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Shock Ignition Theoretical Studies: From Hot Electrons Pressure Generation To Converging Amplification Effects XAVIER RIBEYRE, EMMA LLOR, ALEXANDRA VALLET, PHILIPPE NICOLAI, VLADIMIR TIKHONCHUK, CELIA — The shock ignition (SI) concept in inertial confinement fusion uses an intense power spike at the end of an assembly laser pulse. The power spike launches a strong shock wave with an ablation pressure of ~ 0.3 Gbar that increases in strength when converging through the imploding shell. However, the detail understanding of the role hot electrons in the pressure generation and the converging shell effects on pressure amplification is crucial in SI. First, we present a model describing the effect of the fast electron energy distribution on the dynamics of shock wave formation and the compression of matter behind its front. We have studied analytically and numerically the penetration and the energy deposition of fast electrons in a dense plasma and the shock wave formation. A criterion of a strong shock formation with an electron beam is obtained for an arbitrary distribution function. Finally, we present a new semi-analytical hydrodynamic model to describe the shock from its generation until fuel ignition. The shock pressure amplification follows mainly the overall imploded shell pressure enhancement but is not sufficient for SI. The shock is further amplified when it collides inside the shell with diverging shocks coming from the assembly phase. The shock is partially transmitted to the hot spot when it crosses the shell/fuel interface depending on the shock timing. A semi-analytical criterion for ignition on the shock pressure is expressed.

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