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Status and performance of the detector upgrades for STAR in the BES-II and beyond

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The phase I RHIC beam energy scan program (BES-I) has provided promising hints in the search for a first-order transition in the QCD phase diagram and the turn-off of QGP signatures at collision energies below 20 GeV.

Several observables warrant closer investigation during the beam energy scan phase II program (BES-II) that covers the center-of-mass energy range 7.7 GeV to 19.6 GeV in collider mode and 3 GeV to 7.7 GeV in the fixed-target mode. High statistics at low collision energies will be made possible through the newly developed low-energy electron cooling at RHIC. The three dedicated BES-II STAR detector upgrades will strengthen the physics potential even further. The Event Plane Detector (EPD) improves the event plane resolution and centrality definition. The new inner Time Projection Chambers (iTPC) increase the rapidity coverage and low pT acceptance, while the endcap Time Of Flight (eTOF) detector complements the particle identification capabilities at forward-to-midrapidities.

For the time after BES-II the STAR collaboration plans to install a suite of new detectors in the forward rapidity region (2.5 < eta < 4) consisting of a Forward Tracking System (FTS) and a Forward Calorimeter System (FCS). This will enable novel measurements in pp, pA and AA motivated by cold QCD physics in the regions of partonic momentum fraction inaccessible so far by other machines, and the exploration of the longitudinal structure of the initial state in heavy-ion collisions.

First results from commissioning the new detectors and their performance during the first year of running in BES-II will be presented together with the general progress of BES-II. Additionally the details of the proposed forward upgrade and its scientific opportunities will be discussed.

Collaboration name

STAR

Track

Upgrades and new experiments

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