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Integrated Fast Ignition Target Design at LLNL PRAVESH PATEL, CLAUDIO BELLEI, CLIFF CHEN, BRUCE COHEN, LAURENT DIVOL, ANDREAS KEMP, DAVID LARSON, TONY LINK, FREDERIC PEREZ, YUAN PING, HANK SHAY, DAVID STROZZI, MIKE KEY, MAX TABAK, Lawrence Livermore National Laboratory, HIROSHI SAWADA, BRAD WESTOVER, University of California San Diego — We report on progress in the design of a high gain fast ignition (FI) target using an integrated suite of codes capable of simulating all aspects of an FI implosion. Integrated hohlraum and capsule simulations are performed with the radiation-hydrodynamics code, HYDRA. The ultrashort-pulse laser-plasma interaction and fast electron generation is simulated with an explicit particle-in-cell (PIC) code. The subsequent transport of the electrons through the imploding plasma and their heating of the dense core is modeled with a hybrid-PIC electron transport code coupled to the HYDRA code. The PIC calculations predict an over-energetic and divergent electron source that results in low energy coupling to the compressed core and reduced gain. We describe techniques to improve energy coupling and gain through the use of both azimuthal and axial magnetic fields generated through gradients in material resistivity and magnetic compression of initially imposed seed fields. Integrated calculations are used to design and optimize these schemes, assess overall target performance, and determine the ignition energy requirements for achieving high fusion gain. This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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