Toward a Measurement of the Multiplicity Dependence of the J/ψ Yield in p+p collisions at $\sqrt{s} = 510$ GeV in the STAR experiment

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Abstract

Bound states of heavy quarks with their anti-quarks, known as quarkonia, are a useful probe into the non-perturbative aspects of quantum chromodynamics (QCD). The J/ψ meson is a quarkonium made up of a charm and an anti-charm quark. The aim of this analysis is to measure the J/ψ transverse momentum spectrum and yield as a function of multiplicity in proton-proton collisions at $\sqrt{s} = 510$ GeV via the dilepton decay channels with the STAR experiment. Two prominent J/ψ decay modes are dielectron (e^+e^-) and dimuon ($\mu^+\mu^-$). Decays through the dimuon channel can be detected via the Muon Telescope Detector and the Time Projection Chamber (TPC), while dielectron decays can be identified by a combination of measurements from the TPC, Time of Flight detector, and the Barrel Electromagnetic Calorimeter. The initial steps of the analysis will be shown, including J/ψ invariant mass distributions and the methods for electron and muon identification using the aforementioned detectors.