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Resonator design optimization for a compact transverse-deflecting system

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Various design options have been studied and simulated using CST MICROWAVE STUDIO for a compact transverse-deflecting system proposed for diagnostics of extremely short electron bunches. The idea of the method is to use terahertz radiation, produced from optical rectification of the facility's electron gun laser pulse. The proposed system is to be checked experimentally at the test facility FLUTE (Ferninfrarot Linac- und Test-Experiment) at Karlsruhe Institute of Technology (KIT).

The present paper is focused on the simulations of the resonator providing interaction between the electron bunch and the terahertz pulse. Two types of resonators and their arrays have been studied for this purpose: inverse split-ring resonator and tilted slit resonator. Different types of terahertz pulse structure have been studied, including plane wave and transversely focused (Gaussian) beam. Useful analytical models have been proposed to systematize the results of the simulations.

Footnotes

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