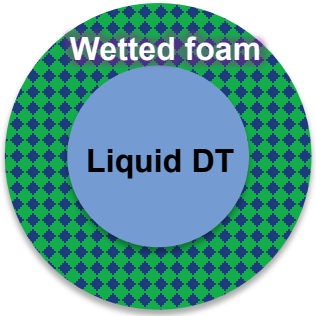
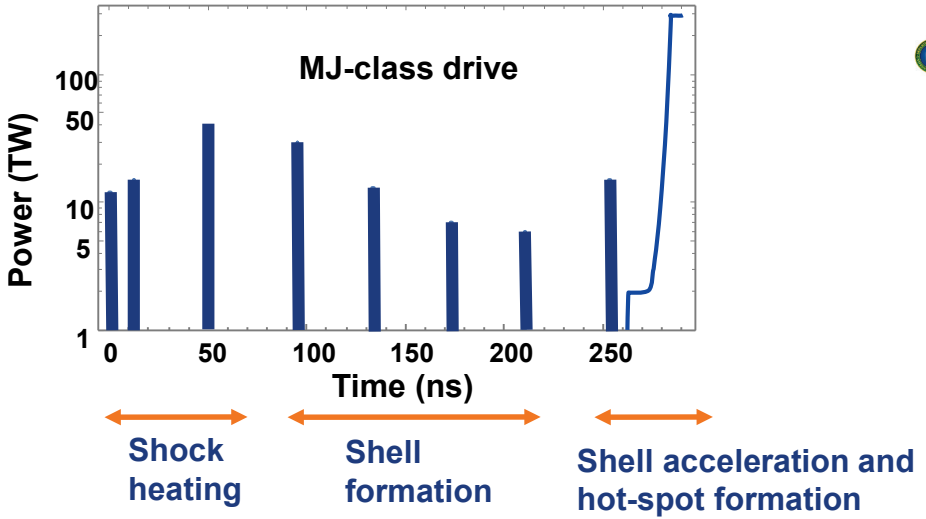
Novel Hot-Spot–Ignition Designs for Inertial Confinement Fusion with Liquid Deuterium–Tritium Spheres





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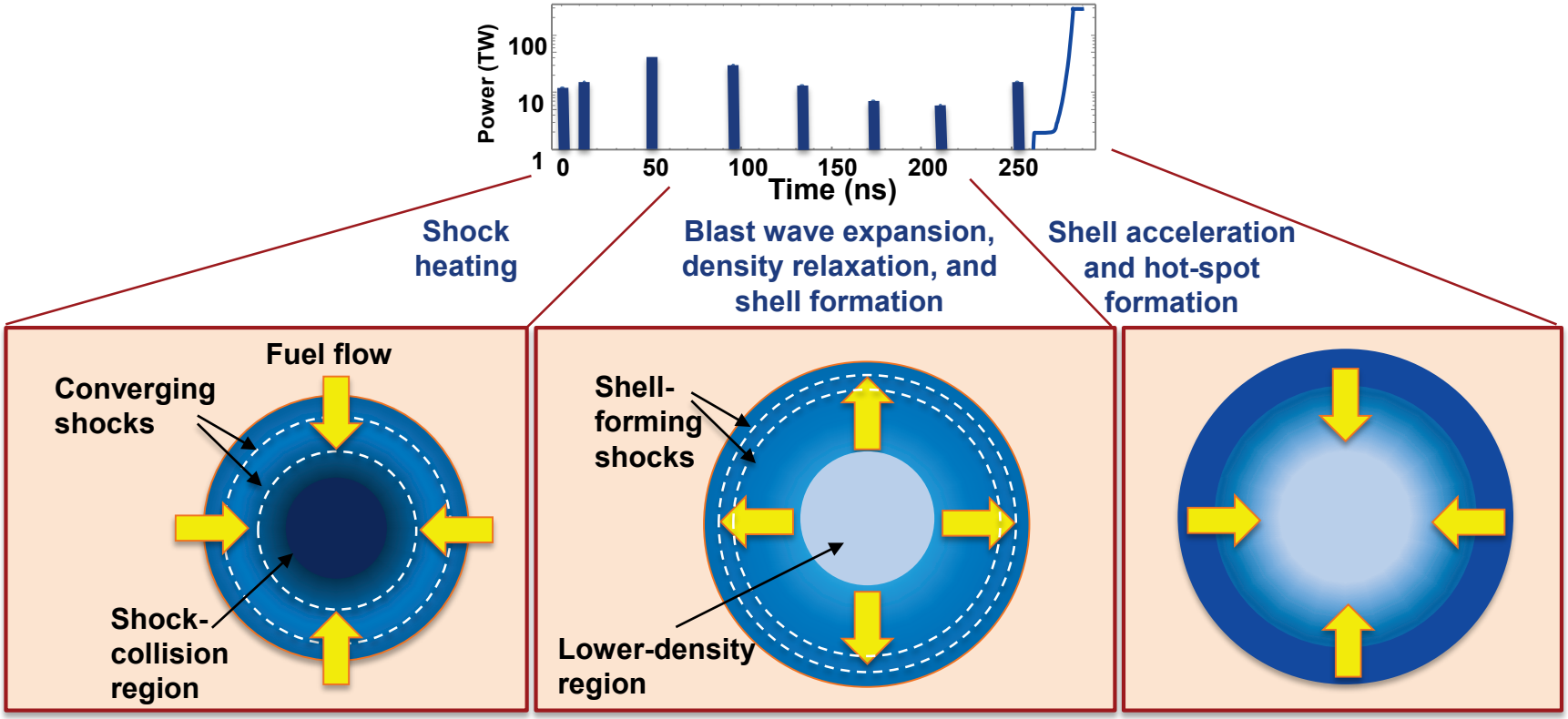
Summary

The dynamic shell formation concept* expands the parameter space for MJ-yield and high-gain ignition designs

- A liquid DT sphere inside a wetted foam shell is used as a target in the new design; the lower-density central region and higher-density shell are created dynamically by appropriately shaping the laser pulse
- Changing the strength of outward mass flow enables the design to control density in the central region and target convergence ratio
- Accurate multidimensional modeling of the new designs are underway to assess their stability properties

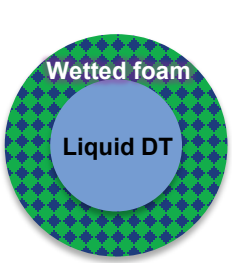
*V. Goncharov *et al.*, Phys. Rev. Lett. 125, 065001 (2020)

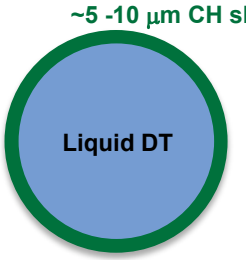
The dynamic shell design evolves through three stages

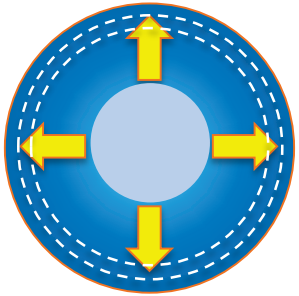


The dynamic shell design offers several advantages over a conventional layered target design

- Target simplicity
- Fuel uniformity
- Control of density in central region
- Control of shell velocity and ablated mass with pulse shaping







The stronger blast wave leads to lower central density

The shell and hot-spot convergence ratio can be controlled by varying central density.