

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

2A&B, Raja S.C. Mullick Road, Jadavpur, Kolkata 700032, India

Seminar

Organized

by

Department of Solid State Physics

Speaker: Dr. Dibyendu Hazra

Affiliation: QCD Labs, Aalto University, Applied Physics Department, Finland

Date: 27th March (Tuesday)

Time: 3 pm

Venue: Sadhan Basu Hall, Centenary Building, IACS

Title: Probing disordered S-wave superconductors using the microwave and electrical transports

Abstract: In recent times, there has been a resurgence to study the disordered S-wave superconductors for their unusual behaviour which are not conceivable by standard BCS theory. More recently, disordered S-wave superconductors have been used as kinetic inductance detectors for THz radiation, optical single photon detectors and also as key elements like a high-impedance resonator or a base material for Josephson junction in the emerging field of circuit-quantum electrodynamics (circuit-qed), especially at a high magnetic field and at high frequency. These experiments demand disordered superconducting thin films with tunable superconducting properties and to understand their microwave response. In the first part of my talk, I shall describe the microwave response of NbN kinetic-inductance quasi-lumped-element resonators. I shall demonstrate that the temperature dependence of the resonance frequency systematically deviates from the BCS behaviour and spell out its consequences for single photon detection. I shall finally present our results on superconducting properties of $\text{Nb}_{1-x}\text{Ti}_x\text{N}$ films with different x, and demonstrate that both disorder and T_c can be tuned with x. In the second part of my talk, I shall present our recent results on graphene-based microwave single photon detector, which is still an open problem.

All are cordially invited to attend the seminar.