Abstract Submitted
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Auxiliary Heating of Inertial Confinement Fusion Targets PETER NORREYS, STFC — The role of collisionless ion heating arising from the propagation of petawatt-laser driven relativistic electron beams in dense plasma will be discussed. The energy cascade mechanism begins first with the rapid growth of electrostatic waves near the electron plasma frequency. These waves reach high amplitudes and break, which then results in the generation of a strongly driven turbulent Langmuir spectrum. Parametric decay of these waves, particularly via the modulational instability, then gives rise to a coupled turbulent ion acoustic spectrum. These waves, in turn, experience significant Landau damping, resulting in the rapid heating of the background ion population. In this talk, I will review the evidence for this cascade process in laboratory plasmas and describe the theoretical background that underpins this process. I will then present the most recent analytic modelling, particle-in-cell and Vlasov-Poisson simulation results of my team within Oxford Physics and the Central Laser Facility that explores the optimum parameter space for this process, focusing in particular on the requirements for auxiliary heating of the central hot spot in inertial confinement fusion target experiments now underway on the National Ignition Facility. I will also describe new methods for hole-boring through the coronal plasma surrounding the fuel using strongly relativistic laser beams that demonstrates the strong suppression of the hosing instability under these conditions.

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