

Seminar

Institute for Plasma Research

Title : Experimental observation of Electron - Acoustic Wave Propagation In laboratory plasma

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Date : 31st January 2019 (Thursday)

Time : 03.30 PM

Venue : Committee Room 4, (New Building), IPR

Abstract :

The present experiment is on excitation of electrostatic waves propagating along an applied magnetic field. Primary focus has been given to a fundamental mode, the electron acoustic mode, which is predicted theoretically by both kinetic and fluid theory. The mode is in general heavily Landau damped. That is why it has not been observed directly in laboratory devices. In this experiment we have shown that electron acoustic wave (EAW) can be observed in two-species electron plasma if there is a suitable relative drift between the species. Using a single grid launcher we could excite EAW in the linear (MaPLE) device. The wave is observed by detecting their phases in 3 single grid detectors placed at three axial locations. The wave is seen to propagate with phase velocity ~ 1.8 times the electron thermal velocity along the magnetic field. The experimentally obtained dispersion curve shows the phase velocity matches satisfactorily with the estimated theoretical values. A small amount of cold, drifting electrons, with moderate bulk to cold temperature ratio ($\sim 2 - 3$), is present in the device. It plays a crucial role in reducing the damping. Our calculation reveals that the drift relaxes the stringent condition on the temperature ratio for wave destabilization. Growth rate becomes positive above a certain drift velocity even if the temperature ratio is moderate. Experimental realization of the mode may open up a new avenue in EAW research.
