Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Characterization of argon cluster targets in high-density, continuous gas jets[1] DONGGYU JANG, University of Maryland, College Park & Gwangju Institute of Science and Technology, YONG SING YOU, YAN TAY, LUKE HAHN, HOWARD MILCHBERG, University of Maryland, College Park, HYYONG SUK, Gwangju Institute of Science and Technology, KI-YONG KIM, University of Maryland, College Park — We have developed a simple all-optical method for characterizing the average cluster size, number of clusters per unit volume (density), and mass fraction of clusters in gas jets. In this technique, we combine three optical diagnostics—forward/backward Mie scattering detection, 90 degree scattering imaging, and neutral gas interferometry. We also demonstrate its use in characterizing a continuous gas jet. In particular, we have investigated the spatial variation of cluster parameters for continuous cluster jets produced by cryogenic cooling. This technique, in principle, can serve as an in-situ diagnostic for characterizing cluster jets prior to injecting high-intensity laser pulses for driving intense laser-cluster interactions. In particular, our cryogenically-cooled, continuous cluster source can produce relatively large clusters ($\sim$ 70 nm), favorable in many laser-cluster experiments including plasma waveguide generation, with a moderate clustering ratio ($\sim$ 20%). Such a cluster source can be used as a potential target for intense, high-repetition-rate (>kHz) laser pulses.

[1]Work supported by DOE, DTRA, and NRFK.

Ki-Yong Kim
University of Maryland, College Park

Date submitted: 11 Jul 2014 Electronic form version 1.4