# PLANS FOR DOUBLE SHELL CAPSULE EXPERIMENTS ON NIF

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Double-shell capsules are an alternative approach to achieving indirect drive ignition. A double shell consists of a low-Z ablatively-driven outer shell that impacts a high-Z inner shell filled with DT fuel (either gas or liquid). In contrast to single-shell designs, double-shell targets burn the fuel via volume ignition, albeit with a lower gain. While double-shell capsules are complicated to fabricate, their design includes several beneficial metrics such as a low convergence pusher (C.R. < 10), low implosion speed (250 km/s), a simple few-ns laser drive in a vacuum hohlraum, less sensitivity to hohlraum asymmetries, and low expected laser-plasma instabilities. In addition, the calculated ignition requirements are a fuel areal density $\rho r \sim 0.3$ g/cm$^2$ and temperature $T_{ion} < 4$-keV, less stringent than for a single-shell due to reduced radiation and conduction losses, and greater inertia for longer confinement times.

We present preliminary double-shell capsule designs for NIF using a cryogenic liquid DT fill which are optimized for yield and minimized for fall-line mix. The outer surface of the inner-shell is tamped with a mid-Z layer to mitigate hydro-instability growth at this interface [1, 2]. Capsule fabrication and diagnostic challenges will be discussed, as well as uncertainties and trade-offs in the physics issues compared to single-shells. Similar to single-shell capsules, experiments to tune the double-shell capsule performance are required. All of the platforms developed to tune single-shell capsules on NIF translate well to double-shell capsules, and a concept for one additional tuning platform will be presented. Finally a development path for fielding double-shells on NIF will be shown.

[1] W.S. Varnum *et al., Phys. Rev. Lett.* **84**, 5153 (2000).
[2] J.L. Milovich, P. Amendt, M. Marinak, H. Robey, *Phys. Plasmas* **11**, 1552 (2004).