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Shock ignition: gain curves and energy-wavelength scaling[1] STEFANO ATZENI, ALBERTO MAROCCHINO, ANGELO SCHIAVI, Dipartimento SBAI, Università di Roma La Sapienza and CNISM, Italy — In shock ignition, separation of the stages of fuel compression and hot spot creation introduces some degree of design flexibility. A lower implosion velocity can be compensated for by a more intense ignition pulse. Flexibility increases with target (and driver) size and allows for a compromise between energy gain and risk reduction. Having designed a reference ignition target, we have developed an analytical model for (up)-scaling targets, and for estimating target gain, as a function of laser energy and parameters related to hydro- and plasma-instabilities. Detailed 1D simulations confirm the model and generate gain curves, while 2D simulations show how different design options affect robustness to asymmetries caused by laser nonuniformities and target mis-positioning. The previous results apply to UV ($\lambda = 0.35$ μm) laser light. We also show that our scaling model can be used in the design of targets driven by green laser ($\lambda = 0.53$ μm). 1D simulations show that gain in the range 100 – 200 can be obtained for total green light laser energy in the range 1.5 – 3 MJ, while operating in the same laser-plasma regime as the UV-driven targets.

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