

Speed Poster: Increasing the repetition rate of electro-optic sampling setups using the photonic time-stretch strategy: results at SOLEIL and ANKA

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Single-shot ultrafast diagnostics at high repetition rate present challenging problems, due to the speed limitation of data acquisition setups. This concerns in particular the cameras which are typically required in electro-optic sampling and transient reflectivity setups. Here we explore an alternate way based on the so-called photonic time-stretch strategy, and which consists in “slowing-down” the signals by optical means before recording. We present a set of results using this strategy in the case of electro-optic sampling of THz pulses at SOLEIL [1], and electro-optic sampling of the electron bunch near-field at ANKA [2,3]. In particular we show how this type of experiment can provide a direct observation (turn-by-turn) of electron bunch structures created by the microbunching instability in storage rings.

[1] E. Roussel et al., observing microscopic structures of a relativistic object using a time-stretch strategy, Scientific Reports 5, 10330 (2015). doi:10.1038/srep10330.

[2] N. Hiller et al. “Electro-Optical Bunch Length measurements at the ANKA Storage Ring”, MOPME014, Proc. IPAC’13, Shanghai, China (2013).

[3] N. Hiller et al. “Single-Shot Electro-Optical Diagnostics at the ANKA Storage Ring”, MOPD17, Proc. IBIC’14, Monterey, CA, USA (2014)

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