

30th International Symposium on Lepton Photon Interactions at High Energies



Contribution ID: 334

Type: **Poster**

Electrons for the HL-LHC

Monday 10 January 2022 16:38 (1 minute)

The Large Hadron-electron Collider is the opportunity for DIS at the TeV scale in the HL-LHC era. An energy recovery linac in racetrack configuration would provide 20-60 GeV electrons to collide with the HL-LHC hadron and nuclear beams, providing instantaneous luminosities around 10^{34} and $5 \cdot 10^{32} \text{ cm}^{-2} \text{ s}^{-1}$ per nucleon respectively. It would extend the kinematic $x - Q^2$ plane down in x and up in Q^2 by around two and four orders of magnitude in ep and eA respectively. A comprehensive physics programme on precision QCD, top, EW, Higgs, BSM and nuclear physics would be achievable with such machine. In this talk we will review accelerator, physics and detector aspects of the proposal, following the update [1] of the 2012 CDR [2]. Besides, the studies on the recent proposal of a detector in IP2 able to study both ep/A and $pp/pA/AA$ collision will be presented, including a new detector and IR design [3].

[1] LHeC Collaboration and FCC-he Study Group, P. Agostini et al., e-Print: 2007.14491 [hep-ex], to appear in J. Phys. G.

[2] LHeC Study Group, J.L. Abelleira Fernandez et al., J.Phys.G 39 (2012) 075001, e-Print: 1206.2913 [physics.acc-ph].

[3] LHeC talks at Offshell-2021 — The virtual HEP conference on Run4@LHC (<https://indico.cern.ch/event/968055/>)

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Session Classification: Future experiments and facilities

Track Classification: Future experiments and facilities