Exponential enhancement of terahertz power from asymmetric plasma profile pumped by two-color laser femtosecond pulses

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Generation of terahertz electromagnetic wave from air ionized by a fs two-color laser has been of active research area for its potential for realizing intense THz source. The THz power, however, has a sublinear growth rate with the incident laser energy increases [1]. We demonstrate one order of increase in terahertz (THz) power by creating asymmetric plasma filament. A one-dimensional model for THz yield is solved, implying amplification of THz wave during its propagation in plasma.

Figure 1. THz power dependence on the adjusted plasma length with fitting lines obtained by considering amplification of the THz wave in the plasma (solid black line) and not considering amplification (gray dashed line). Inset shows the typical plasma profile with different lengths and peak electron density.