Contribution ID: **86** Type: **Speed talk**

Room Temperature Broadband Terahertz Detectors for Particle Accelerator Beam Characterization and Diagnostic

Friday, 1 October 2021 11:40 (5 minutes)

Ultra-short pulses in the picosecond range, combined with the high repetition rate, high power and high brilliance at accelerator facilities opens a wide range possibilities for both fundamental as well as application-oriented research. Radiation generated at Free Electron Lasers (FELs) and Coherent Synchrotron Radiation (CSR) can be used for atomic and sub-atomic level studies. A frequent technique is the optical pump-THz probe method that is used traditionally for the study of matter and materials. The laser and THz pulses are not naturally phase-locked. Thus, time jitter is an obvious obstacle that must be monitored. It further aggravates the use of electro-optical sampling which is otherwise frequently used for table-top phase-locked pump-probe setups. However, room temperature based Schottky diode and Field Effect Transistor (FETs) broadband Terahertz (THz) direct detectors are well suited for monitoring time jitter. They are fast, highly sensitive, robust and easy to use, less expensive (compared to other counterparts such as Bolometers) and does not need cryogenic conditions for operation. FETs can be used much beyond their cut-off frequencies for the rectification of the detected THz radiation. Both type of THz detectors can be suited for aligning the experimental setup at accelerator facility during beam time as well as the diagnostic of THz beam during the maintenance of the beam line. The current limitation to these detectors is the post detection electronics, High frequency passive IF circuitry, packaging methods and system integration with other devices for data processing. In the talk, we will demonstrate the basic working principle of these detectors, state-of-the-art achieved by our group until now and current status.

Summary

Primary authors: Mr YADAV, Rahul (Terahertz Devices and Systems, IMP , TU Darmstadt); Prof. PENIRSCHKE, Andreas; Prof. PREU, Sascha (Terahertz Devices and Systems, IMP, TU Darmstadt)

Presenter: Mr YADAV, Rahul (Terahertz Devices and Systems, IMP , TU Darmstadt)

Session Classification: Session Beam Diagnostics