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Study of laser-generated debris free x-ray sources produced in a high-density linear Ar, Kr, Xe, Kr/Ar and Xe/Kr/Ar mixtures gas jets by 2ω, sub-ps LLNL Titan laser. V.L. KANTSYREV, K.A. SCHULTZ, V.V. SHLYAPTSEVA, A.S. SAFRONOVA, M.C. COOPER, I.K. SHRESTHA, E.E. PETKOV, A. STAFFORD, J.J. MOSCHELLA, M.T. SCHMIDT-PETERSEN, C.J. BUTCHER, University of Nevada, Reno, G.E. KEMP, S.D. ANDREWS, K.B. FOURNIER, Lawrence Livermore National Laboratory — The study of laser-generated debris-free x-ray sources in an underdense plasma produced in a high-density linear gas-puff jet was carried out at the LLNL Titan laser (2ω, 45 J, sub-ps) with an intensity in the 10 um focal spot of 7 x 10^{19} W/cm^2. A linear nozzle with a fast valve was used for the generation of a clusters/gas jet. X-ray diagnostics for the spectral region of 0.7 - 9 keV include: two spectrometers and pinhole cameras, and 3 groups of fast filtered detectors. Electron beams were measured with the EPPS magnetic spectrometer (>1 MeV) and Faraday cups (>72 keV). Spectralon/spectrometer devices were also used to measure absorption of laser radiation in the jets. New results were obtained on: anisotropic generation of x-rays (laser to x-ray conversion coefficient was > 1%) and characteristics of laser-generated electron beams; evolution of x-ray generation with the location of the laser focus in a cluster-gas jet, and observations of a strong x-ray flash in some focusing regimes. Non-LTE kinetic modeling was used to estimate plasma parameters. UNR work supported by the DTRA Basic Research Award # HDTRA1-13-1-0033. Work at LLNL was performed under the auspices of the U.S. DOE by LLNL under Contract DE-AC52-07NA27344.

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