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The LHeC collider as a bridge between major colliders at CERN

The Large Hadron electron Collider (LHeC) is the proposal to deliver electron-proton/nucleus collisions at CERN using the LHC hadron or nuclear beams and a 50 GeV electron beam from an Energy Recovery Linac (ERL) in racetrack configuration. A first phase with concurrent operation of electron-hadron and hadron-hadron collisions at the HL-LHC, followed by a second phase of standalone electron-hadron collisions, was considered in the 2021 update of its CDR [1]. In view of the current HL-LHC schedule, we propose an LHeC program extending the regular HL-LHC program with only a standalone electron-hadron operation phase [2]. The high-energy high-luminosity electron-proton collisions enable a multi-purpose experiment leveraging the HL-LHC proton beams.

In this talk we describe the accelerator aspects of the proposal, including design, parameters, performance, feasibility, sustainability and cost. Besides, we discuss how the accelerator technology deployed in the ERL for the LHeC is a major stepping-stone for the performance, cost reduction and training for future colliders, e.g., with the use of the racetrack as an injector for FCC-ee.

[1] P. Agostini et al. (LHeC/FCC-he Study Group), J. Phys. G 48, 110501 (2021), arXiv:2007.14491 [hep-ex].
[2] F. Ahmadova et al., e-Print: 2503.17727 [hep-ex].

Secondary track

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