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X-ray energy flow and radiography measurements of evolving density perturbations A.S. MOORE, P. GRAHAM, M.J. TAYLOR, J.M. FOSTER, AWE Aldermaston, C. SORCE, A. REIGHARD, S. MACLAREN, P. YOUNG, G. GLENDINNING, LLNL, B.E. BLUE, C.A. BACK, J. HUND, General Atomics — X-radiation transport through plasma density gradients, such as N-waves, form a closely coupled system that is challenging to simulate. Such situations are a key component of the physics of laser-heated hohlraums occurring in the laser-heated cavity and also in the laser-entry and any diagnostic holes. In addition the similarity to some astrophysical conditions may mean that such experiments can be used as a laboratory-scale analogue for their investigation. To better understand these phenomena, we present results from a series of experiments performed at the Omega laser facility. Using a laser-heated hohlraum drive, a tantalum aerogel with an initial seed perturbation is heated, and x-rays initially free-stream through the perturbation before they fill with plasma and radiation transport becomes diffuse. We present energy flux measurements diagnosed using two different methods, and complementary radiography results that achieve sufficient contrast, despite the high background of the hohlraum, to enable the complex shock interactions and stagnation to be directly observed. These results are compared with simulations performed using a 2-D Eulerian hydrocode, which are able to reproduce the overall energetics, and much of the details of the deceleration shock and axial stagnation region at the centre of the slit.

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