Direct Drive Reentrant Cone Targets for Fast Ignition

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Targets designed for fast ignition (FI) must have clear access for the ignitor laser to the compressed pellet core. This is provided in current concepts by embedding a reentrant cone into a spherical shell, with the tip of the cone close to the center of the shell. We have designed a gas-tight direct-drive target as the first step in developing a FI target, and have studied its implosion dynamics at the Omega laser at UR/LLE, using back-lit and self-emission framing cameras. A step in the cone surface, and an aluminum coating on the shell were required to make the assembly gas-tight; this shell type withstood >10 atm gas fill pressure and had a typical pressure half-life of 2-6 hrs. The implosion of these targets were substantially different from those of previous indirect drive targets [1]: there was much less vaporization of the cone; much clearer structure in the collapsing shells; and, a possibility that the hot core could escape around the cone rather than punch in its tip. Additionally self-emission images showed the heating of the shell core gas and the effect of the gas on the cone tip. These results will be compared to simulations.

[1] R.B. Stephens, et al., "Implosion of Indirectly Driven Reentrant Cone Shell Target," submitted to Phys. Rev. Lett. Feb 2003.

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