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Self-Referenced Spectral Interferometry: a comparison with SPIDER

S.Grabielle1, A. Moulet1, N.Forget1, C.Cornaggia2, O.Gobert2 and T.Oksenhendler1

1FASTLITE, Ecole Polytechnique bât. 403, 91128 Palaiseau, France

*2 CEA IRAMIS, Service Photons Atomes & Molécules, Saclay, F-91191 Gif-sur-Yvette, France **

forget@fastlite.com

We present a self-referenced spectral interferometry technique allowing for both spectral phase and intensity retrieval from a single-shot interferogram. Sub-15fs pulses are characterized by SRSI and results are compared to high-resolution SPIDER measurements.

Self-referenced Spectral Interferometry (SRSI) is a recently demonstrated femtosecond pulse measurement method [1]. This technique relies on Fourier-Transform Spectral Interferometry (FTSI)[2], i.e. the treatment of the frequency-domain interference pattern between the pulse to measure and a delayed reference pulse with a broader spectrum and a known phase. In SRSI, the reference pulse is generated from the input pulse itself by cross-polarized wave generation (XPW) [3], a third order non linear effect, which acts as a time filter and tends to broaden the spectrum and flatten the spectral phase. SRSI shares with SPIDER the use of FTSI but remains a completely different technique: there is no spectral shear, calibration nor integrations steps and the spectrum and phase are measured simultaneously from a single interferogram. Besides, SRSI is an achromatic technique particularly well suited for ultra-broadband pulse characterization since the XPW effect is automatically phase-matched. Last, the SRSI technique is single-beam, compact and requires no complex alignment.

In this talk we characterize ultra-broadband pulses generated by post-compression in a gas-filled hollow fiber and compare the results with a high-resolution SPIDER measurement.

Results were checked using an AOPDF to correct for the measured spectral phases.