

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032, India

Seminar Notice

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School of Physical Sciences

Title:	Supercurrent interference in nanowire-superconductor hybrid systems
Speaker:	Bhaskaran Muralidharan, IIT-Bombay, Mumbai
Date:	October 23, 2019 (Wednesday)
Time:	15:00
Venue:	Physics Seminar Room (C-406), 3rd Floor, Centenary Building, IACS
Abstract:	Semiconductor nanowire-superconductor hybrid systems (Fig.1) provide a promising platform for hosting unpaired Majorana fermions and thus realizing fault-tolerant topological qubits. In this talk, starting from the basic tenets of quantum transport theory, we demonstrate how to adapt the Non-Equilibrium Green's Function (NEGF) formalism to model quantum transport in normal (N)-superconductor (S) junctions. We analyze Josephson junctions based on semiconductor nanowires and derive the Andreev bound state spectrum and current-phase relations. Recently, [1], and [2] have reported oscillations in the critical supercurrent with an axial magnetic field. Our simulations indicate that this phenomenon arises from the interference of orbital angular momentum modes [3,4] of the cylindrical nanowire. We also add disorder and study its effect on the critical current oscillations, with an aim to gain a thoroughgoing understanding of the experiments. [1] K. Gharavi et.al., ArXiv:1405.7455v2, (2014). [2] Zuo, et. al. Phys. Rev. Lett. 119, 187704 (2017) [3] P. Sriram et. al., ArXiv:1902.10947 (2019). [4] A. Lahiri et.al., Phys Rev B, 98, 125417, (2018).

All are cordially invited to attend the seminar