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# The STAR Heavy Flavor Tracker: Embedding Simulations into a High Multiplicity Environment

The STAR Heavy Flavor Tracker (HFT) has enabled a rich physics program, providing important insights into heavy quark behavior in heavy ion collisions. Acquiring data during the 2014 through 2016 runs at the Relativistic Heavy Ion Collider (RHIC), the HFT consisted of four layers of precision silicon sensors, including the first application of the thin Monolithic Active Pixel Sensors (MAPS) technology in a collider environment: the STAR Pixel detector. Used in concert with the Time Projection Chamber (TPC), the HFT enables the reconstruction and topological identification of tracks arising from charmed hadron decays. The ultimate understanding of the detector efficiency and resolution demands high quality simulations, accounting for the precise positioning of the sensors, and the detailed response of the detectors and electronics to the incident tracks. The background environment presents additional challenges, including significant contributions from pileup events accumulated during the long integration times of the tracking detectors, and complicated by the large flux through the first pixel layer of low-momentum electrons from ultra-peripheral collisions. We will discuss how STAR has addressed realistic simulations (aka embedding) for efficiency corrections, and will show how the careful consideration of misalignment of precision detectors and calibration uncertainties results in detailed reproduction of basic observables, such as track projection to the primary vertex. We will further summarize the experience and lessons learned in applying these techniques to heavy-flavor simulations and discuss recent results.

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