Seminar

Institute for Plasma Research

Title : Investigation of Laser Induced Plasma in Various Configurations

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Date : 6th September 2019 (Friday)

Time : 11.00 AM

Venue : Committee Room 4, New Building, IPR

Abstract:

High power laser-matter interaction produces a transient plasma plume. Study of Laser Produced Plasma (LPP) has been a key area of interest to the research community for a long time due to its numerous applications in different areas. Apart from practical applications, it also facilitates to understand the basic mechanism of ablation and plasma formation in laser matter interaction. The properties of LPP depend on several parameters such as laser energy, beam profile, pulse duration, ambient condition, target materials and ablation geometry.

The dynamics of laser produced plasma has been studied in two different geometries *i.e.* Front Ablation (FA) and Back Ablation (BA) using a thin film target (LiF-C) with different ambient pressures ranging from vacuum (2×10^{-6} mbar) to 1 Torr. Fast imaging and spectroscopic results show significant differences in the dynamical behaviour and plasma parameters of the plumes in the two different geometries. A composition (ion-neutral) analysis of these plasma plumes in these two geometries have also been done by using Atomic Data And Analysis Structure (ADAS) as well as from intensity ratio under LTE conditions. Further, plasma-plasma collisional phenomenon have been studied for two simultaneously produced plasma plumes propagating in close proximity which form an interaction region between them. The properties of the interaction region of colliding plasma are quite different from the seed plasma. Experimental investigation on colliding plasma has been done with target materials of different atomic masses (C, Al, Ni) and plasma separations (2, 4 and 6 mm). Effect of external magnetic field with different values has also been studied in this case. Expansion dynamics of plasma plume, formation of interaction region are modified and an enhancement in ionic emission intensity is observed in this case. These studies will be useful in controlling the shape, directionality, composition and plasma parameters as per the suitability in different applications.