Abstract Submitted
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Neutron imaging development for ICF experiments OLIVIER LANDOAS, T. CAILLAUD, B. ROSSE, M. BRIAT, I. THFOIN, S. KIME, S. LAFFITE, F. PHILIPPE, J.L. BOURGADE, L. DISDIER, CEA, V. YU GLEBOV, F.J. MARSHALL, T.C. SANGSTER, LLE — Various failure mechanisms may limit the fuel compression during Inertial Confinement Fusion experiments with MegaJoule class lasers. Implosions asymmetries can be observed using a Neutron Imaging System (NIS) which can record both a primary (14MeV) and a down-scattered (5-10 MeV) neutron image with significant spatial resolution (<10μm) and Signal to Noise Ratio (SNR). For 10 years, we have developed the LMJ NIS diagnostic using penumbral or annular coded aperture technique. The annular imaging technique demonstrated to maintain a large SNR but this technique is very sensitive to misalignment (<50μm) compared to the penumbral aperture. A new alignment method was used in 2011 on OMEGA allowing the on-line replacement from the penumbral to the annular aperture. Spherical, prolate and oblate 14 MeV neutron core images were obtained by varying the laser energy balance and compared to X-ray images and simulations. The SNR is in the 40-50 range and the system resolution is 15μm with the large neutron camera (LMJ scaled) placed at 13m from target. Because the resolution contribution is equally limited by detector and aperture, neutron images can be corrected from the scintillator Point Spread Function (PSF) to decrease the system resolution down to about 10μm.

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