ANOMALOUS ABSORPTION OF LASER LIGHT ON ION ACOUSTIC TURBULENCE

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Instability of ion acoustic waves due to return current driven by an electron heat flux is identified as a source of ion-acoustic turbulence (IAT) in hot, inertial confinement fusion plasmas. Two mechanisms of anomalous absorption are studied, first due to enhanced electron collisionality on ion-acoustic fluctuations and second due to electromagnetic wave conversion into Langmuir waves at the critical density, that is enabled by the IAT. An effective absorption coefficient is derived combining the two mechanisms and including stationary IAT spectrum derived from the theory of a weak plasma turbulence. Estimates of the return current instability threshold and anomalous absorption are presented for the hohlraum plasma in the indirect drive fusion experiments. The anomalous absorption is anisotropic due to angular anisotropy of the IAT spectrum and, according to the theory, can be remarkably effective at critical density in high Z plasmas. Possible experiments which could identify IAT and anomalous absorption mechanisms are discussed.