Tuesday COLLOQUIUM

The Wonderland of MAGNETISM

Magnetism attracted great attention for many centuries due to its wonderful properties of attraction and repulsion commonly observed in our daily life. The future of technology also depends on efficient use of magnetic materials. Microscopically, magnetism depends on two objects; (i) magnetic moment and (ii) mediators (delocalized electrons) that couple them. Almost all the magnetic materials consist of elements having partially filled f (rare-earths: Eu, Gd, Tb, Dy etc.) or d (transition metals: Fe, Co, Ni etc.) bands among the highest occupied energy bands. Small radial extension of f-orbitals in rare-earths makes them highly localized leading to finite magnetic moment and coupling occurs via the interaction of these moments with the conduction electrons. The d electrons have both; magnetic moment due to strong electron-electron Coulomb repulsion and itineracy that mediates magnetic coupling.

Various recent studies discovered some materials those exhibit ferromagnetism (Curie temperature ~ 600 K) although they do not contain magnetic elements. On the other hand, the presence of magnetic element in a material does not ensure magnetism. In this talk, the speaker will present some of the high resolution photoemission results that help to explore the origin of such effects. It appears that low density of vacancies/defects in small band gap semiconductors can lead to high temperature ferromagnetism due to disorder induced effects. In the reverse case, Kondo effect compensates the magnetic moment leading to the absence of magnetic order.

Tuesday, 24th August 2010 at 4 p.m.

Seminar Room – PF AG 114, Prefab, Near Annabhau Sathe Bhavan
University of Mumbai, Kalina Campus, Mumbai 400098

Prof. Kalobaran Maiti obtained his B.Sc. from Presidency College, Kolkata, Masters from the University of Kolkata and Ph.D. from Indian institute of Science, Bengaluru. He is currently an Associate Professor at the Tata Institute of Fundamental Research. He has fabricated a state-of-the-art high-resolution photoelectron spectrometer - the first one in India and one of the best in the world, and also setup a spectrometer coupling spin-resolved photoemission spectroscopy and high resolution electron energy loss spectroscopy - a unique machine not found elsewhere.

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