Amplitude shaping in a phase-modulated spectrum due to nonlinear effects

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ABSTRACT

We present a method by which spectral phase modulation is converted into amplitude modulation using femtosecond filamentation. Specifically, after the pulse-shaped beam has undergone filamentation, we measure increased intensity of spectral components whose phases were initially flipped. This provides a way to obtain pulses with adjustable phase and amplitude using a phase-only 4-f pulse shaper followed by a nonlinear medium. This also provides a means whereby information which is encoded into spectral phase jumps may be decoded into easily measured intensity spikes.¹-³

Figure: Forward emission spectra of a femtosecond filament (black) induced by an unshaped laser pulse (red) compared to the forward emission of a filament (blue) induced by a phase-modified pulse.