

Seminar

Atomic Scattering as a Soft and Universal Probe for Surfaces

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Imaging surfaces using low-energy neutral atom scattering based microscopy is a relatively new development in the field of microscopy. In this talk, I will describe the design, development and characterisation of a neutral atom microscope recently built in our lab. Our measurements reveal that this technique is sensitive enough to produce contrast from films as thin as a single monolayer. I have demonstrated this using collimated beams of He and Kr atoms as an incident probe on MoS₂ and WS₂ films grown on SiO₂/Si substrates. Further insights into contrast generation have been obtained by varying the incidence energy of probe atoms. The contrast shows a nearly monotonic decrease with lowering incidence energy for He, whereas for Kr a threshold behaviour is seen, suggesting the possibility of trapping-desorption at lower energies. Further, the experiments with the aim of increasing signal-to-noise ratio and hence the spatial resolution of NAM, the use of seeded and atomic cluster beams have been explored. Interestingly, upon using large ($\sim 10^4$ atoms/cluster) atomic cluster beams of Kr a complete contrast inversion is observed on MoS₂ films on SiO₂/Si substrate. Efforts to understand these results using angle resolved measurements will be discussed. Finally, the design and development of a compact cascaded collimator based atom beam source will be described. This offers the possibility of real-time monitoring of surface coverage by means of measuring He reflectivity. I will describe the capability of this source by showing the results of initial sticking probability measurements of O₂ on Cu(110) surface.

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4:00 PM (Tea / Coffee 3.45 PM)

Auditorium, TIFR-H