Abstract for Invited talk at 2nd Asian Pacific Conference on Plasma Physics

Nonlinear transformation of Stimulated Raman Backscattering from Convective to Absolute Instability and Inflation of Reflectivity in Laser Fusion Experiments

Chuan Sheng Liu

University of Maryland

In collaboration with Y.X.Wang, Q.Wang, C.Y.Cheng, J.Z.Liu,and X.T. He

Peking University

Stimulated Raman backscattering has two forms of Instabilities: Convective and Absolute. In an inhomogeneous plasma, backscattering instability is mostly convective except at the quarter critical density, where it competes with two plasmon decay, and for side scattering near 90 degree. In a homogeneous plasma with finite length, such as the hohlraum plasma in NIF, the threshold for the absolute instability is much higher than convective. They are set by the Landau damping of the Langmuir wave and the collisional damping and the loss rate of the scattered wave out of the system.

For Langmuir wave with phase velocity sufficiently close to the electron thermal speed, it has large linear Landau damping and nonlinearly can trap resonant electrons . These electrons can flatten the distribution function , reduce the absolute threshold and convert the instability from convective to absolute instability. The consequences of the nonlinear transformation to absolute instability and the inflation of reflectivity of several orders of magnitude will be discussed.