Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Intense laser interaction with argon cluster/fiber targets and radiation generation at 1 kHz repetition rates[1] YAN TAY, DONGHOON KUK, HOWARD MILCHBERG, KI-YONG KIM, Univ of Maryland-College Park — We have investigated the interaction of intense femtosecond laser pulses with two types of targets, a gas of clusters and argon solid fibers ($\sim$ 50 micron diameter), at 1 kHz repetition rates for high-flux X-ray and terahertz radiation generation. Here we have used capillary nozzles (50 $\sim$ 500 microns in diameter) to produce argon or nitrogen clusters in high-density (10^{19} - 10^{21} cm^{-3}) gas jets at high backing pressure ($\sim$ 1000 psi) and cryogenic temperature (100 K). All optical methods including optical interferometry and Rayleigh/Mie scattering are used to characterize the atomic gas densities, cluster sizes, and clustering ratios in continuous gas jets. We have also produced continuous argon fiber targets with a thin cryogenically cooled capillary nozzle. These cluster and fiber targets can be utilized to produce enhanced X-ray and terahertz generation, as well as energetic electrons and ions, with intense, high-repetition-rate (>kHz) laser interaction.

[1]Work supported by DOE and DTRA.

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Date submitted: 09 Jan 2015 Electronic form version 1.4