High-yield direct drive experiments at Nova

S. M. Lane, M. D. Cable, S. G. Prussin, S. G. Glendinning, D. H. Munro, S. P. Hatchett, K. G. Estabrook, and L. J. Suter

Lawrence Livermore National Laboratory, P. O. Box 5508, Livermore, California 94550

M. C. Richardson

University of Rochester, Laboratory for Laser Energetics, Rochester, New York 14627

(Presented on 12 March 1986)

A series of direct drive implosions of D-T filled, glass microballoons has been initiated in an effort to produce intense neutron sources for diagnostics development. In particular, measurements such as neutron imaging, burn history using a neutron-sensitive streak camera, and fuel ρr by both neutron activation and neutron spectroscopy could be more easily tested with these simple targets than high-density targets that initially are not expected to produce such high yields. Targets with nominal dimensions of $1000\times 2\,\mu$m which contained D-T at 12–14 atm were imploded with 18 kJ of 0.35-μm light from the 10-beam Nova system. For pulse widths of 1 ns in either converging or diverging geometry, fusion yields in excess of 10^{13} have been obtained. The yields are comparable to those predicted from numerous 1-D model calculations in spite of the asymmetric illumination geometry of the driver. Work performed under the auspices of the U.S. DOE by Lawrence Livermore National Laboratory under contract number W-7405-ENG-48.

Neutral-particle densities outside the TMX-U plasma edge

W. L. Pickles and R. A. Jong

Lawrence Livermore National Laboratory, University of California, Livermore, California 94550

(Presented on 12 March 1986)

Neutral molecular densities just outside the plasma edge are measured at 11 axial locations in tandem mirror experiment-upgrade (TMX-U). These densities are time dependent and vary greatly with different modes of TMX-U plasma operation. The densities are low in the ion-cyclotron resonance heated central cell because of plasma pumping. The density is high in the plug near the sloshing-ion turning point. These densities are measured with a combination of new retractable, and fixed, magnetically unshielded Bayard–Alpert gauges that can be oriented to provide calibrated operation in the high (7 kG) TMX-U magnetic fields. The role of the neutral density in simultaneously fueling and charge exchanging away the plug density is modeled using SMOKE, a Fokke–Planck code.

 0034-6748/86/082100-01$01.30