

## **Seminar**

### **Interaction of Petawatt femtosecond lasers with near critical density plasma**

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The rapid advancements made in the area of intense ultrashort laser pulses have made it possible to recreate terrestrial conditions in laboratory [1]. The exotic astrophysical phenomenon can be demonstrated on a much smaller spatial and temporal scale by focussing of intense ultrashort laser pulses into a medium to achieve high energy density [2]. Near critical density targets are one such medium where relativistic intense laser can create a long channel of strongly heated particles [3]. The rapid heating of the medium can lead to formation of shock wave, which can accelerate background ion species to high energy [4].

In this talk, physical phenomenon behind interaction of petawatt femtosecond lasers with near critical density plasma will be discussed. The space and time resolved optical shadowgrams reveal complex interplay of the plasma density and laser intensity. Measured kinetic energy spectrum of the transverse ions and forward electrons, corroborate with the observed plasma structure. Moreover, modulated stimulated Raman scattered signal indicate filamentation of the laser beam during its propagation in near-critical density plasma.

#### **References:**

- 1] B. A. Remington, et al., Modeling Astrophysical Phenomena in the Laboratory with Intense Lasers. *Science* 284, 1488 (1999).
- [2] B. A. Remington, High energy density laboratory astrophysics. *Plasma Phys. Control. Fusion* 47, A191 (2005).
- [3] G. S. Sarkisov, et al., Self-focusing, channel formation, and high-energy ion generation in interaction of an intense short laser pulse with a He jet. *Phys. Rev. E* 59, 7042(1999).
- [4] M. S. Wei, et al., Ion Acceleration by Collisionless Shocks in High-Intensity-Laser-Underdense-Plasma Interaction, *Phys. Rev. Lett.* 93, 155003 (2004).

***Friday, Mar 31<sup>st</sup> 2017***

***4:00 PM (Tea/Coffee at 3:45 PM)***

***Seminar Hall, TCIS***