

Exploring Upsilon Production Mechanisms using PYTHIA Simulation in Proton-Proton Collision

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Due to Debye-like color screening of quarkonium binding potential, quarkonium suppression has been proposed as an important signature of quark-gluon plasma, produced in central heavy ion collisions. However the quarkonium production mechanism is still an unresolved question. The production can happen through hard scattering and an intermediate Color Singlet or Color Octet states, which various production models attempt to describe.

We propose to investigate the production mechanisms of Υ mesons by analyzing Υ -hadron azimuthal correlations at different pseudorapidity ranges. Through this analysis of azimuthal correlations between Υ mesons and hadrons in PYTHIA-simulated pp collisions, our aim is to gain insights into the dynamics governing the formation and evolution of Υ states. This approach allows us to further test the quarkonia production models as well as Upsilon behavior in overall p+p collision at the beam energies of 500 MeV and 14 TeV, which include Multi Parton Interaction (MPI) effects.

This study serves as proof of principle in order to perform such analysis in the STAR experiment at the Relativistic Heavy Ion Collider in BNL

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