

## **Students' Annual Seminar**

### **Development and characterisation of narrow linewidth high power near & mid-IR radiation source**

#### **Avinash Kumar**

The use of molecular beam and laser spectroscopic techniques, combined with surface science techniques provide a powerful way to probe the dynamics of energy flow in collisions and chemical reactions at the gas-solid interface.

Collision-free environment and internal cooling in molecular beams lead to extremely narrow spectral transitions ( $\frac{\Delta\nu}{\nu} \sim 10^{-8}$ ). Therefore quantum state-selected preparation of vibrationally excited molecules for energy transfer and reaction dynamics studies requires a highly intense ( $\sim 1$  MW/cm<sup>2</sup>), narrow linewidth (0.01 cm<sup>-1</sup>), frequency stable (0.01 cm<sup>-1</sup>) radiation source in near and mid-IR region.

In this talk, I will describe my efforts towards building and characterising an Optical parametric oscillator/Amplifier system to meet the above requirements. I will also describe the first few results obtained using this setup where we are able to selectively prepare molecules in the vibrational state in a molecular beam.

***Monday, Mar 27<sup>th</sup> 2023***

***12:00 PM (Tea / Coffee 11.45 AM)***

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