

## **Internal Seminar**

### **Understanding Contrast Generation Mechanism in Neutral Atom Microscopy Using Kr Clusters as a Probe**

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Neutral atom microscopy (NAM) is a non-destructive imaging method that uses low-energy atoms as probes. With a custom NAM setup, we imaged thin MoS<sub>2</sub> films on SiO<sub>2</sub>/Si substrates using He, Kr, and Kr clusters. Monoatomic He and Kr beams produced clear contrast on CVD-grown MoS<sub>2</sub> [1], while Kr clusters surprisingly showed inverted patterns [2]. We hypothesized that this inverted contrast arises due to the differences in angular distribution of mono atomic vs clusters beams, in particular clusters largely scattering in the superaspecular direction. To understand this, we have added the capabilities for angle resolved measurement to our experimental setup. Our observations suggest that this hypothesis is only partially correct. In this talk, I will discuss these results and possible ways to understand this situation better.

**References:**

- [1] G. Bhardwaj, K. R. Sahoo, R. Sharma, P. Nath, and P. R. Shirhatti, Neutral-atom-scattering-based mapping of atomically thin layers, *Phys. Rev. A* 105, 022828 (2022).
- [2] G. Bhardwaj and P. R. Shirhatti, Contrast inversion in neutral-atom microscopy using atomic cluster beams, *Phys. Rev. A* 107, 062813 (2023).

**Wednesday, Jan 7<sup>th</sup> 2026**

**14:30 Hrs**

**Seminar Hall, TIFRH**