

Abstract Submitted
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In-situ probe of ionization and coherent buildup for high-order harmonic generation in hollow waveguides using counterpropagating light AMY LYTLE, XIAOSHI ZHANG, MARGARET MURNANE, HENRY KAPTEYN, OREN COHEN, JILA/ University of Colorado — We use counterpropagating light to directly observe, in-situ, the coherent buildup of high harmonic generation in a hollow waveguide. We measure, for the first time, the phase mismatch, (i.e. coherence lengths) for high photon energies that cannot be phase matched using conventional approaches. We also probe the transition through phase matching, the ionization level at which different harmonic orders are generated, and the change in the coherence length as the intensity of the guided mode evolves along the fiber. These results demonstrate that the hollow waveguide geometry possesses exceptional coherence and a “quasi-one-dimensional” plane wave geometry, in analogy to conventional fiber optics in the visible. This in-situ information also directly prescribes the optimal structures or pulsetrains required for implementing quasi phase matching.

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