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Observations and efforts to reduce sudden beam loss at SuperKEKB

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The SuperKEKB accelerator recorded a peak luminosity more than twice that of the KEKB accelerator, but there are various challenges in updating the luminosity beyond that. One of the challenges is to eliminate sudden beam loss (SBL), in which a significant part of the circulating beam is lost in a few short turns. SBLs of the positron ring were investigated and found that the SBLs are characterized by vacuum pressure bursts at specific locations in the ring and an increase in beam size. From these measurements, it can be inferred that some phenomenon occurred at the location where the pressure burst was occurring, causing the beam size to increase and the beam to be lost in the narrow aperture of the ring. We performed knocker tests to artificially cause SBL and looked for possible sources of SBL. Based on several assumptions, we performed several works, including swapping the chamber up and down, cleaning the inside of the chamber, and knocking the chamber before operation. Of these works, the cleaning inside the chamber was found to be likely to be effective. This paper summarizes the measurement of SBL when it occurred and the countermeasures that contributed to its reduction.

Footnotes

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