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Quarkonium measurements via the di-muon decay channel in p+p and Au+Au collisions with the STAR experiment

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Heavy quarkonia are an essential probe in understanding the properties of the quark-gluon plasma (QGP) formed
in relativistic heavy-ion collisions. The suppression of J/ψ in the medium due to color-screening has been proposed
as a direct signature of the QGP formation.
However, its production mechanism in p+p collisions have not been fully understood despite of decades of efforts,
which warrants more measurements. Moreover, the contribution from regenerated J/ψ by the coalescence of
uncorrelated c and $\bar{c}$ quarks in the medium can add an additional complication to the interpretation of observed J/ψ suppression in Au+Au collisions. Precise measurements of J/ψ production in p+p collisions, and the nuclear
modification factor (R_{AA}) and elliptic flow (v_2) in a wide p_T range in Au+Au collisions, can help better understand
different production mechanisms in such collisions. On the other hand, Υ states are cleaner probes
since the regeneration contribution is negligible at RHIC energies.

The newly installed Muon Telescope Detector, which provides muon identification capability at mid-rapidity, opens the door to
measure quarkonia via the di-muon channel at STAR.
In this talk, we will present (1) measurements of J/ψ production in p+p collisions at $\sqrt{s} = 500$ GeV sampled during RHIC 2013 run,
including its cross-section and yield dependence on event multiplicity; (2) measurements of R_{AA} and v_2 of J/ψ , and the production
of Υ states in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV, based on the full data sample taken in RHIC 2014 run.

On behalf of collaboration:

STAR

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