

Control of the pulse properties in a seeded FEL

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The experiments enabled by ultrashort XUV/X-rays FELs, e.g. coherent control of quantum phenomena, nonlinear optics, etc., require the knowledge, and possibly the control, of the spectro-temporal content of individual pulses. While spatial coherence is also a property of FELs based on SASE, the capability of generating temporally coherent pulses is a distinctive feature of seeded FELs. Indeed, this is a natural consequence of the principle on which a seeded FEL relies: before emitting radiation, electrons interact with a coherent source, the seed, and, under given conditions, the latter transmits its coherence properties to the FEL light.

In the following, we demonstrate the use of interferometry in the frequency domain to investigate the properties of the seeded FEL pulses. Moreover, we provide the first direct evidence of the temporal coherence of a seeded FEL working in the extreme ultraviolet spectral range and show the way to control the light generation process to produce Fourier-limited pulses.