

Abstract Submitted
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Simply Measuring the Electric Field of Very Long, Complex Pulses¹ JACOB COHEN, Georgia Institute of Technology, PAMELA BOWLAN, Swamp Optics, RICK TREBINO, Georgia Institute of Technology — We introduce a method for measuring both the intensity and the phase of arbitrary ultrafast waveforms in time (~ 1 ns long, with < 100 -fs substructure). It is an extension of a simple version of spectral interferometry called SEA TADPOLE, and we call it MULTIPLE Delay for Temporal Analysis by Dispersing a Pair of Light E-fields (MUD TADPOLE). In contrast to standard versions of spectral interferometry, MUD TADPOLE utilizes, not one, but a train of identical parallel-propagating reference pulses. These multiple reference pulses are used because each pulse broadens in time inside the spectrometer by the reciprocal of the spectrometer spectral resolution, t_{sp} . In the case of standard spectral interferometry, one reference pulse can, at best, measure light only t_{sp} long. In contrast, by utilizing a train of N reference pulses, MUD TADPOLE has the capability to measure light which is $N * t_{sp}$ long. MUD TADPOLE has been demonstrated to measure complex pulses up to 71ps in length. We believe this simple, compact, and inexpensive device can measure pulses with time-bandwidth products in excess of 100,000 using off-the-shelf components.

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