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

Seminar

Experimental Investigation of Laser-Plasma Interactions using a Sub-Nanosecond Kilojoule-Class Laser at the PALS Facility

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IPP, Prague

High-intensity laser-plasma interactions play a pivotal role in high energy density physics and inertial confinement fusion, enabling fundamental studies of laser energy absorption, particle acceleration, radiation generation and laboratory astrophysics. Understanding the transition from sub-relativistic to relativistic laser intensities is crucial for identifying the dominant energy-coupling mechanisms that govern hot-electron generation and subsequent plasma dynamics. This presentation reports experimental studies of laser-plasma interactions in the sub-relativistic and relativistic intensity regimes at the Prague Asterix Laser System (PALS). Plasma dynamics, hot-electron generation, and secondary radiation were characterized using complementary diagnostics, including electron and X-ray spectroscopy, streak cameras, and time-resolved interferometry. The results reveal a discontinuous increase in the hot-electron flux with increasing laser intensity, indicating a transition in the dominant laser energy absorption mechanisms driven by laser self-focusing and parametric instabilities. Experimental studies of parametric instabilities in ultra-low-density foam targets are supported by hydrodynamic simulations. The presentation also discusses hot-electron-driven magnetic field generation, the influence of externally applied magnetic fields on hot-electron transport and Cu Kα X-ray emission, and future experimental campaigns at the PALS and ELI Beamlines laser facilities.

Friday, Jul 31st 2026

14:30 Hrs (Tea / Coffee 14:15 Hrs)

Seminar Hall, TIFRH