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A detector for top-energy DIS

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The Large Hadron-electron Collider and the Future Circular Collider in electron-hadron mode [1] will make possible the study of DIS in the TeV regime providing electron-proton (nucleus) collisions with per nucleon instantaneous luminosities around $10^{34}(10^{33}) \text{ cm}^{-2}\text{s}^{-1}$ by colliding a 50-60 GeV electron beam from energy-recovery linac with the LHC/FCC hadron beams concurrently with other experiments for hadron-hadron collisions. Here we describe the current detector design for such experiments [1,2] and the key developments needed, included in the 2021 ECFA detector research and development roadmap [3], particularly concerning machine-detector interface, large acceptance tracking and calorimetry, and the technological choices to be taken in order to fulfil the demands of their physics programmes.

[1] LHeC Collaboration and FCC-he Study Group: P. Agostini et al., J. Phys. G 48 (2021) 11, 110501, e-Print: 2007.14491 [hep-ex].

[2] K.D. J. Andre et al., Eur. Phys. J. C 82 (2022) 1, 40, e-Print: 2201.02436 [hep-ex].

[3] ECFA Detector R&D Roadmap Process Group, report CERN-ESU-017, <http://cds.cern.ch/record/2784893>, 10.17181/CERN.XDPL.W2EX.

Collaboration / Activity

LHeC/FCC-he Study Group

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