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Heavy Flavor Triggered Azimuthal Correlations in p+p and Au+Au Collisions from STAR

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At RHIC energies, heavy quark pairs are mostly produced through initial hard scatterings, leading to a cleaner interpretation and understanding of the measurements in heavy-ion collisions. Correlations between heavy flavor quark (c, b) pairs offer a unique insight into early interaction dynamics of the hot and dense QCD matter. In the meantime, a comprehensive investigation of heavy quark pair production mechanisms in proton-proton collisions is of great importance and interest as a fundamental perturbative QCD (pQCD) test and baseline measurement for heavy-ion collisions.

We report new STAR measurements of heavy flavor correlations in p+p and Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV and p+p collisions at $\sqrt{s} = 500$ GeV using D mesons, Non-Photonic Electrons (NPE) from semileptonic decays of open heavy flavor hadrons as well as J/ψ 's as trigger particles. Azimuthal angular correlation distributions between trigger D mesons and associated charged hadrons (D-h), NPE (D-NPE) as well as anti-D mesons (D- \bar{D}) are measured in p+p 500 GeV for the first time. Results with much improved precisions are also obtained on J/ψ -h and NPE-h correlations in p+p collisions at $\sqrt{s} = 200$ and 500 GeV, respectively. These results are compared with pQCD calculations to improve understanding of charm and bottom quark production in elementary hadron collisions. NPE-h correlations are also measured in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV and compared with those in p+p collisions at $\sqrt{s} = 200$ GeV to investigate parton-medium interactions. Finally, the first measurement of electron-muon correlations from heavy flavor quark-antiquark pair decays is presented, utilizing the new STAR Heavy Flavor Tracker and Muon Telescope Detector in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV. Prospects of heavy flavor correlation measurements in heavy-ion collisions are discussed.

On behalf of collaboration:

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