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Overview of Terahertz detectors technologies for particle accelerator application

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Accelerator-Based Terahertz (THz) radiation sources[1] open new domains for both physical matter as well as application based research in the Terahertz domain. The generated THz Spectrum as well as its pulse shape is of importance for both, beam line scientists in order to study the beam dynamics[2] as well as for the experimental scientists in order to use THz signals for numerous studies.
Various cryogenic and room-temperature based detection technologies for THz signals are available for medium and high power THz signals. The detectors can be subdivided into heterodyne (mixing) and homodyne (direct detection). For several applications, broadband room-temperature Terahertz detectors are well suitable for beam diagnosis and alignment at accelerator facilities due to easy handling, compact size, direct detection and robustness [3,4]. Zero-Bias Schottky Diode (ZBSD) based detectors are highly sensitive and extremely fast, enabling detection of picosecond scale THz pulses.
In this work, we present a brief overview of various types of THz detector technologies available for beam diagnostic and beam dynamic studies. Along with that we will show the latest results of THz detectors developed by our research group. Future development prospects of the detector will be discussed in the outlook section.
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References:
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