Characterization of cluster/monomer ratio in pulse supersonic gas jets

RICHARD KORZEKWA, XIAOHUI GAO, XIAOMING WANG, BONGGU SHIM, ALEXEY AREFIEV, MIKE DOWNER, Institute for Fusion Studies, University of Texas at Austin, Austin, Texas 78712 — We determine cluster mass fraction $f_c(r, t)$ at position $r$ within, and time $t$ after firing, a pulsed supersonic gas jet by measuring femtosecond evolution of the jet’s refractive index by single-shot frequency domain holography. A fs pump pulse singly ionizes monomers, while quasi-statically ionizing and heating clusters to a level at which recombination remains negligible as clusters expand. Under these conditions, index evolves in two simple steps corresponding to monomer and cluster contributions, allowing recovery of $f_c$ without detailed cluster dynamic modeling. Variations of $f_c$ with $t$ are measured.

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