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The importance of $e+A$ collisions at an Electron-Ion Collider

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Over the last decade, there has been a plethora of new and exciting results in heavy-ion collisions emanating from the CERN and Brookhaven Laboratories. These results have led to a sea change of the view on how the evolution of a high energy heavy-ion collision proceeds. What has become apparent is that in order to validate claims of perfect fluidity, for example, the initial conditions at small- x need to be well understood. Whilst $d+A$ and $p+A$ collisions provide a handle on some of these effects, for precision measurements and precise knowledge of the kinematics, $e+A$ collisions become essential.

A proposal has been developed at Brookhaven National Lab to add an electron accelerator to the current RHIC complex, providing for electron beams ranging from 5 GeV to 30 GeV. Complementing the programme on polarised $e+p$ scattering, a broad programme on $e+A$ physics is envisioned which will range from investigating saturation physics at low- x to hadronization at high- x . In this poster, I will show the recent progress made on the golden measurements which were identified in the proceedings of the Fall programme at the INT [1].

[1] "Gluons and the quark sea at high energies: Distributions, polarization and tomography.", Eds D. Boer, M. Diehl, R. Milner, R. Venugopalan, W. Vogelsang, BNL-96164-2011, INT-PUB-11-034, JLAB-THY-11-1373

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