Contribution ID: **118** Type: **not specified**

The STAR Cold QCD Physics Program after 2020

Tuesday 17 April 2018 14:00 (30 minutes)

The STAR experiment is planning to upgrade the forward rapidity region (2.5 < eta < 4.5) to enable novel measurements in p+p, p+A and A+A collisions. The upgrade is motivated by exploration of cold QCD physics in the very high and low regions of Bjorken x. The current design envisions a Calorimeter System (FCS) that integrates parts of the refurbished PHENIX sampling ECal and a hadronic calorimeter (sandwich iron scintillator plates). In addition to the FCS, a Forward Tracking System (FTS) is also proposed to discriminate the hadron charge sign in p+p and p+A collisions at high momenta p<80 GeV/c. The design combines three Silicon mini-strip disks and four Small-Strip Thin Gap Chamber (sTGC) wheels similar to the ATLAS muon detector upgrade. In addition, STAR's excellent capabilities at midrapidity are upgraded to moderate forward kinematics (|eta| < 1.7) for the Beam Energy Scan (phase II) and beyond. The full set of upgrades will enable key physics opportunities in three broad areas of interest: the dynamics of low and high x partons in cold nuclear matter (CNM);Â modification of fragmentation and hadronization of partons through interactions within CNM; experiments to study the 2+1d momentum and spatial structure of protons and nuclei. These measurements will provide critical new insights into the QCD structure of nucleons and nuclei in the near term, as well as the high
precision data that will be essential to enable rigorous universality tests when combined with future results from the EIC.

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Session Classification: WG6-WG7 Joint Session

Track Classification: WG7: Future of DIS