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Seminar

Institute for Plasma Research

Title : Dynamics of fast ions from Laser produced Aluminum Plasma

Speaker: Dr. Garima Arora

Institute for Plasma Research, Gandhinagar

Date : 25th October 2021 (Monday)

Time : 11.00 AM

Venue : Online - Join the talk:

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Abstract :

Investigation of fast ions produced in laser induced plasma is an important topic of interest for inertial fusion using lasers [1], understanding laser matter interaction [2,3] and acceleration of ions [4,5]. Time of flight studies reveal that energy distribution of ions from laser ablation falls in two distinct groups: (1) low energy thermal ions from direct ablation and (2) small but significant number of ions having higher energy due to acceleration inside the plasma plume. In this presentation, we discuss the dynamics of fast ions generated from laser produced aluminum plasma expanding against background gas for moderate laser fluences. A single Langmuir probe located at 3 cm from the target is used to record the time evolution of ion saturation current for different laser fluences. It is observed that fast ions get accelerated for these laser fluences. The observations are also complemented by the Spectroscopic Time of flight (STOF) measurements of different charged species for different laser fluences. Optical Emission Spectroscopy (OES) has also been performed to get the time evolution of plasma density and temperature for getting insight into the mechanism ion acceleration. However, in order to determine the plasma parameters and obtain precise information about the laser-produced plasma in the early stages of plasma plume formation, advanced and unambiguous diagnostics are essential. Hence, a sophisticated low temperature Thomson scattering diagnostic has been considered and have initiated its implementation. The progress on the work on low temperature Thomson diagnostics and its calibrations will also be discussed in this talk.

References:

- [1] Radziemski, L.J. & Cramers, D.A. ~1989 Laser Induced Plasma and Application New York: Marcel Dekker Inc.
 - [2] Cairns, R.A. & Sanderson, J.J. ~1980 Laser Plasma Interaction, Edinburg: SUSSP publication.
 - [3] H. Daido, M. Nishiuchi, and A. S. Pirozhkov, Rep. Prog. Phys. 75, 056401 (2012).
 - [4] M. Passoni, L. Bertagna, and A. Zani, New J. Phys. 12, 045012 (2010).
 - [5] A. P. L. Robinson, M. Zepf, S. Kar, R. G. Evans, and C. Bellei, New J. Phys. 10, 013021 (2008).
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