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eRHIC: an high-energy high-luminosity electron-ion collider at BNL

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In this talk I present current design of our future electron-ion collider (EIC) at BNL, eRHIC. It is based on the existing Relativistic Heavy Ion Collider (RHIC) hadron facility, with two intersecting superconducting rings, each 3.8 km in circumference. We plan adding a polarized electron-beam with energy tunable within the 5-20 GeV range to collide with variety of species in the existing RHIC-accelerator complex. Specifically, the hadron species will include polarized protons (with a top energy of 250 GeV), polarized He3 ions (with a top energy of 170 GeV/u), and light and heavy fully striped ions (with energies up to 100 GeV/u). Our innovative design is based on one of the RHIC's hadron rings and a multi-pass energy-recovery linac (ERL). Using the ERL as the electron accelerator in our collider assures high luminosity reaching above $10^{34} \text{ cm}^{-2} \text{ s}^{-1}$, and a c.m. energy range ranging from 30 GeV to 140 GeV. We are also considering a ring-ring eRHIC design, which has lower luminosity, as a back-up option.

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