Abstract Submitted
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Generation of scalable terahertz radiation from cylindrically focused laser pulses in air[1] DONGHOON KUK, YUNGJUN YOO, ERIC ROSENTHAL, NIHAL JHAJJ, HOWARD MILCHBERG, KI-YONG KIM, Univ of Maryland-College Park — We have demonstrated scalable terahertz (THz) generation via cylindrical focusing of two-color laser pulses in air. In this experiment, we have used a terawatt (TW) laser system which can deliver >50 mJ, 800 nm, 50 fs pulses at a 10 Hz repetition rate. A 800 nm pulse passing through a nonlinear crystal (BBO) generates its second harmonic pulse (400 nm). Both pulses pass through a cylindrical lens and are focused together to generate a 2-dimensional plasma sheet in air. This yields two diverging THz lobes, characterized by an uncooled microbolometer. This observed radiation angle and pattern is explained by the optical-Cherenkov radiation theory. The diverging THz radiation is re-focused to yield strong THz field strengths (>20 MV/cm) at the focus. At laser energy of 40 mJ, cylindrical focusing provides THz energy of >30 microjoules, far exceeding the output produced by spherical focusing. This shows that cylindrical focusing can effectively minimize ionization-induced defocusing, previously observed in spherical focusing, and can allow scalable THz generation with relatively high laser energies (>20 mJ).

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Ki-Yong Kim
Univ of Maryland-College Park

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