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## Study of multiplicity dependent $J/\psi$ and $\psi(2S)$ production in $p+p$ collisions with PHENIX

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The PHENIX experiment at RHIC has a special ability to detect muons at the region  $1.2 < |y| < 2.2$  from heavy quarks which are studied extensively to understand their production and modification in high energy hadron-hadron collisions. Quarkonia states like  $J/\psi$  and  $\psi(2S)$  of different binding energies are expected to have their yields modified differently by the medium or comoving particles. The  $\psi(2S)$  is significantly more suppressed than  $J/\psi$  in heavy-ion collisions by color screening effect. Quarkonia production in small collision systems like  $p+A$  collisions is also modified due to the initial state and final state effects, and a relative modification between  $J/\psi$  and  $\psi(2S)$  can provide important information on final state effects. We have been studying the multiplicity dependence of the production of  $J/\psi$  and  $\psi(2S)$  in  $p+p$  collisions at PHENIX to analyze the behavior of the potentially smallest QGP (collision system). In this poster, we will present the status of this study along with recent measurements of  $J/\psi$  and  $\psi(2S)$  in  $p+p$  collisions at  $\sqrt{s_{NN}} = 200$  GeV with other experiments and theoretical models.

**Primary author:** OH, Jongho (Pusan National University (KR))

**Presenter:** OH, Jongho (Pusan National University (KR))

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