



IAP Seminar Series



Quantum sensing meets scanning probe spectroscopy: A tale of two techniques

Date: 25th June 2025

Time: 4PM-5PM

ONLINE TALK

Abstract: Quantum sensing leverages the unique properties of quantum systems to push the boundaries of measurement sensitivity and spatial resolution in condensed matter experiments. This talk will cover two different scanning probe techniques, where the use of unique quantum mechanical properties of electrons in materials, have been harnessed as scanning probes. First, I will talk about a novel form of spectroscopy in the scanning tunneling microscope (STM) environment, using fabricated nanowires of a topological material instead of metallic STM tips. We have exploited the spin-momentum locking of Dirac fermions in the nanowire to prepare a non-invasive, spin sensitive probe that can image atomic scale antiferromagnetism. The second half of my talk will explore the exciting field of quantum sensing using nitrogen vacancy (NV) defects in diamond. These defects harbor a stable spin qubit across a large range of temperatures and can be manipulated using microwaves and read-out optically. NV centers can be integrated into the apex of a scanning probe to map out static and dynamic magnetism locally. I will discuss about this experimental platform in detail, including some recent measurements on different device platforms. This technique allows unprecedented insight into mesoscale and nanoscale phenomena in condensed matter physics and material science.

About the Speaker



DR. ANUVA AISHWARYA

**POSTDOCTORAL RESEARCHER,
DEPARTMENT OF PHYSICS,
HARVARD UNIVERSITY**

Dr. Anuva Aishwarya is a Postdoctoral fellow in the Department of Physics at Harvard University working with Prof. Amir Yacoby. She is interested in probing strongly correlated electron systems, topological phenomena and unconventional superconductors using various scanning probe techniques. Anuva received her Bachelor of Science degree in Physics from the Indian Institute of Science, Bengaluru in 2017. She obtained her Ph.D. in Physics from University of Illinois, Urbana-Champaign in 2023, where she worked with Prof. Vidya Madhavan studying various strongly correlated electron systems using low temperature scanning tunneling microscopy and spectroscopy. Presently at Harvard, she works on quantum sensing techniques using nitrogen vacancy centers in diamond and employs them to study magnetism and superconductivity in mesoscopic devices

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