

Institute Seminar

Speaker: Dr. Kalpataru Pradhan

Affiliation: University of Augsburg

Title of the Talk:

Magnetically Disordered Interfaces in Magnetic Tunnel Junctions

Abstract of the the Talk:

We use a two-orbital double-exchange model including superexchange interactions, Jahn-Teller lattice distortions, and long range Coulomb interactions to investigate the origin of magnetically disordered interfaces (MDI) between ferromagnetic metallic (FM) and antiferromagnetic insulating (AFI) manganites in FM/AFI superlattices. The induced magnetic moment in the AFI layer varies non-monotonically with increasing AFI layer width as seen in the experiment [D. Niebieskikwiat et al., Phys. Rev. Lett. 99, 247207 (2007)]. We provide a framework for understanding this non-monotonic behavior which has a one-to-one correspondence with the magnetization of the FM interface and the charge transfer across the interface. Our calculations provide new insight for the FM/AFI superlattices to enhance the tunneling magnetoresistance (TMR) by choosing the optimum width of the AFI layer which minimizes the MDI. These results are also discussed in the context of FM manganite joined with a non-magnetic insulating (NMI) oxide in prototype magnetic tunnel junctions in which the MDI has an adverse effect on the TMR. Our concept can be extended to understand why the TMR increases by inserting an intervening AFI layer at a FM/NMI interface as seen in the experiment

[H. Yamada et al. Science 305, 646 (2004)].

Date & Time: 12.11.2013 at 4.00 P.M.

Venue: Fermion