Similariton Based Technique for Determination of Femtosecond Pulse Duration

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We demonstrate a similaritonic technique of femtosecond pulse duration determination alternatively to classic autocorrelation method. The new technique is based on spectral properties of the nonlinear-dispersive (NL-D) similariton, generated in a single-mode fiber without gain. We studied the spectral peculiarities of NL-D similaritons, both numerically and experimentally. We experimentally checked that the spectral bandwidth of the similariton is proportional to the square root of the input pulse peak power and, thus, inversely proportional to the square root of the input pulse duration. In our study we investigated this property of the NL-D similariton, by testing it for various input pulse forms. This allowed us to state that the similaritonic technique of the pulse duration determination has the important advantage of measurements being independent from the pulse shape, compared to the autocorrelation method.

Phase Regularities of Spectron: Numerical Analysis

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The spectron pulse, generated in the far zone of dispersion, images its spectrum in temporal analogy to the Fraunhofer diffraction. The spectron shaping was studied in the scope of dispersive Fourier transformation (DFT) or real-time Fourier transformation. Our study is targeted to the spectron phase peculiarities. Particularly, to test whether the DFT method, along with the amplitude imaging the spectrum, works also for the phase, i.e. to find conditions under which the temporal phase of the spectron pulse images the initial spectral phase. In our numerical study, we first tested the spectrons generated from

various input pulses of Gaussian, sech2, super-Gaussian shapes, as well as from the asymmetric, two- and three-peak pulses. We examined also the peculiarities of spectrons generated from pulses with initial spectral phase. Finally, we generated the spectron from a two-peak pulse with strong self-phase modulation. For all variety of these pulses, the temporal phase of the spectron repeats the spectral phase of the initial pulse. The results of our studies on the spectron phase peculiarities can be prospective for the pulse spectral phase measurement, and so for femtosecond pulse complete characterization alternatively to spectral interferometric techniques.

Numerical Study of Femtosecond Signal Spectral Self Compression

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The nonlinear process of ultrashort pulse spectral self-compression (self-SC or soliton effect spectral compression) in a medium with anomalous dispersion and weak nonlinearity is studied numerically. Up to 33x self-SC is shown for Gaussian, sech2, super-Gaussian, as well as for randomly amplitude- and phase-modulated pulses. The study shows that the proposed new technique is useful for the radiation noise suppression.

Session 3: Electron Beams

SRF Gun Development for High Brightness, Short Pulse Applications

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A short summary of the SRF photo injector activities related to bERLinPro, an energy-recovery linac fest facility will be presented.