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Machine-learning meets nonlinear optics for multicycle THz generation

High-energy pulses of multicycle THz radiation open new regimes of science and technology with applications from controlling quantum materials to driving novel, compact electron accelerators. A new methodology has recently been demonstrated for efficient and high-energy THz pulse generation using trains of tens to hundreds of optical pulses, but optimizing the properties of these trains is technically complex. In this project, a multitude of techniques ranging from spectral interferometry to machine learning will be applied in order to develop a robust methodology for achieving the optimum pulse configuration. Initial implementation of the concepts on the computer will be followed by implementation on an existing THz generation system to validate the concepts.

Group

FS-CFEL-UFOX

Project Category

A5. Lasers and optics

Special Qualifications

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