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Stable Orbits, Brighter Beams: Understanding and Controlling Orbit Stability in 4th Generation Synchrotron Light Sources

Wednesday 10 September 2025 09:00 (1 hour)

The advent of 4th generation synchrotron light sources has placed unprecedented demands on beam stability, requiring sub-micron orbit control to fully exploit their ultra-low emittance and high-brightness capabilities. This tutorial explores orbit stability, covering sources of perturbations like magnet misalignments, ground vibrations, and power supply fluctuations, as well as correction algorithms used to mitigate their effects. One focus of the tutorial will be on advances in simulations, which have played a crucial role in optimizing the design and performance of subsystems as well global mode space analysis. Various correction techniques, including slow and fast orbit feedback systems, beam-based girder alignment, and the integration of XBPMs into the electron beam control system, will also be discussed to improve long-term beam stability and performance. Real-world examples from leading 4th-generation facilities will highlight how advanced orbit control strategies and cutting-edge hardware have enabled the achievement of remarkable orbit correction bandwidths, significantly enhancing electron beam stability

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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