

Abstract

Patrick Skrodzki
University of Michigan
pskrodzk@umich.edu

Demonstrating millisecond-duration attenuation of optical signals in the wake of femtosecond laser-driven filaments

Filamentation of intense, femtosecond laser pulses has garnered recent interest in remote detection of proliferation-relevant materials. The phenomenon of filamentation results from the dynamic equilibrium between self-focusing of intense laser pulses propagating in a nonlinear medium such as air, de-focusing following plasma formation, and diffraction. The transient gas and plasma structures left in the wake of these filaments in air have been demonstrated to be useful for guiding of optical signals. Such transient waveguides are interesting for remote sensing, where distant signal collection is limited not only by detector efficiency but also noise and background rejection. In contrast to recent work using filaments as waveguides, in current work we investigate the potential for time-gated signal rejection using filament air plasma structures. We demonstrate millisecond-scale on-axis signal suppression using filament air plasmas formed by unaltered Gaussian beams with implications for background/continuum rejection in remote sensing of nuclear materials.