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Multiple Filamentation of Supercritical UV Laser Beam in Atmospheric Air

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Multiple filamentation of UV picosecond pulses being amplified in hybrid Ti:Sapphire/KrF laser facility GARPUN-MTW was investigated under propagation in atmospheric air over ~100 m. Peak pulse power attained 0.3 TW, which is in 3000 times higher than the critical value (~0.1 GW) for filamentation of 248 nm wavelength radiation. In contrast to 100-fs pulses significant distinctive features (3 times bigger filament diameter, several orders of magnitude lower clamped intensity and electron density, linear whole beam focusing behavior) were observed being probably caused by Resonance Enhanced Multi-Photon Ionization of gas via two-photon resonance excitation of oxygen molecules and stimulated Raman scattering.

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