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Quarkonium production in pp and Pb-Pb collisions with ALICE at the LHC in Run 3

Quarkonium is one of the most important tools to study the strongly interacting medium under extreme conditions formed in heavy-ion collisions. Heavy quarks ($\bar{c}c$ and $\bar{b}b$) are produced in the early stages of the collisions and thus experience the whole Quark Gluon Plasma (QGP) evolution. In addition, its significant (re)generation (recombination of uncorrelated charm quark pairs) makes it a unique and interesting candidate for studying the formed QCD medium. The study of quarkonia in high-energy proton-proton (pp) collisions is used as a testing ground for quantum chromodynamics (QCD) to investigate both perturbative and non-perturbative dynamics. The initial stage, governed by hard parton-parton scatterings is described by perturbative QCD, while the later stage involves low momentum scales, and it is intrinsically non-perturbative.

The azimuthal anisotropy measurements in heavy-ion collisions provide insights on the nature of the QGP medium and of its evolution in heavy-ion collisions. The second-order Fourier coefficient (v_2) of J/ψ mesons is an observable sensitive to the degree of thermalization of charm quarks in the medium at low p_{T}, as well as to its path-length dependence on energy loss at high p_{T}. The Pb—Pb data sample collected by the ALICE experiment during LHC Run˜3 is approximately twice that collected in Run 2, representing a unique opportunity to achieve higher precision in statistics-driven measurements. This presentation will discuss the new results of the J/ψ v_2 via the dimuon decay channel using event-plane methods for Run 3 Pb—Pb data at $\sqrt{s}_{\mathrm{NN}}$ = 5.36 TeV at forward rapidity ($2.5 < y < 4$). The preliminary results on the double ratio of $\psi(2S)$-to-J/ψ as well as inclusive quarkonium yields in pp collisions at $\sqrt{s}$ = 13.6 TeV, measured by the ALICE Collaboration, will be presented and compared with current theoretical model predictions. Additionally, results from ALICE's ongoing measurements of the exotic particle X(3872) in pp collisions at $\sqrt{s}$ = 13.6 TeV will also be discussed.

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