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A faster pixel detector for open bottom hadron measurements at RHIC

Heavy flavor quarks are dominantly produced from initial hard partonic scattering processes in high-energy nuclear collisions. Their interactions with nuclear medium are sensitive to the medium properties. The Heavy Flavor Tracker (HFT) has been successfully integrated into the STAR experiment at RHIC since early 2014. Based on the state-of-the-art Monolithic Active Pixel Sensor (MAPS) technology, the HFT allows precise measurements of open charm mesons (D^0, $D^{\pm}$ and D_s) as well as the first measurements of open charm baryons (Λ_c) and bottom hadron production in heavy-ion collisions over a wide range of transverse momentum.

In this talk we propose a faster pixel detector, based on the next generation of MAPS technology, for precise bottom hadron measurements to study the flavor dependence of partonic energy loss in Au+Au collisions at RHIC. The advantages of the new MAPS sensors are that they have a much better radiation tolerance and a much faster integration time of less than 40 μs, which allow for improved operation in high luminosity environment with less pile-up hits and better tracking efficiency. With the faster pixel detector and integrated luminosity of 10 nb^{-1} for Au+Au collisions and 60 pb^{-1} for p+p collisions at $\sqrt{s_{NN}}$ = 200 GeV to be recorded, the nuclear modification factor (R_{AA}) for non-prompt J/ψ and D^0 from beauty decays and b-tagged jets can be measured with good precision according to Monte Carlo simulations. Such precision measurements on bottom production will complete the heavy flavor program at RHIC, and will be complimentary to similar measurements at the LHC.

Preferred Track

Future Experimental Facilities, Upgrades, and Instrumentation

Collaboration

STAR

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