Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

**Demonstration of a Laser-Driven, High Efficiency, Low Noise Argon Gas Jet X-Ray Source*** N.L. KUGLAND, UCLA and LLNL, B. AURAND, GSI, C.G. CONSTANTIN, E.T. EVERSON, UCLA, S.H. GLENZER, LLNL, D. SCHAEFFER, UCLA, A. TAUSCHWITZ, GSI, C. NIEMANN, UCLA — The electromagnetic pulse (EMP) from Ar gas jet plasmas has been measured to be 4x weaker and 20x shorter in time duration than the EMP from solid density plasmas of similar (3 keV) x-ray energy. We irradiated high density ($10^{20}$ $cm^{-3}$ atomic density) supersonic Ar gas jets and solid (6 x $10^{22}$ $cm^{-3}$ atomic density) plastic $C_2H_2Cl_2$ targets with an ultra-high intensity ($10^{19}$ $W/cm^2$), petawatt-class 1053 nm laser. Electron spectroscopy shows that the electron distribution leaving the rear side of gas jet targets close to the laser axis is more than 4x higher in number and energy than for solid targets, in spite of the greatly reduced EMP. This suggests that target density is the more decisive factor. Monochromatic x-ray imaging and K-shell x-ray spectroscopy provide additional insight into the nature of the laser-target interaction. With competitive conversion efficiency from laser energy into x-rays, Ar gas jets are a bright and low-noise source of 3 keV x-rays for plasma diagnostics.
*This work was supported by the DOE Plasma Physics Junior Faculty Award Program and was performed under the auspices of the U.S. Department of Energy by the Lawrence Livermore National Laboratory under contract DE-AC52-07NA27344.
LLNL-ABS-442193

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Date submitted: 14 Jul 2010 Electronic form version 1.4