SEMINAR NOTICE

Department of Physics and Engineering Physics
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SPEAKER: Dr. Alexander Moewes
Department of Physics & Engineering Physics

TOPIC: ***Adjacent Iron-vacancy interactions as the Origin of Room Temperature Ferromagnetism in*** $(In_{1-x}Fe_x)_2O_3$

DATE: September 27th, 2016

TIME: 3:30-4:30 p.m.

PLACE: Physics 103

ABSTRACT:

I will begin with providing a brief introduction to the research topics in my group. This will be followed by a brief introduction of the techniques we are using and why these are powerful to study new materials.

The bulk of my talk will focus on the topic of spinelectronic materials. These materials are believed to be one possible answer to the quest for new materials that will allow continuing to increase storage density and processor speed in modern computers. The conventional Si-based semiconductor processor techniques will come to an end in the very near future when the continuous shrinking of storage density will hit fundamental quantum mechanical limits.

The research example I will discuss in detail are dilute magnetic semiconductors (DMSs) that show great promise for applications in spin-based electronics, but in most cases continue to elude explanations of their magnetic behavior. Here, we combine quantitative X-ray spectroscopy and Anderson impurity model calculations to study ferromagnetic Fe-substituted In_2O_3 films, and we identify a subset of Fe atoms adjacent to oxygen vacancies in the crystal lattice, which are responsible for the observed room temperature ferromagnetism. Using resonant inelastic x-ray scattering, we map out the near gap electronic structure and provide further support for this conclusion. Serving as a concrete verification of recent theoretical results and indirect experimental evidence, these results solidify the role of impurity-vacancy coupling in oxide-based DMSs [1].

References

1. R.J. Green, T.Z. Regier, B. Leedahl, J.A. McLeod, X.H. Xu, G.S. Chang, E.Z. Kurmaev, and A. Moewes, Phys. Rev. Lett. 115, 167401 (2015).

Coffee and Cookies will be served in Physics 103 at 3:00 p.m. for those attending the seminar.