Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Hard x-ray backlighters for high resolution Compton radiography of Inertial Confinement Fusion targets[1] R. TOMMASINI, A. MACPHEE, D. HEY, T. MA, C. CHEN, N. IZUMI, A. MACKINNON, S.P. HATCHETT, Lawrence Livermore Nat. Lab., J.A. KOCH, P. SPRINGER, O.L. LANDEN, Lawrence Livermore Nat. Lab. — Radiographs of the final stages of imploding DT fuel in inertial confinement fusion experiments will be extremely valuable for checking the convergence, areal density and areal density uniformity of the fuel. For x-rays with energies between 30 and 200 keV, the main opacity will be due to Compton scattering. Here we present the demonstration of 75-200 keV point backlighter sources generated by gold targets irradiated by picosecond laser pulses. In experiments performed at the Titan laser facility at Lawrence Livermore National Laboratory, we measured the source size and the Bremsstrahlung spectrum, as a function of laser intensity and pulse length, from by 5e17-5e18 W/cm^2 using 2-40 ps pulses. We achieved 1D and 2D source sizes of 10 μm, and conversion efficiencies exceeding 1e-3 J/J into x-ray photons with energies in the 100-200 keV spectral range. These sources meet the requirements for radiographing the fuel in inertial confinement fusion implosions at both OMEGA and the National Ignition Facility (NIF) whose experimental designs will also be discussed.

[1]Prepared by LLNL under Contract DE-AC52-07NA27344.

Riccardo Tommasini
Lawrence Livermore Nat. Lab.

Date submitted: 14 Aug 2008 Electronic form version 1.4