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Towards direct detection of the shape of CSR pulses with fast THz detectors

Coherent synchrotron radiation (CSR) is emitted when the emitting structure is equal to or smaller than the observed wavelength. Consequently, these pulses are very short and most detectors respond with their impulse response, regardless of the pulse length and shape. Here we present single-shot measurements performed at the Karlsruhe Research Accelerator (KARA) using a fast real-time oscilloscope and Schottky barrier detectors sensitive in the sub-THz range. The time response of this setup to CSR pulses emitted by electron bunches during the microbunching instability is shown to be sensitive to the shape of the electron bunch. Our results show how, in the future, the shape of electron bunches can be directly measured using a straightforward setup.

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