Zero-Bias Schottky Diode and Field Effect Transistor Based Room Temperature THz Detectors for Beam Alignment and Diagnosis

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The coherent Terahertz (THz) radiation generated [1] by Free Electron Lasers (FELs), Synchrotrons or LINACs have higher brilliance, energy and intensity compared to table top THz sources. The stable ultrashort pulses of sub-picosecond scale at FELBE or TELBE open new domains of THz research such as non-linear spectroscopy and study of matter interaction at atomic levels. For such experiments, however, exact knowledge about the pulse and beam characteristics is a must. Compact, robust, cost effective, broadband and agile THz detectors are important for beam diagnosis and alignment of the experimental setup. Zero-bias Schottky diode and Field Effect Transistor based THz detectors [2,3] have proven to be excellently suited for simplifying the beam alignment and diagnosis process at accelerator facilities. We present the latest development status of AlGaAs/GaAs FETs and Schottky diode THz detectors developed at TU Darmstadt and TH Mittelhessen. The understanding of the electrical circuit of AlGaAs/GaAs FET is crucial to develope the efficient and fast measurement capability THz detectors [4] to detect the sub-picosecond scale pulse widths at FELBE or TELBE. The frequency response of both type of technologies, recorded with table top THz and FEL sources, will be discussed in this talk [5]. The talk will be concluded by providing an overview on current work and the future roadmap of research.

References

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