

An Energy Recovery Linac for energy-frontier DIS at CERN: the LHeC and the FCC-eh

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Energy-frontier DIS can be realised at CERN through an energy recovery linac that would produce 60 GeV electrons to collide with the HL-LHC or later HE-LHC (LHeC) or eventually the FCC hadron beams (FCC-eh). This would create a new laboratory for energy frontier particle and nuclear physics. It provided electron-proton/nucleus collisions with centre-of-mass energies in the range 0.3-3.5 TeV per nucleon, and luminosities exceeding $10^{34} \text{ cm}^{-2}\text{s}^{-1}$ in ep scattering. Such machine would provide a huge physics programme, as the highest resolution microscope for hadron substructure, through high precision Higgs, top and precision EW physics, and with unique possibilities for BSM searches. With a high luminosity of $5 \times 10^{32} \text{ cm}^{-2}\text{s}^{-1}$ in ePb scattering, both LHeC and FCC-eh are unique top-energy nuclear physics facilities with eventual access to a new regime of QCD at high partonic densities. All these aspects have strong complementarities with the respective, concurrent pp and AA programmes. In this talk we review the recent accelerator and infrastructure aspects of the LHeC and FCC-eh proposals at CERN, as will be presented to the next European Strategy for Particle Physics in 2019/2020. We also review the progress on the corresponding ERL demonstrator, PERLE, under preparation to be built at LAL Orsay.

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