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Fast Ignition Modeling with Realistic Electron Source[1] D.J. STROZZI, M. TABAK, A.J. KEMP, L. DIVOL, D.P. GROTE, M.H. KEY, LLNL, D.R. WELCH, Voss Scientific, B.I. COHEN, R.P.J. TOWN, LLNL — We perform electron-beam transport simulations with the LSP code [D. R. Welch et al., Phys. Plasmas 13, 063105 (2006)] to determine the ignition requirements for cone-guided fast ignition. We run LSP as a direct-implicit PIC code, with a fluid treatment of the dense background. We use idealized plasma conditions for dense (~ 300 g/cm^3) DT fuel with a carbon or other low- to mid-Z cone. We do not include a laser, but excite an electron beam in the cone with a distribution based on explicit-PIC calculations with the PSC code of the short-pulse laser-plasma interaction. These simulations show the electron source has a two-temperature energy spectrum, and a relatively large angular divergence. This second fact pushes us toward ignition hot spots whose radial width exceeds their lateral depth, and larger beam energies. In particular, the role of short-pulse laser characteristics (e.g. wavelength), beam radius, magnetic-field focusing by resistivity tailoring, and cone-fuel standoff distance are explored. We are generalizing these burn-free calculations to include fusion reactions.

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