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Single line ERL permanent magnet electron FFA accelerator for LHeC

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We present a Fixed-Field-Alternating (FFA) permanent magnet racetrack electron accelerator with energy range between 10-60 GeV for the future LHeC. Electron beam is brought back to the linac by the single beam line without requiring electric power REDUCING estimated wall power of 100 MW in the present LHeC design to a negligible power for arcs as the permanent magnets are used. The design is based on experience from the very successful commissioning of the Cornell University and Brookhaven National Laboratory Energy Recovery Test Accelerator –‘CBETA’. The proposal supports sustainability efforts for LHeC by making a ‘green’ accelerator. It is an energy recovery linac with 99.9% energy efficiency and reduces the power consumption by using small permanent magnets. The FFA non-linear gradient design is a racetrack shape, where, as in the CBETA, the arcs are matched by adiabatic transition to the two (LHeC) or multiple straight sections. Two 10 GeV superconducting linacs are placed on both sides of the Interaction Region (IR) significantly reducing the power of synchrotron radiation loss.

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