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Compact prebunched waveguide THz-FEL

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Free-electron-lasers fill a critical gap in the space of THz-sources as they can reach high average and peak powers with spectral tunability. Using a waveguide in a THz FEL significantly increases the coupling between the relativistic electrons and electromagnetic field enabling large amounts of radiation to be generated in a single passage of electrons through the undulator. In addition to transversely confining the radiation, the dispersive properties of the waveguide critically affect the velocity and slippage of the radiation pulse. Here we report on an experiment carried out at the UCLA Pegasus laboratory where the spectral properties of a compact waveguide THz FEL are characterized using electro-optic sampling based reconstruction of the time-domain waveform. The data shows simultaneous lasing at two different frequencies and the high frequency component in the pulse can be enhanced by injecting in the undulator an electron beam prebunched on the scale of the resonant radiation wavelength.

Footnotes

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