

Magnetic Reversal at the Nanoscale

Date: 19-August-2010
Time: 11:30am to 01:00pm
Speaker: Dr. E. Dan Dahlberg
Agenda: Informal networking will begin at 11:30am.
Dr. Dahlberg's presentation will begin at 12:00 noon.

Location: Promega BioPharmaceutical Technology Center
5445 East Cheryl Parkway
Fitchburg, WI 53711

Menu: Pizza buffet, salad, and pop will be available: \$5 for IEEE members, \$10 for non-members.
RSVP: by August 16 to Charles Gervasi (cj@cgervasi.com) via online registration:
http://meetings.vtools.ieee.org/meeting_view/list_meeting/2769



Non-member guests are always welcome!

Abstract

One current frontier in magnetism is to understand the domain structure and the magnetization reversal in nanometer sized particles. Explorations at these length scales have been aided by the development of new magnetic imaging techniques one of which is the magnetic force microscope (MFM), a variant of the atomic force microscope. We have utilized the high resolution MFM (30 nm) we developed to increase our fundamental understanding of magnetism on this length scale. Dr. Dahlberg will discuss the magnetic reversal of chains of 50nm magnetite crystals (a magnetosome) grown in magnetotactic bacteria (this includes a video of the bacteria trying to find food at the end of the magnetic rainbow). He will also preview some of our most recent work on the field induced magnetic reversal in stadia shaped particles on the order of hundreds of nanometers wide and about twice that in length. In general for the small aspect ratio stadia (length to width ratio) the magnetization reverses by the formation of a single vortex and its propagation down the length of a stadium (when the fields are applied perpendicular to the long axis). The surprising discovery is the importance of virtual particles (vortex-antivortex pairs) creation and annihilation in the magnetic reversal in larger aspect ratio stadia.

Biography

E. Dan Dahlberg received the B.S. and M.S. in physics from the University of Texas at Arlington in 1970 and 1972, respectively, and the Ph.D. from University of California, Los Angeles, in 1978. He joined the faculty at the University of Minnesota in 1980 and is currently a professor of physics and an Institute of Technology Distinguished Professor. He is the director and principal investigator of the Magnetic Microscopy Center (MMC) at the university. His recent research is on exchange bias, the physics of magnetic tunnel junctions, and noise in magnetic devices. Some of his previous research includes magnetotransport and other magnetic properties of thin films and multilayers, the dynamics of spin glasses, nonequilibrium superconductivity, the thermodynamics of magnetic superconductors, and the quantum Hall effect.

Professor Dahlberg is a member of Sigma Pi Sigma (1971) and a Fellow of the American Association for the Advancement of Science (1995) and the American Physical Society (1996). He was an Alfred P. Sloan Foundation Research Fellow (1981-1985). He served as general chair of the 2001 Joint Magnetism and Magnetic Materials (MMM)-Intermag Conference and as an editor of several MMM and MMM-Intermag conferences. He was divisional councilor to the Division of Condensed Matter Physics of the American Physical Society (1999-2002), a member of the Executive Board of American Physical Society (2001-2002), and Vice President of the International Union of Pure and Applied Physics (IUPAP) (2006-2009).

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