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Quarkonium Production at STAR

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The production of quarkonium has been studied to provide information about the hypothesized Quark Gluon Plasma (QGP) that is expected to be created in relativistic heavy ion collisions at RHIC. Lattice QCD predicts a suppression of quarkonium production in the presence of a hot and dense medium relative to proton-proton collisions, with the suppression pattern of the various quarkonium states providing insight into the thermodynamic properties of the QGP. The suppression is expected due to the Debye screening of the potential between heavy quarks in a dense medium. However there are other effects due to the presence of a QGP which may contribute to the modification of heavy quark production, such as statistical coalescence of heavy quark-antiquark pairs, or co-mover absorption. There are also ordinary Cold Nuclear Matter (CNM) effects, such as the modification of nuclear PDFs (shadowing), and final state nuclear absorption, which need to be taken into account in order to fully quantify an anomalous suppression. This can be achieved by studying the production of various quarkonium states in p+p, d+A and A+A collisions. Furthermore, p+p collisions can offer insight to the quarkonium production mechanism and feed down effects from higher states.\\

In this talk we will report the results on heavy quarkonium production in p+p, d+Au, and Au+Au collisions at midrapidity via the dielectron decay channel at $\sqrt{s_{NN}} = 200$ GeV from STAR. Results from J/ψ production in p+p collisions will be presented to provide a baseline for production and understand the quarkonium production mechanism. The nuclear modification factor for J/ψ will also be reported, along with results from Upsilon production in p+p, d+Au, and Au+Au collisions, to investigate the suppression of quarkonium at STAR.

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