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eA collisions at the LHeC and FCC

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The Large Hadron Electron Collider (LHeC) is a proposed facility which will exploit the LHC and FCC
heavy ion beams for electron-nucleus scattering, using either a new 60 GeV electron accelerator or one of the FCC 'ee' beams.
The kinematic coverage extends beyond previous deep inelastic lepton-ion experiments by nearly four orders of
magnitude at low Bjorken-x and towards higher Q^2. This contribution summarises the content of the simulations in
the Conceptual Design report, plus its relation with the LHC with emphasis on pPb data, and the outlook towards a
Technical Design report. After an introduction on the open problems in pA and eA collisions and the expected impact on the heavy ion program, we show inclusive observables and new results on the resulting constraints
on nuclear parton densities. We then analyse the possibilities for inclusive and exclusive diffraction and the opportunities that they offer to reveal the non-linear dynamics which tame the low-x growth of parton densities.
Finally, we discuss semi-inclusive measurements that will clarify the mechanism of hadronisation and QCD radiation
inside the nuclear medium.

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