B8

Size and density redistribution by a rod obstacle in a cluster jet for quasi-phase matching of high harmonic generation

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We investigate the the possibility to realize a fully coherent XUV light source generating wavelengths down to 4 nm by using high-order harmonic generation (HHG) in an ionized medium. Due to the strong ionization, current p We investigate the possibility to realize a fully coherent XUV light source generating wavelengths down to 4 nm by using high-order harmonic generation (HHG) in an ionized medium. Due to the strong ionization, current phase-matching techniques for HHG are not suitable. Instead, we will investigate quasi-phase matching (QPM) over an extended interaction length to increase the output pulse energy. For this, we will prepare a cluster jet from a 5 mm long supersonic nozzle operated at high backing pressure (up to 75 bar). The modulation for QPM is obtained by placing either an array of wires or slits on top of the exit of the nozzle. Here, we report on the characterization of the modulated argon cluster jet. We apply Rayleigh scattering imaging and interferometry to infer the cluster size and total atomic number density distribution in the jet. Initial experiments concern the modulation of the jet by placing a 2 mm rod above the nozzle. The first results on the cluster size and density distribution will be compared with the simulation results from our 2D fluid dynamics model.