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Charmonium production in Pb-Pb collisions with ALICE at the LHC

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Charmonia (for instance J/ψ and $\psi(2S)$) are mesons formed of a charm and anti-charm quark pair. In high-energy hadronic collisions such as those delivered by the LHC between 2010 and 2013, charmonium production results from the hard scattering of two gluons, which occurs very early. In heavy ion collisions, charmonia can thus probe all states of the nuclear matter formed afterward and have therefore been used extensively to study the properties of the Quark-Gluon Plasma (QGP).

In this presentation we will report on published charmonium measurements performed by ALICE in Pb – Pb collisions at a center of mass energy per nucleon-nucleon collision $\sqrt{s_{NN}} = 2.76$ TeV, at both mid ($|y| < 0.8$) and forward ($2.5 < y < 4$) rapidities. The nuclear modification factor of inclusive J/ψ will be presented as a function of the collision centrality, the J/ψ transverse momentum (p_T) as well as its rapidity. The variation of the J/ψ mean transverse momentum and mean transverse momentum squared as a function of the collision centrality will also be discussed. These measurements will be compared to models that include one or several of the following mechanisms: color screening; balance between dissociation and recombination in the QGP; recombination at the QGP phase boundary; interaction with a dense comoving medium. Results on the production of the heavier and less bound $\psi(2S)$ meson in Pb – Pb collisions at forward-rapidity will also be presented and compared to both models and measurements performed by other experiments. At mid-rapidity we will also report on ALICE unique capability to separate prompt and non-prompt J/ψ production down to low p_T (≥ 1.5 GeV/c) and thus provide direct insight on the energy loss of b quarks in the QGP.

On behalf of collaboration:

ALICE

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