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Measurements of Upsilon production in p+p collisions at sqrt(s)=500 GeV with the STAR experiment

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Studies of the production cross-sections for various Υ states have provided valuable constraints on the bottomonium production models. Recently, a more differential measurement, namely the relative production yields as a function of event multiplicity, has been presented for the Υ mesons in p+p collisions at the LHC. A stronger-than-linear rise is observed, indicating an interplay between hard and soft processes. Possible explanations for such a rise include a possible collective behavior due to interactions between color field strings in high-multiplicity collisions or creation of Υ mesons in multiple parton interactions. Similar measurements at the RHIC energy can further shed light onto the Υ production mechanism. In addition, possible effects of interactions between loosely-bound excited Υ states and the co-moving hadrons can be accessed by studying the relative yields between the ground and excited Υ states as a function of event multiplicity.

In this talk, the first measurement of the Υ invariant cross section in p+p collisions at $\sqrt{s} = 500\,\mathrm{GeV}$ at RHIC will be presented as a function of transverse momentum and rapidity. The data sample collected in year 2011 allows a separation of $\Upsilon(1S)$ and $\Upsilon(2S+3S)$ states. The obtained cross sections are compared to the Color Evaporation Model as well as to the Non-relativistic Quantum Chromodynamics calculation coupled with the Color Glass Condensate formalism. The relative production yields for the ground and excited Υ states separately, as well as the yield ratios between the ground and excited Υ states, will be presented as a function of event multiplicity, and compared to model calculations and existing data.

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