



Contribution ID: 588

Type: Oral presentation

J/ψ and $\psi(2S)$ production in small systems with PHENIX

Wednesday 6 April 2022 15:40 (20 minutes)

The suppression of the J/ψ nuclear modification factor has been seen as a trademark signature of final state effects in large collision systems for decades. In small systems, deviations of the nuclear modification from unity had been attributed to cold nuclear matter effects until the observation of strong differential suppression of the $\psi(2S)$ state in $p/d+A$ collisions, which suggests the presence of final state effects. In this talk, we present results of J/ψ and $\psi(2S)$ measurements in the dimuon decay channel for $p+p$, $p+Al$, and $p+Au$ collision systems at $\sqrt{s_{NN}} = 200$ GeV. Key results include the nuclear modification factors R_{pA} as function of p_T and rapidity. The measurements are compared with shadowing and transport model predictions, as well as to complementary measurements at LHC energies.

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Session Classification: Parallel Session T05: QGP in small and medium systems

Track Classification: QGP in small and medium systems