

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE

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Seminar Notice

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Theoretical Physics Department

Title:	Quantum transport in superconductor hybrid junction
Speaker:	Paramita Dutta, Institute of Physics, Bhubaneswar
Date:	October 30, 2017 (Monday)
Time:	12:00 noon
Venue:	Theoretical Physics Seminar Room (C406), 3rd Floor, Centenary Building, IACS
Abstract:	In the first part of my talk, I will discuss thermal transport phenomena in a ferromagnet-superconductor hybrid structure with Rashba spin-orbit interaction at the interfacial layer. The exponential rise of thermal conductance with temperature manifests a cross-over temperature scale separating the two regimes corresponding to the opposite behaviors of the thermal conductance with the change of polarization in the ferromagnet. Inclusion of finite potential barrier at the ferromagnet-superconductor interface results in reduction of the thermal conductance whereas the interfacial Rashba spin-orbit field can enhance it resulting in a non-monotonic behavior as a function of the Rashba spin-orbit coupling. In presence of Rashba spin-orbit interaction, Seebeck coefficient rises with the increase of barrier strength and also with the polarization at weak or moderate interfacial Rashba strength. From the application perspective, we also compute the figure of merit, which can exceed 1 with higher polarization of the ferromagnet both in absence and presence of weak Rashba spin-orbit interaction. In the second part, I will present our study on electron transport phenomena in an NSN junction made of thin topological insulator. We explore the role of hybridization in transport properties of the NSN junction, especially how it affects the crossed Andreev reflection (CAR). Depending on the incoming and reflection or transmission channel, CAR probability can be maneuvered to be higher than 97% under suitable coupling between the two TI surface states along with appropriate gate voltage and doping concentration in the normal region. Reference: Phys. Rev. B 96, 045418 (2017); Phys. Rev. B 96, 155429 (2017).