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Photon diagnostics for the high-gain THz FEL at PITZ

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Research and development of an accelerator-based THz source prototype for pump-probe experiments at the European XFEL are ongoing at the Photo Injector Test Facility at DESY in Zeuthen (PITZ). Proof-of-principle experiments have been performed to generate a high-gain THz Free-electron Laser (FEL) based on the Self-Amplified Spontaneous Emission scheme. The FEL radiation pulses with a central wavelength of about $100\ \mu\text{m}$ ($3\ \text{THz}$) and single pulse energy of several tens of μJ can be generated. In this paper, we present and discuss the photon diagnostic setup for the THz FEL together with examples of diagnostic results, including pulse energy and an FEL gain curve. The upgraded photon diagnostic setup, capable of measuring pulse energy, transverse distribution, and spectral distribution, is expected to be operational in the spring of 2023.

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Footnotes

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Yes

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