Contribution ID: **245** Type: **Oral Presentation**

J/ψ suppression at forward rapidity in Pb–Pb collisions

Tuesday, 4 July 2017 15:00 (20 minutes)

The Quark Gluon Plasma (QGP), characterized by high temperature and density, is a state of strongly interacting matter in which the constituents of hadronic matter, the quarks and gluons, are no longer confined. Some of the most sensitive probes of the QGP are charmonia and bottomonia, which are bound states of charm–anticharm (c-$\bar{c}$) or bottom–antibottom (b-$\bar{b}$) quarks, respectively. Early theoretical models predicted a suppression of these bound states to be induced by the screening of the color force in a deconfined medium and to become stronger as the QGP temperature increases. For the J/Ψ meson, the ground c$\bar{c}$ state, a suppression was found for nucleus-nucleus interactions at centre-of-mass energy per nucleon pair, √sNN, ranging from 17.62 GeV to 2.76 TeV. However, at 2.76 TeV this suppression is found to be lower than observed at lower energies. This observation is unexpected since the initial temperature of the QGP is higher at 2.76 TeV. This could be explained in terms of contributions from J/ψ regeneration via a recombination mechanism between the c and $\bar{c}$ quarks during the phase of no confinement and/or the hadronisation phase of the medium. This interplay between suppression and regeneration of J/ψ production at the LHC can be studied further by comparing the centrality and pT dependence of the J/ψ, measured at √sNN=2.76 TeV, to that obtained at √sNN=5.02 TeV, the highest energy available in nuclear collisions.
Recently the ALICE Collaboration presented the first results on the J/ψ measured in Pb–Pb collisions at √sNN=5.02 TeV and the integrated and pT-differential J/ψ production cross section in pp collisions at the same energy. In both Pb–Pb and pp collisions, the J/ψ is reconstructed via its dimuon decay channel at forward rapidity, 2.5<y<4 and for pT<12 GeV/c. This presentation will focus on the comparison of these data with the earlier measurements at √sNN=2.76 TeV, together with theoretical calculations which could provide insights in the evolution of the relative contribution of the two processes.

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Session Classification: Nuclear, Particle and Radiation Physics 2

Track Classification: Track B - Nuclear, Particle and Radiation Physics