**Tata Institute of Fundamental Research**
Survey No. 36/P, Gopanpally Village, Serilingampally, Ranga Reddy Dist., Hyderabad – 500 046

# Students' Annual Seminar

## Towards realising an ultrashort relativistic electron source from a tabletop industrial laser

## Sonali Khanna

Laser plasma interaction is source of high energy electrons, ions, electromagnetic radiation ranging from THz to X-rays. Bright particle beam and source size of $\mu m$ order has potential applications in wide range of contexts, from medical physics to defence and many other industries. To make the source viable for many applications, production of high energy electrons with high repetition rate of laser that can be handled by non-experts is necessary. The recent developments from our lab have shown that structural modification of microdroplets with the help of pre-pulse provide efficient environment for Two Plasmon Decay (TPD) instability growth and boosts electron acceleration to MeV energies even at intensity of $10^{16} W/cm^2$ with 1kHz Titanium Sapphire laser while this temp was expected at an intensity of $10^{18} W/cm^2$ having repetition rate of few Hz only. In this talk, I will present work done to study the effect of laser parameters on TPD instability with the aim of checking feasibility of TPD with industrial lasers by tweaking our current laser system. Also, I will present work done to control the electron beam divergence for efficient transport and utilisation of electron beam with the help of glass capillary. Then the progress we made in making streak camera for electrons to measure its pulse-width will be discussed.

***Friday, May 12th 2023***

***11:00 AM (Tea / Coffee 10.45 AM)***

***Seminar Hall, TIFR-H***