Two-plasmon–decay mitigation using laser-frequency detuning

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Three-dimensional laser–plasma interaction simulations show that laser-frequency detuning by an amount achievable with current laser technology can be used to suppress the two-plasmon–decay (TPD) instability and the corresponding hot-electron generation. For the plasma conditions and laser configuration in a direct-drive inertial confinement fusion implosion on the OMEGA laser, 3-D *LPSE* (laser-plasma simulation environment) simulations show that 0.7% laser-frequency detuning is sufficient to eliminate TPD-driven hot-electron generation in current OMEGA implosions. This allows for higher ablation pressures in future implosion designs by using higher laser intensities. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944, the University of Rochester, and the New York State Energy Research and Development Authority. The support of DOE does not constitute an endorsement by DOE of the views expressed in this article.