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MAX 4U: Accelerator physics and engineering challenges of the first upgrade of a fourth-generation synchrotron light source

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The MAX IV 3 GeV storage ring in Lund, Sweden, is the first multibend achromat (MBA) lattice fourth-generation light source worldwide and delivered at the time of its inauguration, in June 2016, a world-record ultralow electron beam emittance of 328 pm rad with a corresponding ultrahigh photon beam brightness. This contribution summarizes the accelerator physics and engineering challenges to implement the first ever upgrade of a fourth-generation source* aimed at reducing the electron beam emittance further down to below 100 pm rad. We focus in particular on the engineering design concepts proposed to enable this major performance boost through a minimum-interference upgrade in which localized interventions in selected subsystems and components are carefully chosen to provide the maximum impact with minimum cost and, equally important, minimum dark time for the MAX IV user community.

Footnotes

* <https://maxiv.lu.se/max4u>

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Author: TAVARES, Pedro (MAX IV Laboratory)

Presenter: TAVARES, Pedro (MAX IV Laboratory)

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