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Measurement of the cluster mass fraction in a pulsed supersonic gas jet by frequency domain holography XIAOHUI GAO, XIAOMING WANG, RICK KORZEKWA, MIKE DOWNER, The University of Texas at Austin — Accurate interpretation and control of laser-cluster experiments require complete characterization of the cluster gas jet, of which the cluster mass fraction is usually difficult to measure. Here we present an in situ optical measurement of the cluster mass fraction. We measured the fs-time-resolved phase shifts from the gas jet after ionization and heating by a pump pulse using frequency domain holography. The distinct dynamics of the intense-laser-ionized monomer and cluster allow us to separate the monomer and cluster contribution to the phase shifts in the time domain and thus to determine the cluster mass fraction. The temporal evolution of the cluster fraction and various other influences on the cluster fraction in a pulsed supersonic gas jet is being investigated. We found that the cluster fraction is typically less than 0.5 in our jet. We aim to increase the cluster fraction to 0.8, which is crucial for phase-matched harmonic generation at high laser intensity in cluster jet.

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