Production of $D^{\pm}$ mesons in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV at the STAR experiment

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Charm quarks are an excellent probe of the quark-gluon plasma created in heavy-ion collisions as they are produced at very early stages of such collisions and subsequently experience the whole evolution of the system. At the STAR experiment, charm quark production can be measured by direct topological reconstruction of open-charm hadrons thanks to the exceptional spatial resolution of the Heavy-Flavor Tracker detector.

In this poster, we will present a measurement of $D^{\pm}$ meson production in Au+Au collisions at $\sqrt{s_{NN}} = 200$ GeV by the STAR experiment using data collected in 2014 and 2016. Supervised machine-learning techniques were used to maximize signal significance in raw yield extraction from the three body hadronic decay channel $D^{\pm} \to K^{\mp}\pi^{\pm}\pi^{\pm}$. The $D^{\pm}$ invariant spectrum was then obtained in 0-10%, 10-40%, and 40-80% central Au+Au collisions. The measured nuclear modification factor $R_{AA}(p_T)$ reveals a significant suppression of high-p_T $D^{\pm}$ mesons in central (0-10%) and mid-central (10-40%) Au+Au collisions with respect to p+p collisions. The $(D^+ + D^-)/(D^0 + \overline{D^0})$ yield ratio has also been extracted and compared to that from PYTHIA calculations.