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Design of the Electron Ion Collider - eRHIC

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We present a design of polarized electron - proton/He³⁺ and ion collider eRHIC in the present tunnel of the existing Relativistic Heavy Ion Collider (RHIC). Polarized electrons are accelerated up to the maximum energy of 21 GeV with a 1.334 GeV Energy Recovery Linac - ERL using two Non-Scaling Fixed Field Alternating Gradient (NS-FFAG) arcs. 70% polarized protons have an energy range 25-250 GeV, while the light ions (d, Si, Cu) and heavy ions (Au, U) have an energy range 10- 100 GeV/u, while the polarized He-3 ions 17-167 GeV/u. The ions (protons, He³⁺, ions) will be with a reduced emittance obtained by coherent electron cooling. Electron and ion beams collide with an angle of ~10 mrad, with a beta-squeeze of 5 cm luminosities above 10³⁴ can be reached by using the crab cavities.

Summary

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