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Temporal Characterization of Below-Threshold Harmonics in a Scaled Keldysh System E. POWER, Department of Physics, University of Michigan, A.M. MARCH, F. CATOIRE, E. SISTRUNK, Department of Physics, The Ohio State University, K. KRUSHELNICK, Center for Ultrafast Optical Science, University of Michigan, P. AGOSTINI, L.F. DIMAURO, Department of Physics, The Ohio State University — We report an experimental and theoretical study of below-threshold high harmonics created by the scaled Keldysh system interaction of a 3.6μm laser and a cesium target with Keldysh parameter $\gamma \sim 1$; in the Keldysh picture this interaction is the scaled equivalent of an 800nm laser illuminating an argon target. Harmonic orders $5-13$ were temporally characterized using cross-correlation frequency-resolved optical gating (XFROG); this scheme is sensitive to the relative delay between harmonic orders, $\mathrm{d}\phi/\mathrm{d}q$, and also provides a complete reconstruction of the individual harmonic orders. Through the use of unconventional dispersion management we completely account for the dispersion in our heat pipe exit window, allowing access to $\mathrm{d}\phi/\mathrm{d}q$ and the spectral phase $\phi(\omega - \omega_q)$ inside the heat pipe. We show that below-threshold harmonics exhibit negative dispersion. Comparison with a time-frequency analysis of harmonic emission times performed on 1-D TDSE simulation results will be presented. The observed $\mathrm{d}\phi/\mathrm{d}q$, pulse durations for individual harmonic orders, and intensity scaling strongly suggest non-perturbative below-threshold harmonic generation.

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