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Baseline design of an eRHIC Detector and Interaction Region

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The long-term upgrade plan for the RHIC facility foresees the addition of a high-energy polarized electron beam to the existing hadron machine, thus converting RHIC into an Electron-Ion Collider (eRHIC) with luminosities exceeding $10^{33} \text{ cm}^{-2} \text{ s}^{-1}$ [1]. The main physics topics to be explored at this new facility are (i) the polarized sea quark and gluon distributions in the nucleon, (ii) QCD dynamics of the low-x, high density gluon regime, (iii) hadronization and energy loss in the nuclear medium. A dedicated eRHIC detector, designed to efficiently register and identify deep inelastic electron scattering (DIS) processes in a wide range of center-of-mass energies available with the new collider is one of the key elements of this upgrade. The detector and interaction region design will be shown, technology choices discussed, and the first physics simulation results presented.

[1] A. Accardi *et al.*, "Electron Ion Collider: The Next QCD Frontier - *Understanding the glue that binds us all*" (EIC White Paper), arXiv:1212.1701 (2012).

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