Abstract Submitted
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Spectrally encoded optical/x-ray relative delay with ∼10 fs RMS resolution[1] RYAN COFFEE, MINA BIONTA, CHRISTOPH BOSTEDT, MATTHIEU CHOLLET, DAVID FRITZ, NICK HARTMANN, HENRIK LEMKE, MARC MESSERSCHMIDT, DANIEL RATNER, SEBASTIAN SCHORB, LCLS-SLAC, JAMES CRYAN, JAMES GLOWNIA, MARIANO TRIGO, PULSE-Stanford, MARION HARMAND, SVEN TOLEIKIS, DESY, MARCO CAMMARATA, Univ. Rennes, DOUG FRENCH, Penn. State, DANIEL KANE, Mesa Photonics, LCLS-TIMING COLLABORATION — We present a spectral encoding technique that measures the single-shot relative delay between optical and x-ray laser pulses at the Linac Coherent Light Source. The technique has now been shown capable of resolving relative delays with an RMS accuracy down to 10 fs for both soft and hard x-rays. We sort the single-shot measurements into time-ordered traces and construct a scanning spectrogram representation of the x-ray/optical cross-correlation reminiscent of frequency resolved optical gating. We will discuss how such measurements can be used to reconstruct the ultrafast material response to the x-ray pulses. Once the material response is known, it may be possible to reverse the algorithm to reconstruct the average temporal shape of the x-ray pulses.

[1]This research was carried out at the Linac Coherent Light Source (LCLS).

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