Coherence analysis of supercontinuum spectrum for efficient carrier-envelope offset signal detection and laser stabilisation

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Using the active stabilization method, we aim to stabilize the carrier-envelope offset phase (CEP) in a SESAM mode-locked linear cavity laser. The vital part of this technique involves the generation of an octave-spanning coherent supercontinuum to detect CEP signal by f-2f interferometry, [1][2][3]. The CEP signal’s signal-to-noise ratio (SNR) depends upon the level of coherence across the generated supercontinuum. For a stable CEP-locking, one should aim to detect CEP signal with high SNR (typically >25 dB), [4][5]. We numerically study the influence of laser parameters such as input pulsewidth, peak power, and the nonlinear fiber length on the coherence properties of supercontinuum and attempt to find the optimal laser parameters to achieve a high degree of coherence. Later, these parameters will be used for coherent, octave-spanning supercontinuum generation and laser stabilization.