Determining mean argon cluster size in a planar expansion

Argon clusters are large molecules of 10 to 10,000 argon atoms. Clusters are of interest in intense laser-cluster interactions which can produce attosecond pulses of light. To produce clusters, the gas is expanded through a small opening into vacuum. To understand the physics of the laser-cluster interactions, it is necessary to determine the cluster sizes in the expansion. I use Rayleigh scattering combined with interferometric measurement to make the first determination of the mean size of argon clusters formed in a planar expansion. I also set up an expansion using an aperture nozzle to compare the results with those of other investigations. My experimental setup consists of a 15cm long by 100micron wide slit type nozzle, a 15mW 532nm CW Nd: YAG probe beam, a PMT for the signal collection, and a PZT mounted in the nozzle's plenum for direct measurement of stagnation pressure. Using a PZT pressure sensor I am able to determining the mean cluster size as a function of the stagnation pressure. The experimental setup now incorporates a Michelson interferometer, in which we have one arm pass through the gas expansion and the other arm pass below the gas.