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Measurement of the J/ψ polarization in pp and Pb–Pb collisions with ALICE at the LHC

Quarkonia production in high-energy proton-proton (pp) collisions serves as an important probe for studying quantum chromodynamics (QCD) in vacuum. Understanding the production mechanism of the J/ψ, a bound state of a charm and anticharm quark, is essential for constraining both perturbative and non-perturbative aspects of QCD calculations. The polarization of quarkonia in pp collisions is a powerful observable for distinguishing between various QCD-based models of quarkonium production. Furthermore, J/ψ polarization measurements in pp collisions provide a valuable reference for investigating the behavior of charmonium in the quark-gluon plasma formed in nucleus-nucleus collisions.

In this contribution, we will present the first preliminary results of the inclusive J/ψ polarization measurement via the dielectron decay channel at midrapidity ($|y| < 0.9$) in pp collisions at $\sqrt{s} = 13.6$ TeV. This analysis will be discussed alongside previous J/ψ measurements at forward rapidity and related results, including vector mesons such as ϕ and K^* in pp collisions from ALICE Run 2 data. Additionally, the J/ψ polarization with respect to the event plane in heavy-ion collisions will also be discussed.

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