S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Condensed Matter Physics and Material Sciences

22nd June'2022 **4.00 PM** **ONLINE/ FERMION**

SPEAKER

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TITLE OF THE TALK

SPIN TO CHARGE CONVERSION WITH HEAVY METALS, TOPOLOGICAL INSULATORS AND ANTIFERROMAGNETS

ABSTRACT

The precession of magnetization in a ferromagnet (FM) can transmit pure spin current into an adjacent heavy metal (HM) via spin pumping. This pure spin current gets converted to a charge current due to high spin orbit coupling (SOC) of the HM due to the inverse spin Hall effect (ISHE). I will discuss recent ISHE results on Co2 Fe0.4 Mn0.6 Si/Pt bilayers, where Co2 Fe0.4 Mn0.6 Si is a full Heusler alloy. Damping analysis indicates the presence of significant spin pumping at the interface of Co2 Fe0.4 Mn0.6 Si and Pt [1]. I will also discuss ISHE experiments on some other combinations such as CoFeB/IrO 2 and manganite based La 0.66 Sr0.34 MnO 3 /Pt bilayers. [2-3] Recently AFM materials having high SOC have been found to be a good replacement of HM in spin current based study. We have performed the ISHE study of CoFeB (10 nm)/ AFM (d nm) where we considered various AFM such as Mn 2 Au, IrMn, Mn3 Ga, Co3 O 4 , NiMn etc. The systematic angle dependent ISHE measurements have been carried out to disentangle the different spin rectification effects viz. anisotropic magnetoresistance and anomalous Hall effect [4 - 7]. Further I will show the ISHE study on topological insulator (TI)/ferromagnetic Bi 2 Se3 /CoFeB films [8, 9]. ISHE experiments have also been performed to demonstrate that TIs are potential candidates to replace HM as they possess high spin-orbit coupling. Further, I will show that transition metal dichalcogenide MoS 2 exhibits high spin-to charge conversion due to its high spin-orbit coupling [10].

Contd..

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HOST FACULTY

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