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Hadron production and bottomia suppression at the LHC

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Collaboration

Abstract content

Hadron production in heavy-ion collisions at the LHC through gluon-gluon and gluon-valence quark collisions can be described in various microscopic and macroscopic models. Here I use a phenomenological three-sources approach that allows to precisely account for the charged-hadron pseudorapidity distributions measured by the ALICE collaboration in Pb-Pb collisions as function of centrality at the current c.m. energy of 2.76 TeV, and make predictions at the design energy of 5.52 TeV. The three-sources model also describes the asymmetric charged-particle distributions recently measured in proton-lead collisions at 5 TeV [1] where it provides a prediction [2] at large pseudorapidities $|\eta| > 2$. As a sensitive probe for the quark-gluon plasma that is likely created in heavy-ion collisions at RHIC and LHC energies, heavy quarkonia and in particular, the Υ meson as observed by CMS [3] have proven to be a very useful tool. Here it is suggested that the combined effect of gluon-induced dissociation, collisional damping, screening, and reduced feed-down explains [4] most of the suppression of Upsilon states that has been observed [3] in Pb-Pb relative to pp collisions at $\sqrt(s_{NN}) = 2.76$ TeV at the CERN LHC. The suppression is thus a clear, albeit indirect, indication for the presence of a Quark-Gluon Plasma.
[1] B. Abelev et al., ALICE Collab., Phys. Rev. Lett. 110, 032301 (2013). [2] G. Wolschin, J. Phys. G 40, 045104 (2013). [3] S. Chatrchyan et al., CMS Collab., Phys. Rev. Lett. 107, 052302 (2011); 109, 222301 (2012). [4] F. Nendzig and G. Wolschin, Phys. Rev. C87, 024911 (2013), and submitted to J. Phys. G.

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