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Improved Predictive Models and Further Progress in the Cryogenic Optimization Campaign on OMEGA VARCHAS GOPALASWAMY, RICCARDO BETTI, JAMES KNAUER, DHRUMIR PATEL, AARNE LEES, KAMING WOO, ALISON CHRISTOPHERSON, OWEN MANNION, FREDRICK MARSHALL, CHRISTIAN STOECKL, VLADIMIR GLEBOV, SEAN REGAN, RAHUL SHAH, DANA EDGELL, MICHAEL ROSENBERG, DUC CAO, VALERI GONCHAROV, IGOR IGUMENSHCHEV, RADHA BAHUKUTUMBI, TIM COLLINS, CRAIG SANGSTER, MICHAEL CAMPBELL, Laboratory for Laser Energetics, MARIA GATU-JOHNSON, JOHAAN FRENJE, RICHARD PETRASSO, Massachusetts Institute of Technology — Previous work on OMEGA has established a framework for generating predictive models for cryogenic ICF implosions, which were then used to increase performance on the OMEGA laser system. Here, we present improved predictive models built using this framework for the neutron yield, areal density, minimum ion temperature and x-ray hotspot radius in cryogenic implosions, which are used to optimize implosion design. We also present a predictive model for suprathermal electrons from warm implosions, which are necessary to quantify the preheat levels in cryogenic implosions to fully understand their effect in direct-drive experiments. In addition to highlighting and quantifying the magnitude of potential degradation sources, the use of this ensemble of predictive models has led to the design of experiments that are expected to show an increase in the areal density compared to the previous best performing implosion on OMEGA, while keeping neutron yields constant.

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