

bunch-by-bunch vertical beam size monitor for SuperKEKB

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A novel bunch-by-bunch vertical beam size monitor was developed for the SuperKEKB storage rings (e+ and e-) at KEK in Tsukuba, Japan. Each monitor is capable of resolving the pattern of synchrotron radiation from each passing bunch of charge. The nanobeams, which are new for SuperKEKB, produce a 5-15 keV spectrum of X-Rays with a small opening angle. The Si sensor is 75 μm thick with 128 strips (50 μm pitch), and it is facing the beam edge-on (2.6 mm depth) to improve stopping power at higher energies. To further increase light yield, a coded aperture is used in lieu of a pinhole slot. The readout is based on that of the Time-of-Propagation counter in the Belle2 detector (also at SuperKEKB). One of the current challenges is to do feature extraction to reconstruct the beam size in real-time. Results will be presented from the first campaign of data taking during the Fall 2019 and Spring 2020 SuperKEKB runs, and a comparison will be made to an integrating scintillator+camera readout.

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