

210.Title: Synthesis and Measurement of Ultrafast Waveforms from Five Discrete Optical Harmonics

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Abstract: Achieving the control of light fields in a manner similar in sophistication to the control of electromagnetic fields in the microwave and radiofrequency regimes has been a major challenge in optical physics research. We manipulated the phase and amplitude of five discrete harmonics spanning the blue to mid-infrared frequencies to produce instantaneous optical fields in the shape of square, sawtooth, and subcycle sine and cosine pulses at a repetition rate of 125 terahertz. Furthermore, we developed an all-optical shaper-assisted linear cross-correlation technique to retrieve these fields and thereby verified their shapes and confirmed the critical role of carrier-envelope phase in Fourier synthesis of optical waveforms.