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Heavy Flavor Physics with MVTX Detectors in sPHENIX

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The sPHENIX experiment will begin commissioning in Spring 2023 at the Relativistic Heavy Ion Collider (RHIC) at BNL, presenting a unique opportunity to study QGP properties using jets and heavy quarks with unprecedented precision. The successful construction and deployment of the three-layer Monolithic-Active-Pixel-Sensor (MAPS) based VerTeX detector (MVTX) for the sPHENIX experiment in 2023 enables precise measurements of heavy bottom quark jets (b-jets) and B-hadrons produced in high-energy heavy-ion Au+Au and p+p collisions at RHIC. These measurements offer a unique set of observables given the large bottom quark mass. These measurements will span an unexplored kinematic regime, particularly at low p_T where mass-dependence effects in QGP are expected to be significant, while the underlying backgrounds are also expected to be high.
The MVTX detectors serve as the innermost tracking system of the sPHENIX experiment, covering 2.5-4.0 cm radially and a pseudorapidity range of $|\eta| < 2$. With its very fine 27 μm x 29 μm pixels, the MVTX detector can identify heavy hadron decay secondary vertices and heavy flavor jets in heavy ion collisions with high efficiency and purity. In this poster, we will highlight the impact of the MVTX detector on future heavy flavor measurements, including b-hadrons and b-jets in heavy ion collisions and will present the status of the MVTX detector commissioning.

Category

Experiment

Collaboration (if applicable)

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