

1. Record Nr.	UNINA9910346947303321
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Titolo	Diagnostics of Short Electron Bunches with THz Detectors in Particle Accelerators
Pubbl/distr/stampa	KIT Scientific Publishing, 2019
ISBN	1000090017
Descrizione fisica	1 electronic resource (XIII, 226 p. p.)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Sommario/riassunto	Several novel diagnostic systems based on the detection of coherent THz radiation are presented. The investigation of the photon beam properties allow for bunch-by-bunch and turn-by-turn diagnostics of the emitting electron bunches in the accelerator. It is used for time-resolved studies of the micro-bunching instability. Accompanying simulations with Inovesa show a good agreement with the measurement which enhances the knowledge of the physics behind the micro-bunching instability.