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Simultaneous measurements with fast beam size and position monitors disentangle the sudden beam loss evolution mechanism

Wednesday 10 September 2025 10:50 (30 minutes)

At the SuperKEKB electron-positron collider, which aims to achieve the world's highest luminosity, "Sudden Beam Loss events (SBL)" have prevented its stable operation, in which several tens of percent of the beam current is lost and aborted within several turns (20-50 μs).
Elucidating SBLs, which can cause extensive damage to accelerator components and the Belle II experiment detectors, is a pressing issue for SuperKEKB. To measure the beam size and position variation, key information for disentangling SBLs, over dozens of turns just before the SBL-induced beam aborts, we have developed new turn-by-turn beam size monitors in two different wavelength regions, X-ray and visible light, and bunch-by-bunch beam position monitors where one has utilized a novel architecture AMD/Xilinx RFSoC. Simultaneous measurements of turn-by-turn beam size and bunch-by-bunch beam position enable elucidation of the cause and time evolution mechanism of the SBL events. In this presentation, we will first introduce recently developed fast beam size and beam position monitors, then show their simultaneous measurements of SBL events. Finally, we will discuss the possible causes and time evolution mechanisms of the SBL events.

Footnotes

Funding Agency

I have read and accept the Conference Policies

Yes

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