

Physics Colloquium

Monday September 12th, 2005 4:15 PM

428 Pupin Hall

Professor Chris Hammel

Physics Department, Ohio State University

"Ultrasensitive Magnetic Resonance with the Magnetic Resonance Force Microscope "

The magnetic resonance force microscope (MRFM) is a novel scanned probe instrument which combines the three-dimensional imaging capabilities of magnetic resonance imaging with the high sensitivity and resolution of atomic force microscopy. Based on mechanical (force) detection of magnetic resonance, MRFM affords exceptional sensitivity. A high quality factor cantilever serves as a sensitive detector of the force exerted by spins in the sample under the influence of Gauss/nanometer magnetic field gradients generated by a micromagnetic cantilever tip. The magnetic field gradient also defines the location of the resonant spins as in Magnetic Resonance Imaging. Excellent spin sensitivity will enable very high spatial resolution in non-destructive, microscopic studies and imaging of subsurface properties of a broad range of materials. I will present the principles of the MRFM and discuss applications of the MRFM to the detection of NMR, ESR and Ferromagnetic Resonance (FMR). I will discuss high sensitivity detection leading to single electron spin magnetic resonance and show an example of high resolution imaging of ferromagnetic microstructures.



Host: Professor Millis