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Status of the STAR Event Plane Detector (EPD)

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The first phase of Beam Energy Scan (BES) program of the Relativistic Heavy Ion Collider (RHIC) was an exploration of the QCD phase diagram. The second phase is an exploration for criticality and phase transition signals. For the Solenoidal Tracker at RHIC (STAR) a quantitative understanding of these signals requires an increase in statistics in 7.7, 11.5, 14.5 and 19.6 GeV AuAu collisions as well as dedicated hardware upgrades. The Event Plane Detector (EPD) is a proposed high η hit detector that would replace the STAR Beam Beam Counter (BBC –a 32 channel hit detector $3.3 < |\eta| < 5.0$ used for BES triggering and first order event plane reconstruction) for BES II, which is scheduled to begin in 2019. The EPD would provide improved triggering, increased detector coverage in jet-like η-ϕ correlation measurements, improved resolution for event plane determination independent of the TPC ($|\eta| < 1$), and provide a TPC independent centrality definition. Divorcing event plane and centrality determination from the TPC via a forward detector is crucial for correlation measurements performed at mid-rapidity.

The EPD design consists of two scintillator discs at $\pm$ 3.75m, each is separated into ˜500 tiles. A tile has embedded wavelength shifting fiber coupled to clear fiber outside of the tile which is, in turn, coupled to a silicon photomultiplier (SiPM) –an inexpensive and magnetic field insensitive replacement for traditional phototubes. A pre-prototype of the detector, featuring scintillator with embedded fiber coupled to SiPMs was integrated into STAR during the 2015 run. Currently tile designs varying geometry and detector specifications are being fabricated and tested along with latest generation SiPMs. Additionally simulations have been performed to optimize tile η/ϕ segmentation, size, and shape. A newly machined prototype featuring the anticipated geometry of the EPD will be put in place during RHIC run 2016.

On behalf of collaboration:

STAR

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