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## Measurement of inclusive $J/\psi$ polarization at midrapidity in pp collisions at $\sqrt{s} = 13.6$ TeV with ALICE

Quarkonia in high-energy proton-proton (pp) collisions are important probes for studying the quantum chromodynamics (QCD) in vacuum. Understanding the production mechanism of  $J/\psi$ , a bound state of a charm and anti-charm quark, is crucial to constrain both perturbative and non-perturbative aspects of QCD calculations. Different theoretical models have been developed aiming to describe the whole production mechanism from the partonic interaction to the heavy-quark pair hadronisation into a quarkonium state. All approaches are based on the factorisation hypothesis between hard and soft scales. The polarization of quarkonia in pp collisions is a powerful observable to discriminate among several QCD-based model calculations of quarkonium production. Furthermore,  $J/\psi$  polarization measurement in pp collisions can also provide a reference for investigating the fate of charmonium in the quark-gluon plasma formed in nucleus-nucleus collisions. In this poster, we will present the performance and analysis status of the inclusive  $J/\psi$  polarization measurement via the dielectron decay channel ( $J/\psi \rightarrow e^+e^-$ ) at midrapidity ( $|y| < 0.9$ ) in pp collisions at  $\sqrt{s} = 13.6$  TeV. This analysis is based on data collected by the upgraded ALICE detector and benefits from the high luminosity collected during the first three years of LHC Run 3. It offers significantly higher statistics compared to the one available from previous pp data collected during the Run 2 of LHC, allowing for the first  $J/\psi$  polarization measurement at midrapidity. This analysis will be discussed together with previous  $J/\psi$  measurements in pp collisions from ALICE based on Run 2 data.

### Category

Experiment

### Collaboration (if applicable)

ALICE

**Author:** XIONG, Zhenjun (University of Science and Technology of China (CN))

**Presenter:** XIONG, Zhenjun (University of Science and Technology of China (CN))

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