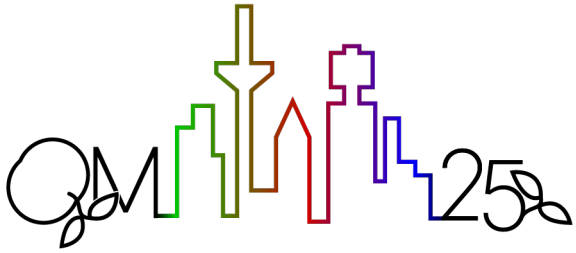

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sPHENIX Alignment of the MVTX Tracking Detector

sPHENIX, located at the Relativistic Heavy Ion Collider at Brookhaven National Laboratory, is a multipurpose proton and ion collider detector, and a central piece of its physics program is the measurement of open heavy flavor production in both pp and AuAu collision systems. Production of D mesons, both prompt and as cascade decays from B mesons, provide clean probes of the Quark Gluon Plasma. In sPEHNIX, these charm hadrons will be reconstructed via their decays to charged particles and their associated reconstructed tracks originating from a secondary vertex. The reconstruction of these secondary vertices is required to distinguish open heavy flavor events from background processes, and in sPHENIX this is achieved with the MAPS Vertex Detector (MVTX). The MVTX is a Monolithic Activated Pixel Sensor (MAPS) detector consisting of three layers of 48 staves total, each with 9 sensor chips providing coverage of $|\eta| < 1$. To ensure the track reconstruction and vertexing achieves optimum performance, it is necessary to ensure the MAPS chips, staves, layers, and half detector components are aligned to a precision of O(10 μm). The relative alignment of the MVTX is thus performed using a combination of collision data from sPHENIX run 24 with 200 GeV pp collisions for high statistics and cosmic ray events to constrain bulk transformations and weak modes. The alignment is performed iteratively through a combination of 3D Distance of Closest Approach minimization and use of global alignment fit package, Millepede II. The results of the MVTX alignment is shown, including representative event displays, and residual distributions demonstrating the achieved precision of the MVTX alignment.

Category

Experiment

Collaboration (if applicable)

sPHENIX

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