Theory and modelling of Inertial Confinement Fusion Plasmas

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One of the general challenges for direct drive Inertial Fusion is the efficient transfer of laser energy from where it is absorbed at relatively low density into the dense compressed fuel. This is accomplished by a combination of energy transport by electrons and hydrodynamic compression. Electron transport is non-linear and non-local even in conventional hot-spot ignition schemes. In shock ignition schemes, the hotter electrons produced at the higher laser intensity may potentially carry energy deeper into the capsule and increase the uniformity of the pressure driving the high velocity shock that heats the fuel at the end of the implosion. In high-gain fast-ignition schemes the laser energy is passed to very energetic electrons that propagate directly into the dense fuel. In this talk I will review the role electron transport plays in these schemes and the challenges presented to theory and simulation.