Generation of thin, near critical density gas targets for laser plasma interaction experiments\textsuperscript{1} FATHOLAH SALEHI, ANDY GOERS, GEORGE HINE, LINUS FEDER, BO MIAO, HOWARD MILCHBERG, University of Maryland College Park — We present the design and characterization of a thin (200m FWHM), high density pulsed gas jet which we use to study near critical and overcritical laser plasma interactions. We show that cryogenic cooling of the pulsed jet provides the necessary density enhancement for reaching overcritical plasma densities at 800 nm ($\sim 1.7 \times 10^{21}$ cm$^{-3}$) with pure hydrogen gas at plenum pressures below 1000 psi. Further, we present 2D and 3DPIC simulations showing the interaction of femtosecond pulses with our experimentally measured near critical gas density profile. These simulations show electron and ion acceleration at drive pulse energies as low as a few tens of millijoules:

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