



Contribution ID: 87 Contribution code: THP41

Type: Poster Presentation

Longitudinal bunch diagnostics in the Terahertz domain at TELBE using fast room temperature operable zero-bias Schottky diodes

Thursday 12 September 2024 16:00 (1h 30m)

Modern accelerator-based light sources rely on short bunches to generate intense photon pulses. To achieve this, the electron bunches from the accelerator need to be compressed longitudinally in a magnetic chicane. A valuable tool for the measurement of the signal in the bunch compressor is the use of broadband EM-detectors covering a spectral range from few 100 GHz up to THz frequencies. With this setup, bunch length variations caused by instabilities in the acceleration process can be measured that in turn also affects the secondary photon beam. In this paper, we demonstrate the pre-commissioning of broadband, room temperature Schottky THz detectors for the diagnosis of compressed short electron bunches at the TELBE facilities at the Helmholtz-Zentrum Dresden-Rossendorf, Germany. Qualitative bunch compression measurements have been carried out to diagnose the beam to optimize the machine setup and provide feedback to the beam-line scientists for optimum machine operation. These detectors are scheduled to be commissioned at free-electron facilities in near-future.

Footnotes

Funding Agency

The work is supported by the German Federal Ministry of Education and Research (BMBF) under contract no. 05K22RO1 for applications at Helmholtz-Zentrum Dresden-Rossendorf, Accelerator Research Experiments

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Session Classification: THP: Thursday Poster Session

Track Classification: MC5: Longitudinal Diagnostics and Synchronization