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Fuel Areal-Density Measurements in Laser-Driven Magnetized Inertial Fusion from Secondary Neutrons J.R. DAVIES, D.H. BARNAK, R. BETTI, V.YU. GLEBOV, J.P. KNAUER, J.L. PEEBLES, Laboratory for Laser Energetics, U. of Rochester — Laser-driven magnetized liner inertial fusion is being developed on the OMEGA laser to provide the first data at a significantly smaller scale than the Z pulsed-power machine in order to test scaling and to provide more shots with better diagnostic access than Z. In OMEGA experiments, a 0.6-mm-outer-diam plastic cylinder filled with 11 atm of D_2 is placed in an axial magnetic field of $\sim$10 T, the D_2 is preheated by a single beam along the axis, and then the cylinder is compressed by 40 beams. Secondary DT neutron yields provide a measurement of the areal density of the compressed D_2 because the compressed fuel is much smaller than the mean free path and the Larmor radius of the T produced in D–D fusion. Measured secondary yields confirm theoretical predictions that preheating and magnetization reduce fuel compression. Higher fuel compression is found to consistently lead to lower neutron yields, which is not predicted by simulations. The information, data, or work presented herein was funded in part by the Advanced Research Projects Agency-Energy (ARPA-E), U.S. Department of Energy, under Award Number DE-AR0000568 and the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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