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Auxiliary Heating with Fast Electrons NAREN RATAN, University of Oxford, RAOUL TRINES, STFC Rutherford Appleton Laboratory, NATHAN SIRCOMBE, AWE plc, ROBERT BINGHAM, University of Strathclyde / STFC Rutherford Appleton Laboratory, PETER NORREYS, University of Oxford /STFC Rutherford Appleton Laboratory — Indirect drive inertial confinement fusion experiments can now achieve hot spot temperatures and densities tantalizingly close to ignition conditions. We are investigating the use of a fast electron beam to provide auxiliary heating to tip an existing scheme over the edge to ignition. Experiments on the stopping of fast electron beams have demonstrated that fast electrons are stopped in a much shorter distance than can be accounted for by collisions. Beam-plasma instabilities, a collective phenomenon, are a good candidate for explaining this anomalous stopping. Simulations of electron beams in plasmas have shown heating of the ions in the plasma. A possible explanation for these observations is that a beam-plasma instability produces Langmuir waves which decay to produce ion-acoustic waves, and that these ion-acoustic waves are subsequently damped leading to ion heating. We are studying the possibility of using such a mechanism to provide auxiliary heating of the hot spot using fast electron beams. We will present analytical work and simulations of each stage of this heating mechanism: the beam-plasma system becoming unstable, the decay of the resulting Langmuir waves, and the damping of the ion waves produced.

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