Measurements of $D^{\pm}$ meson production and total charm quark production yield at midrapidity in Au+Au collisions at $\sqrt{s_{\rm NN}} = 200\,\text{GeV}$ by the STAR experiment

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One of main goals of the STAR experiment is to study the Quark-Gluon Plasma (QGP) produced in ultra-relativistic heavy-ion collisions. Charm quarks are an ideal probe of the QGP, as they are created primarily in hard partonic scatterings at early stage of Au+Au collisions. In this talk, we present the measurements of $D^{\pm}$ meson production in Au+Au collisions at $\sqrt{s_{\rm NN}} = 200$ GeV by STAR using the data collected in 2014 and 2016. $\rm D^{\pm}$ mesons are reconstructed via a topological reconstruction of the three body hadronic decay $D^{\pm} \to K^{\mp}\pi^{\pm}\pi^{\pm}$, enabled by the exceptional track pointing resolution of the Heavy-Flavor Tracker. Supervised machine-learning techniques are used to improve the signal significance. The $D^{\pm}$ transverse momentum ($p_{\rm T}$) spectra are then obtained in 0-10%, 10-40%, and 40-80% central Au+Au collisions. The spectra are used to calculate the nuclear modification factor as a function of p_T which reveals a significant suppression of high-p_T $D^{\pm}$ meson production in central and mid-central Au+Au collisions with respect to p+p collisions. The D^{+}/D^{0} yield ratios as a function of $p_{\rm T}$ and centrality have also been extracted and compared to that from PYTHIA calculations. For the first time, STAR has measured the total charm quark production cross section per nucleon-nucleon collision, combining the main open charm hadron ground states ($\rm D^0$, $\rm D^{\pm}$, $\rm D_s$, and Λ_c), at midrapidity in 10-40% central Au+Au collisions at 200 GeV, which provides insight into the charm quark production in heavy-ion collisions.