



Contribution ID: 575

Type: Poster

Quarkonium production in p+p collisions measured by the STAR experiment

Friday, 8 April 2022 14:08 (4 minutes)

In heavy-ion collisions, quarkonium states are used to study the properties of the quark-gluon plasma. Measurements of quarkonia in p+p collisions serve as important references. However, the production mechanism of quarkonium states in p+p collisions is still not fully understood because it involves both perturbative and non-perturbative QCD processes. Measurements of J/ψ production with jet activity (number of jets in an event) provide important insight into the production mechanism as Color Singlet Model (CSM) and Color Octet Model (COM) give different predictions on the number of jets produced in J/ψ events. In addition, the production mechanism can also be studied by measuring inclusive quarkonium production cross section and differential production within jets.

In this presentation, the transverse momentum and rapidity spectra of Υ states, including $\Upsilon(2S)$ and $\Upsilon(3S)$ states separately, measured in p+p collisions at $\sqrt{s} = 500\text{ GeV}$ will be shown. Furthermore, the first measurements of the J/ψ production with jet activity in p+p collisions at $\sqrt{s} = 200\text{ GeV}$ and J/ψ production in jets at $\sqrt{s} = 500\text{ GeV}$ will be presented. All results will be compared to quarkonium production model calculations.

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Session Classification: Poster Session 3 T11_3

Track Classification: Heavy flavors, quarkonia, and strangeness production