TEMPORAL CHARACTERIZATION OF SUB-PICOSECOND OPTICAL PULSES BY MEANS OF A CROSS-CORRELATION TECHNIQUE

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Abstract

We present here the experimental setup that we developed at ELETTRA for the temporal characterization of sub|-|picosecond pulses. It is based on a cross|-|correlation setup where the ultra|-|short pulses produced by a table top laser are used to probe the pulse duration of synchrotron and storage ring (SR) FEL light. The present configuration makes use of a passive mode|-|locked Cr:LiSAF laser that produce 100 fs pulses at a repetition rate of nearly 83 MHz. A feedback system acting on the laser cavity length allows to synchronize the laser pulse with the SR radio|-|frequency, that is with the SR|-|FEL, with a relative jitter of few hundred fs. The frequency mixing signal produced by a non|-|linear crystal (e.g. BBO) indicates that the two pulses are overlapped in space and time and can than be used to evaluate the unknown pulse duration, sweeping one pulse across the other by means of an optical delay line. The preliminary results obtained at 660nm confirms what has been previously observed with more conventional techniques. In the near future we plan to extend this technique to the temporal characterization of the harmonic radiation produced by the SRFEL when operated in Q|-|switching mode.

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