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Hot-Spot Flow Velocity in Laser-Direct-Drive Inertial Confinement Fusion Implosions SEAN REGAN, University of Rochester, OWEN MANNION, CHAD FORREST, JAMES KNAUER, RICCARDO BETTI, MICHAEL CAMPBELL, DUC CAO, VLADIMIR GLEBOV, VALERI GONCHAROV, STEVEN IVANCIC, FREDERIC MARSHALL, RADHA BAHUKUTUMBI, THOMAS SANGSTER, RAHUL SHAH, CHARLES SORCE, CHRISTIAN STOECKL, WOLFGANG THEOBALD, Laboratory for Laser Energetics, University of Rochester — Multidimensional effects on the hot-spot formation of laser-direct-drive inertial confinement fusion implosions can lead to an anisotropic hot-spot flow velocity and incomplete stagnation. The first and second moments of the primary DT fusion neutron peak, recorded with four neutron time-of-flight detectors positioned around the target chamber in quasi-orthogonal diagnostic lines of sight, are analyzed to infer the hot-spot flow velocity and the ion temperature of implosions on the 60-beam, 30-kJ, 351-nm OMEGA laser. The possible physical degradation mechanisms (e.g., initial target offset, target stalk orientation, and nonuniformities in the target and the laser drive) leading to a hot-spot flow velocity in implosions of DT cryogenic targets and DT gas-filled plastic shells will be presented. Correlations of the hot-spot flow velocity with gated x-ray images of the hot spot recorded along multiple lines of sight and of in-flight asymmetries of the imploding shell will be examined. A hot-spot flow velocity of 50 to 150 km/s is observed to point in the direction of the maximum inferred ion temperature. This material is based upon work supported by the DOE National Nuclear Security Administration under Award Number DE-NA0003856.

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