings with large momentum transfers, and can be well described by perturbative QCD. The second one, which involves long distances and soft momentum scales, is a typical non-perturbative process. Measurements of J/ψ and $\psi(2S)$ cross section in pp collisions are crucial for studying charmonium production mechanisms and testing different QCD-based model calculations. They can also provide a reference for investigating the quark-gluon plasma formed in nucleus-nucleus collisions and the cold nuclear matter effects in proton-nucleus collisions.

In this talk, we will present the results of inclusive J/ψ and $\psi(2S)$ production at midrapidity ($|y| < 0.9$) in pp collisions at the center-of-mass energy of $\sqrt{s} = 13.6$ TeV. The analysis is based on the data collected in 2022 by the upgraded ALICE detector during LHC Run 3, which offers significantly higher statistics compared to Run 1 and 2. The p_T -differential production of inclusive J/ψ cross section, as well as the $\psi(2S)$ -to- J/ψ ratio, will be reported. Results will be shown along with similar measurements at forward rapidity and compared with model calculations.

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