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Creation of a THz Smith-Purcell Radiation Source using a LWFA Electron Bunch

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We present experimental results from Helmholtz-Zentrum Dresden-Rossendorf of a THz Smith-Purcell Radiation source generated using Laser Wakefield Accelerator electron bunches. Affordable and small, aluminum-coated gratings were placed near accelerated electron bunches with an average energy and charge of 405 MeV and 467 pC to produce strong, coherent emission. The generated shots of radiation were transmitted through a high-pass filter, and had significant enough energy to be observable on a Pyrocam IV pyroelectric detector. Initial analysis suggest energy per shot within the 10s-100s uJ range, with peak electric fields as large as 0.66 MV/cm incident on the detector. Furthermore, the known exponential dependence of Smith-Purcell Radiation for a pencil electron beam as a function of distance from the source (grating) was modified due to the transverse size and shape of the electron bunch, and could be explained using a 1D model.

Working group

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