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Charm and beauty isolation in heavy flavor electron measurements in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV at RHIC

Summary

Heavy quarks (charm and beauty) are believed to be produced predominately in hard scattering processes at early stage of the collisions before the QGP production so they can pass through the hot-dense medium completely, and their production yields can be calculated by perturbative-QCD, which makes them ideal probes for QGP. According to the theoretical prediction, energy loss of heavy quarks is less than that of light quarks due to the suppression of the gluon radiation angle by the quark mass. Heavy quarks could be more difficult to be thermalized than light quarks in the hot-dense medium and moved following the collective flow during the expansion of the partonic matter. Because of its three times larger mass compared with that of charm, beauty could have different properties in terms of its interactions with QGP medium from charm.

We develop a data-driven method to isolate charm and beauty contributions from the inclusive heavy flavor electrons based on the most recent open charm hadron measurements in minimum bias Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV at RHIC. The individual electron nuclear modification factor (R_{AA}) and elliptic flow (v_2) from charm and beauty decays will be reported. Model comparisons and discussions will also be given.

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