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Impact of Spatiotemporal Smoothing on the Two-Plasmon-Decay Instability[1] DAVID TURNBULL, ANDREI MAXIMOV, DUC CAO, ALISON CHRISTOPHERSON, DANA EDGELL, RUSS FOLLETT, VARCHAS GOPALASWAMY, JAMES KNAUER, JOHN PALASTRO, ALEX SHVYDKY, CHRISTIAN STOECKL, HAN WEN, DUSTIN FROULA, Laboratory for Laser Energetics, U. of Rochester — Higher levels of hot electrons from the two-plasmon-decay instability are observed when smoothing by spectral dispersion (SSD) is turned off in directly driven inertial confinement fusion experiments at the Omega Laser Facility. This finding is explained using a hot-spot model based on speckle statistics and simulation results from the laser-plasma simulation environment. The model accurately reproduces the relative increase in hot-electron activity at two different drive intensities, although it slightly overestimates the absolute number of hot electrons in all cases. Extrapolating from the current 360-GHz system while adhering to the logic of the hot-spot model suggests that larger SSD bandwidth should significantly mitigate hot-electron generation, and legacy 1-THz OMEGA experiments appear to support this conclusion. These results demonstrate that it is essential to account for laser speckles and spatiotemporal smoothing to obtain quantitative agreement with experiments.

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