Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Femtosecond Control of Plasma Filaments in Atmosphere with Multiple Ultrashort Laser Pulses J.P. PALASTRO, T.M. ANTONSEN, S. VARMA, H.M. MILCHBERG, IREAP, University of Maryland — A laser pulse propagating through atmosphere self-focuses due to the nonlinear index of refraction modifications from the instantaneous electronic and delayed rotational Raman responses in air. If the pulse power is sufficient, the focused pulse intensity can surpass the ionization threshold, resulting in a plasma filament. The balance between defocusing due to the plasma and focusing due to the instantaneous and delayed Raman responses results in extended propagation at high intensity. Because the rotational Raman response is periodic in time, owing to quantum mechanical discreteness of the rotational eigenfrequencies of the molecules, subsequent laser pulses delayed at the recurrence period will experience the index modification left behind by the previous pulses. Here we present propagation simulations based on experimental parameters showing that extension of the plasma filament is sensitive to subsequent pulse delays of 10 femtoseconds with respect to the recurrence time of the rotational response.

John Palastro
IREAP, University of Maryland

Date submitted: 12 Jul 2011 Electronic form version 1.4