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Evaluation of Lattice Robustness and Correction Strategies for BESSY III

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The BESSY III project aims to develop a fourth-generation light source operating in the soft X-ray regime, providing unprecedented beam stability and brightness. To meet these goals, comprehensive simulation studies are carried out to assess and enhance the robustness and reliability of the storage ring lattice. The robustness analysis enables direct comparison of the BESSY III lattice performance with other fourth-generation facilities under realistic error conditions. Subsequently, the simulated commissioning process focuses on restoring optimal lattice performance by mitigating these perturbations, primarily through beam position monitors (BPMs) and corrector magnets. This work quantifies the achievable machine performance by simulating the complete commissioning chain, including optimization of beam transmission and on-axis injection efficiency, sextupole ramp-up, RF cavity correction, beam-based alignment (BBA), orbit correction, and LOCO-based optics correction. The results provide essential feedback for defining the commissioning strategy and enhancing the overall resilience of the BESSY III lattice design, forming a key contribution to the upcoming conceptual design report.

Speed talk:

I am unwilling/unable to present a speed talk

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