Seminar – Wednesday, March 4 in 132 EIB **3:00 p.m. – 4:00 p.m.**

Seminar Series

Ultrathin Magnetic Alloy Films for Ghz Applications

Dr. William Bailey

Materials Science and Engineering
Columbia University

Abstract

Pure iron is the magnetic metal analogous to pure silver, which has the lowest known electrical resistivity at room temperature. Fe (Ag) has long been known to lose the least energy in forced magnetization (electronic) motion, with the slowest rate aligning magnetization (current) and applied fields. Just as impurities typically increase the electrical resistivity of a pure metal, impurities increase the relaxation rate of ferromagnets, nearly universally; local moments stand in for local potentials. Remarkably, however, we find that one alloying element, vanadium, reduces the relaxation rate in epitaxial, ultrathin (8nm) iron films beyond the values known for the best Fe single crystals--the lowest-loss metallic ferromagnets known--to G=35 MHz in $Fe_{73}V_{27}$, reduced by 40%. I will describe how this result fits in to our knowledge of relaxation mechanisms, the utility of the material for nanoscale spin electronics technology, and our ongoing work to understand the microscopic origins of relaxation using stroboscopic soft x-ray techniques.

Biography of Speaker

William Bailey is an Associate Professor of Materials Science and Engineering at Columbia University, with primary research interests in deposition and properties of magnetic ultrathin films. He received the Sc.B. degree in Materials Engineering at Brown University in 1993 and MS and Ph.D. degrees in Materials Science and Engineering at Stanford University in 1995 and 1999, respectively. He held a NRC Postdoctoral Fellowship at the National Institute of Standards and Technology (NIST) in Boulder, CO, from 1999 to 2001, at which point he joined the faculty in the Department of Applied Physics and Applied Mathematics at Columbia as an Assistant Professor. Honors for his research include the NSF CAREER and Army Research Office Young Investigator Awards.