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NLTE atomic kinetics modeling in ICF target simulations[1]
MEHUL V. PATEL, CHRISTOPHER W. MAUCHE, HOWARD A. SCOTT, OGDEN S. JONES, BENJAMIN T. SHIELDS[2], Lawrence Livermore Natl Lab — Radiation hydrodynamics (HYDRA) simulations using recently developed 1D spherical and 2D cylindrical hohlraum models have enabled a reassessment of the accuracy of energetics modeling across a range of NIF target configurations. Higher-resolution hohlraum calculations generally find that the X-ray drive discrepancies are greater than previously reported. We identify important physics sensitivities in the modeling of the NLTE wall plasma and highlight sensitivity variations between different hohlraum configurations (e.g. hohlraum gas fill). Additionally, 1D capsule only simulations show the importance of applying a similar level of rigor to NLTE capsule ablator modeling. Taken together, these results show how improved target performance predictions can be achieved by performing inline atomic kinetics using more complete models for the underlying atomic structure and transitions.

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