Tata Institute of Fundamental Research
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Internal Seminar

Anomalous Hall effect in a non-collinear antiferromagnet

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Generally, ferromagnets (FM) are the active components of memory devices to read and write the information while antiferromagnets (AFM) play a supporting role by enhancing the magnetic hardness of an FM layer through the interfacial exchange-bias effect. However, recent experiments showed that AFMs can be used as an active material in the storage devices. Furthermore, the high operating frequency of AFMs makes them more superior candidates for ultra-fast spintronics devices. Therefore, it is imperative to study the electrical and spin dependent transport phenomena such as anomalous Hall Effect (AHE) and spin Hall Effect (SHE) in different AFM materials.

The AHE has been observed in ferromagnetic and paramagnetic materials having non-zero magnetization. However, Chen et al. predicted that a non-collinear AFM order can lead to a non-vanishing Berry curvature which yields a large AHE. $PtMn_3$ is a metallic AFM having non-collinear ordering which makes $PtMn_3$ a potential candidate for antiferromagnetic based spintronics devices. $PtMn_3$ thin films were deposited on Si/SiO_2 (500 nm SiO_2 on Si) and sapphire substrates by co-sputtering at a base pressure of 5×10^{-8} mbar. Structural, morphological and magnetic characterizations have been carried out to optimize the growth of $PtMn_3$ thin film. We have observed anomalous Hall Effect in polycrystalline $PtMn_3$ thin films.

Tuesday, Mar 12th 2019

2:30 PM (Tea/Coffee at 2:00 PM)

Seminar Hall, TIFR-H