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Observation of persistent species temperature separation in inertial confinement fusion mixtures[1] BRIAN HAINES, Los Alamos National Laboratory, RAHUL SHAH, University of Rochester Laboratory for Laser Energetics, JOE SMIDT, BRIAN ALBRIGHT, TANA CARDENAS, MELISSA DOUGLAS, Los Alamos National Laboratory, CHAD FORREST, VLADIMIR GLEBOV, University of Rochester Laboratory for Laser Energetics, MARK GUNDERSON, CHRIS HAMILTON, KEVIN HENDERSON, YONGHO KIM, MATTHEW LEE, TOM MURPHY, JOHN OERTEL, RICK OLSON, BRIAN PATTERSON, RANDALL RANDOLPH, DEREK SCHMIDT, Los Alamos National Laboratory
— The injection of contaminant mass into the fuel region of ICF implosions is a primary factor preventing ignition. We report results of unique separated reactants implosion experiments[1] which indicate that the amount of contaminant inferred in ICF experiments is routinely underestimated. Our experiments[2] study the limiting case of pre-mixed chunks of contaminant in the fuel and we interpret the results with the aid of detailed 3D simulations that resolve mixing lengthscales. At conditions relevant to mixing regions in high-yield implosions, we observe that contaminant does not achieve thermal equilibrium with the fuel and this temperature separation persists throughout the burn phase. The assumption of thermal equilibrium is made in nearly all computational modeling of high-yield implosions as well as methods used to experimentally infer levels of contaminant present. [1]B.M. Haines et al., submitted, 2019. [2]T.J. Murphy et al., J. Phys.: Conf. Ser. 717, 012072, 2016

[1]US DOE LANL DE-AC52- 06NA25396 and 89233218NCA000001

Brian Haines
Los Alamos National Laboratory

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