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Quarkonium polarization in Pb-Pb and pp collisions with ALICE

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Polarization and spin-alignment measurements represent an important tool for the understanding of the particle production mechanisms occurring in proton–proton collisions. When considering heavy-ion collisions, quarkonium polarization could also be used to investigate the characteristics of the hot and dense medium (quark-gluon plasma) created at the LHC energies. In ALICE, this observable was extracted for the first time in Pb-Pb collisions and a significant difference with respect to a corresponding pp measurement of LHCb was found. This discrepancy could be related to the modification of the J/ψ feed-down fractions, due to the suppression of the excited states in the QGP, but also to the contribution of the regenerated J/ψ in the low p_T region. Moreover, it has been hypothesized that quarkonium states could be polarized by the strong magnetic field, generated in the early phase of the evolution of the system, and by the large angular momentum of the medium in non-central heavy-ion collisions. This kind of information can be assessed by defining an ad hoc reference frame where the quantization axis is orthogonal to the event plane of the collision.

In this contribution, the first result of J/ψ polarization with respect to the event-plane in Pb–Pb collisions at $\sqrt{s_{NN}} = 5.02$ TeV will be presented. The p_T-differential measurement was performed at forward rapidity (2.5 < y < 4) and the results will be shown for different centrality classes. The preliminary measurement of the Υ polarization in pp collisions at $\sqrt{s} = 13$ TeV as a function of the transverse momentum will also be discussed.

In-person participation

Yes

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