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Single spike hard x-ray free-electron laser pulses generated by photocathode laser shaping

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We report the generation of single spike hard x-ray pulses at the Linac Coherent Light Source enabled by temporal shaping of the photocathode laser. The pulses were produced with typical pulse energies of 10 uJ and full-width at half-maximum spectral bandwidths averaging 30 eV, corresponding to a 60 attosecond Fourier-limited pulse duration. These pulses open new doors in electronic-damage-free probing of ultrafast phenomena and, eventually, attosecond hard x-ray scattering experiments. We discuss future plans to characterize the pulse in the time domain using hard x-ray angular streaking and a hard x-ray split and delay device.

Footnotes

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