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Engineering Robustness into Inertial Confinement Fusion Designs[1] LUC PETERSON, BOGDAN KUSTOWSKI, LAURENT MASSE, JOSEPH KONING, BENJAMIN BAY, JIM GAFFNEY, KELLI HUMBIRD, MICHAEL KRUSE, RYAN NORA, BRIAN SPEARS, Lawrence Livermore National Laboratory — Traditional indirect drive design is a two-step process: first a desired capsule, laser and hohlraum configuration are constructed via simulation, followed by a subsequent experimental test. However, due to variations in laser performance and material manufacturability (e.g. capsule geometry), the as-fired configuration will naturally deviate from the originally conceived ideal case. Furthermore, due to physics knowledge gaps, the inferred radiation environment in the experiment differs from that which was predicted by simulations (and around which the design was originally conceived). The combination of the design and experiment having both different boundary conditions and different physics can complicate the interpretation of results, obfuscating whether observations are inherent to the design itself (and therefore potentially fixable) or whether attributable to random shot-to-shot variation. In this work we aim to answer the question, Can we engineer resilience to as-fired conditions into a capsule design? We will explore this question in the context of re-optimizing high-performing as-fired NIF shots to include uncertainty due to manufacturability and laser drive. Given what we can infer about likely experimental conditions, can we design the best capsule to suit?

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