GMAG Newsletter
October 2003
Frances Hellman, Chair

Dear GMAG members,

This newsletter contains complete information on the five GMAG-sponsored Focused Session Topics for the March '04 APS meeting, including information on how to contribute abstracts. We include again information on our new student awards and membership support for those who might have missed the previous announcement in our Spring and Summer Newsletters, and remind you all of the procedures for nominating worthy people from the magnetism community for a Prize or Fellowship.

STUDENT AWARDS AND STUDENT MEMBERSHIP SUPPORT: (DEADLINE NOV. 1) In an effort to encourage more students to participate in GMAG events, GMAG has decided to implement (on a trial basis) two new policies: 1) Free student membership in GMAG: Students who are members of APS can join GMAG without paying additional dues (GMAG will pay student GMAG dues to the APS). Interested students should email Jonathan Sun (jonsun@watson.ibm.com) with their name, APS membership#, mailing address, and email address (note that students can join the APS free for one trial year and $26 for each succeeding year). 2) Outstanding Dissertation in Magnetism awards: GMAG will award up to three awards at the next March Meeting to recognize students who have conducted outstanding research related to Magnetism leading to their dissertation. The prize will consist of an invited talk in an appropriate session at the March APS Meeting, a $500 prize to the student, and up to $250 towards travel or other costs of attending the Meeting. The student must be in their final year before being awarded a Ph.D., and both the student and the advisor must be current members of GMAG.

Nominations will consist of a nominating letter by the student's advisor and an extended abstract of the research. The nominating letter must address the following: the quality and independence of the student's work; their speaking ability; the year they began graduate school; their expected completion date (by Sept. 1, 2004, for 2003 nominations); assessment of their future potential as a research scientist. (Please note that students should still submit their abstracts via the usual APS March Meeting website by the APS deadline of Dec. 5, in addition to the extended nomination abstract discussed above.) Nominations should be sent by email to Frances Hellman (fhellman@ucsd.edu) no later than Nov. 1, 2003 for evaluation by the GMAG Executive Committee. Winners will be notified by Nov. 27 and will be expected to submit an abstract for their invited talk through normal APS channels before the Dec. 5 deadline. The student is expected to present the invited talk at the 2004 March APS Meeting to receive the prize.

NOMINATIONS FOR APS FELLOWSHIPS AND PRIZES/AWARDS: GMAG is allowed to nominate 2-3 people for APS Fellowship each year ((0.5%) of our membership). The nomination deadline for the upcoming year is April 2, 2004 (information can be found at http://www.aps.org/fellowship/). You might want to start

preparing a nomination for next year for a young (or not so young!) person you think should be awarded APS Fellowship. The nomination deadline for APS prizes and awards for this year has passed (July 1, 2003) but it is not too early to begin thinking of worthy people from the magnetism community for next year (http://www.aps.org/praw/).

GMAG MEMBERSHIP AND OTHER ACTIVITIES: As always, we encourage you to get involved with GMAG, and to encourage colleagues who may not be members to join. We are always looking for GMAG members who are interested in helping to expand GMAG activities. We are also specifically looking for someone interested in working on updating/expanding the GMAG web site (http://www.aps.org/units/gmag/index.html) to make it an exciting and useful site to visit.

MARCH MEETING 2004: ABSTRACT SUBMISSION (DEADLINE DEC. 5, 2003 5 PM EST) An important function of GMAG is to plan and organize sessions and symposia on topics associated with magnetism at the March APS Meeting. This is done by sponsoring Focused Sessions Topics, by organizing Invited Symposia, and by carrying out the sorting of contributed abstracts for Category 6.

For the March 2004 Meeting, GMAG is co-sponsoring the following five Focused Session Topics :
6.11.1 Theory and Simulation of Magnetism and Spin-Dependent Properties
6.11.2 Magnetic Nanostructures and Heterostructures
6.11.3 Magnetoresistance and Phase Complexity in Oxides
6.11.4 Spin Transport and Spin Dynamics in Metal-Based Systems
6.11.5 Spin-Dependent Phenomena in Semiconductors

Full descriptions and organizers for each topic are listed below. The Focused Session Topics are arranged into individual sessions which typically have one invited speaker and up to 12 contributed talks. (Nominations for invited speakers are no longer accepted; these are already in APS hands for final decisions)

Contributed talks for the Focused Session Topics need to be submitted directly to the APS at <http://abstracts.aps.org/>http://abstracts.aps.org/. Please use the sorting categories listed above if your contributed talk fits into one of the Focused Session Topics. Note that the deadline for submitting an abstract for the March Meeting (including those submitted for Focused Sessions) is December 5, 2003.

FOCUS TOPICS
6.11.1 Theory and Simulation of Magnetism and Spin Dependent Properties
The purpose of this Focus Topic is to explore recent advances in theory and modeling of magnetic and spin-dependent properties of materials. The topic will include methods and materials systems as well as magnetic and spin-dependent properties. Of particular concern are magnetic materials in reduced dimension where surface and interface effects become increasing dominant and influence the spin structure, spin dynamics and spin transport. Thus it is expected that a significant part of this Focus Topic will be devoted to theoretical and computational issues in connection with magnetic nanosytems such as

2D-multilayers, 1D-wires, 0D-particles, molecules, and impurities; these include metals, alloys, magnetic semi-conductors, magnetic oxides and magnetic molecules in various environments (isolated structures as well as embedded in the bulk and on surfaces). Properties include magnetic structure, mechanisms of exchange coupling, anisotropy, spin-dynamics, damping mechanisms, domain structure, hysteretic phenomena, phase transitions, magneto-optics, spin-transport, spin injection and quantum tunneling. Methods include first principles density functional theory-based methods (LDA, etc) as well as new developments for strongly correlated systems (such as LDA plus dynamical mean field theory), spin models, Monte Carlo and spin dynamics methods, and micromagnetic modeling. Of particular interest are methods for multiscale modeling that bridge length scales and approaches to extend the time scale of simulations.
Organizers:
Warren E. Pickett, Department of Physics, University of California Davis
pickett@physics.ucdavis.edu
David P. Landau, Department of Physics and Astronomy
The University of Georgia dlandau@hal.physast.uga.edu
Mark van Schilfgaarde, Department of Mechanical and Aerospace Engineering, Arizona State University, Mark.Vanschilfgaarde@asu.edu

6.11.2 Magnetic Nanostructures and Heterostructures
The magnetic properties of nanometer-scale structures can differ significantly from bulk properties, giving rise to interesting and technologically-important behavior. This Focus Topic will cover magnetic structures such as thin films, multilayers, nanocomposites, nanowires, nanoparticles, nanoparticle arrays, and patterned films. All aspects of these structures are of interest, including theory, fabrication, characterization, measurement, and modeling. Areas of interest include low-dimensional magnetism, proximity effects, interlayer magnetic coupling, exchange spring, exchange bias, magnetic quantum confinement, magnetic anisotropy, effects of structural disorder, hysteresis, coercivity enhancement, and other magnetic phenomena. Of special interest are the fabrication of nanostructures with atomic-scale control, synthesis and assembly of nanoparticles and arrays, high-resolution characterization methods with site and/or element specificity, novel techniques for the creation of nanoscale magnetic features, and unusual physical phenomena present in these systems.
Organizers:
Mark Stiles, National Institute of Standards and Technology
mark.stiles@nist.gov
Ziqiang Qiu, Dept. of PhysicsUniversity of California at Berkeley
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6.11.3 Magnetoresistance and Phase Complexity in Oxides
The complex nature of transition-metal oxides such as manganites, cobaltites, and ruthenates, creates a variety of interesting physical phenomena including colossal magnetoresistance (CMR), half-metallicity, ferro- and antiferromagnetic ordering, charge- and orbital-ordering, as well as phase separation and percolative properties both at the nano- and mesoscopic scales. This Focused Topic will address experimental, computational, and theoretical investigations in this context, both of fundamental and

applied nature. Among the main goals is to understand the relation between magnetic and electronic properties with other physical phenomena such as magneto-transport, lattice, elastic and magnetic excitations, surface behavior, and electron correlation effects. The similarities between the many compounds will be emphasized. Analogies with materials that also present nanoscale inhomogeneities, such as the high-Tc cuprates, will be addressed.

Organizers:
Elbio R Dagotto, Dept of PhysicsFlorida State University, dagotto@magnet.fsu.edu
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6.11.4 Spin Transport and Spin Dynamics in Metal-Based Systems (GMAG/DMP)

This Focus Topic concerns experimental and theoretical investigations that elucidate and/or utilize the transport and transfer of spin, at the nanoscale, in metal-based magnetic systems. Studies that emphasize spin phenomena in semiconductor systems will be covered in a separate focused topic. Topics of interest include all aspects of spin-dependent transport and scattering, in the diffusive, ballistic, tunneling and hot electron transport regimes as evidenced, for example, in giant magnetoresistance (GMR), tunneling magnetoresistance (TMR), ballistic magnetoresistance, tunneling spectroscopy of spin states, spin filtering and related effects. Also of particular interest are studies of the transfer of spin between charge carriers and magnetic elements resulting in either the excitation or damping of the magnetic element, and the use of magnetoresistance and spin-transfer phenomena to investigate nanomagnetic behavior and dynamics. Additional topics include, but are not limited to, interfacial spin transport, spin injection and spin lifetime studies in ferromagnetic - normal metal and ferromagnetic- superconductor systems, as well as the use of such systems to study spin polarization.

Organizers:
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6.11.5 Spin-Dependent Phenomena in Semiconductors

The field of spin-dependent phenomena in semiconductors has developed rapidly in the past several years. Considerable progress has been realized in electrical injection, transport, manipulation and detection of spin-polarized carriers in semiconductor heterostructures. Optical and high-speed electrical manipulation of electron spin coherence, and polarization/imprinting of the nuclear spin system in GaAs by an adjacent ferromagnet has been explored and demonstrated. The understanding and control of ferromagnetic order in semiconductor hosts such as the III-Mn-V alloys has significantly improved, and offers great potential for new device functionality. A number of new semiconducting materials which exhibit ferromagnetism at relatively high temperatures (in some cases in excess of 300 K) have been reported, although many of these materials remain to be fully characterized and the origin of their ferromagnetism clarified. In addition, room-temperature magnetoelectronic devices such as magnetic tunnel junctions and magnetic tunneling transistors continue to develop rapidly. For example, giant magnetocurrents (>3400%) with large output currents have recently been reported for

GaAs magnetic tunneling transistors. This Focus Topic solicits abstracts in each of these areas. Abstracts of particular interest include: magnetic semiconductors: fabrication, characterization and theory, clarification of the origin of high temperature ferromagnetism in semiconducting hosts; manipulation of electron and nuclear spin in quantum structures; electrical spin injection into semiconductors from magnetic metals and semiconductors; magnetoelectronic devices including spin-LEDs, spin transport/manipulation in heterostructures such as spin-FETs, magnetic tunnel junctions involving semiconducting barriers or functional integration with semiconductors, magnetic tunneling transistors.

Organizers:
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