Note From the Chair

A good part of the 2010 March Meeting organization has already happened at this point thanks to the efforts of Barry Jonker the GMAG chair-elect and thus also GMAG program chair. Namely, the invitations for symposia and focus topic invited talks have been mailed out by now. As far as I am concerned this part of the program looks already extremely inviting and hopefully it will be complemented by many excellent contributions, which are due on November 20th.

In addition this newsletter will have information on the new GMAG student dissertation awardees (congratulations!) and how to become more involved in various GMAG activities. As in the past, if you have additional feedback on how GMAG can assist you or the magnetism community-at-large in their scientific endeavors, feel free to contact any member of the GMAG executive committee.

—Axel Hoffmann, GMAG Chair

Request for Magnetism Outreach Proposals

For several years GMAG has made funds available to its members to support outreach activities. Funds up to $2500 per project are available to cover supplies and expenses associated with activities, which aim to educate non-scientists about magnetism and its applications. Preference will be given to innovative activities that will be documented so that they can be reproduced elsewhere. The outcome of the activities are then disseminated to the GMAG membership through the GMAG Newsletter (for an example see the August 2008 GMAG Newsletter) and to the broader magnetism community through the GMAG website. Interested GMAG members should prepare a 1-2 page summary of the proposed activity (including expected duration and outcome) along with a 1 page CV and a list of anticipated expenses. These should be mailed as a single file in PDF format to the GMAG Chair, Axel Hoffmann (hoffmann@ornl.gov). The GMAG Executive Board will review proposals on an ongoing basis.

Nominations for APS Fellowships and Prizes/Awards

It is never too early to think about nominating some of your well-deserving colleagues for fellowships and suitable prizes. GMAG nominates 3–5 people (0.5% of our membership) for APS Fellowship each year. The next deadline is June 1, 2010 and nominations should be made on-line at http://fellowship.aps.org/. APS prize descriptions and nomination deadlines are at http://www.aps.org/praw/.

GMAG Student Dissertation Awards

Each year GMAG will select dissertation awards that recognize students who have conducted outstanding research leading to their dissertation. These awards will be presented at the next APS March Meeting in Portland, OR during the GMAG business meeting and they consist of an invited talk in an appropriate session at the March Meeting, a $500 prize for the student and an award of up to $250 toward his or her travel expenses to the meeting.

The most recent winners selected from among many excellent nominations are Rajit Pal Chaudhury of the University of Houston for his dissertation on “Effects of high pressure, magnetic fields and substitutions on multiferroic system” and Jun Zhao of the University of Tennessee for his dissertation on “Magnetic structures and spin excitations of electron-doped cuprates and Fe Pnictides superconductors with the technique of neutron scattering.”

Next year’s new nominations will be due on September 1, 2010.

Nominations for GMAG Officers and members of the Executive Committee

The nomination committee, which is chaired by Mike Fitzsimmons, recently selected a slate of candidates for new positions within the GMAG Executive Committee. Early next year GMAG members will be able to elect a new Vice-Chair (who will become subsequently the Chair-Elect, Chair, and Past Chair) and two new at-large members for the Executive Committee. The two candidates for the new Vice-Chair will be Matthias Bode (Argonne National Laboratory) and Paul Crowell (University of Minnesota). For member-at-large the four new candidates will be Olav Hellwig (Hitachi GST), Ali Lukaszez (College of William and Mary), Patti Sparks (Harvey Mudd College), Shufeng Zhang (University of Arizona), and Igor Žutić (State University of New York at Buffalo).

According to the GMAG bylaws, the GMAG membership may recommend additional candidates to be included in the election. To be included, a candidate must be nominated by 5% of the GMAG membership (thus requiring at least 42 supporters) as of December 31st, 2009. Any such additional candidate nominations should be sent to Maria Varela (mvarela@ornl.gov), Secretary/Treasurer, before December 31, 2009.

March Meeting 2010, Portland, OR

The APS March Meting will be held next year in Portland, OR during March 15–19, 2010. As in the past we expect that sorting category 6 (magnetism) will be one of the biggest topics of the meeting. Any contributed talks must be submitted directly to APS at http://abs.aps.org/ until November 20, 2009. Below are the magnetism sorting categories and a description of the GMAG sponsored focus topics.
6.14.2 Bulk Properties of Complex Oxides (DMP/GMAG)

Transition metal oxides exhibit a wide range of novel phenomena, which originate from the complexity induced by competing interactions and the presence of multiple ground states. Associated with this complexity is a tendency for short range order such as the formation of stripes, ladders, checkerboards, or phase separation, and an enhanced response to external fields that gives rise to giant and colossal effects with potential for applications. This Focus Topic explores the nature of the various ground states observed in bulk specimens of complex oxides and their competing interactions, the ways in which the spin, lattice, charge and orbital degrees of freedom respond on a variety of length scales, and how they interact and compete with each other to produce novel phenomena. It provides a forum to discuss recent developments and results covering basic aspects (new materials synthesis, experiment, theory and simulation) of bulk systems, including 3-, 4-, and 5-d transition metal complex oxides.

Organized by:
Dave Mandrus, Oak Ridge National Laboratory
Daniel Khomskii, Universität zu Köln
John Mitchell, Argonne National Laboratory

6.14.3 Complex Oxide Thin Films (DMP/GMAG)

A rich variety of intriguing behaviors has been observed in complex oxides, many of which remain far from understood. High Tc superconductivity, ferroelectricity, metal-insulator transitions, or colossal magnetoresistance are just a few of them. When grown in the form of thin films, heterostructures, or nanostructured systems, they often exhibit additional effects resulting from epitaxial strain, reduced dimensionality, charge transfer, proximity effects or phase competition across interfaces. New effects can emerge at such interfaces including two-dimensional electron gases or ferromagnetism. This Focus Topic is dedicated to fundamental advances in the growth, characterization, and experimental as well as theoretical understanding of the physical properties of complex oxides in thin-film, superlattice, and nanostructured forms, paying special attention to the role of interfaces. It also will focus on understanding the impact of defects on their properties, growth conditions on film microstructure, and the mechanisms by which the macroscopic properties are affected, which may include strain, electronic phase separation, charge transfer or localization, etc. These mechanisms often play an important role in the interaction between spin, charge, lattice, and orbital degrees of freedom in thin films of these complex oxides.

Organized by:
Darrel Schloemer, Cornell University
Jean-Pierre Loquet, Katholieke Universiteit Leuven
Elbio Diagotto, Oak Ridge National Laboratory and University of Tennessee

6.14.4 Spin Transport & Magnetization Dynamics in Metal Based Systems (GMAG/DMP/FIAP)

Spin-related effects in metals and in (ferromagnetic) heterostructures are generally robust and readily observed at room temperature. Fundamental discoveries such as the Giant and...
Tunnel Magnetoresistance and the current-induced spin-transfer torque have moved from discovery to applications in remarkably short times, and this whole field of research is rapidly expanding. This Focus Topic covers the new developments in this field, including experimental and theoretical aspects of spin transport and magnetization dynamics in metal-based systems, such as ultrathin films, lateral nanostructures, perpendicular nanopillars, and tunnel junctions.

In particular, contributions describing new results in the following areas are solicited:

- The interplay between spin currents and magnetization dynamics in magnetic nanostructures; spin-transfer, spin pumping and related phenomena, including current-induced magnetization dynamics in heterostructures and domain wall motion in magnetic wires.

- Effects of the spin-orbit interaction on steady-state and dynamical properties of nanostructures; intrinsic and extrinsic spin orbit interactions causing the (inverse) spin and anomalous Nernst effects; microscopic mechanisms of magnetization (Gilbert) damping; out-of-plane spin-transfer torques in magnetization textures.

- Ultrafast magnetization response to (and reversal by) intense laser pulses.

- Thermoelectric spin phenomena such as giant-magneto thermopower and Peltier effects, spin-Seebeck effect, spin and anomalous Nernst and Ettingshausen effects (spin caloritronics).

- Magnetization dynamics in (composite) nanostructures including spin wave excitation, propagation, and detection (magnonics), as well as vortices.

- Coupling between magnetic and elastic degrees of freedom, such as the spin-current induced Einstein-de Haas effect in nanoscale mechanical systems.

Organized by:
KRISTEN BUCHANAN, COLORADO STATE UNIV (KRISTEN.BUCHANAN@COLORSTATE.EDU)
OLLE HEINONEN, SEAGATE (OLLE.HEINONEN@GMAIL.COM OR OLLE.G.HEINONEN@SEAGATE.COM)
GERRIT BAUER, DELFT UNIVERSITY OF TECHNOLOGY (E.E.BAUER@TUDELFT.NL)

6.14.7 Spin Dependent Phenomena in Semiconductors (GMAG/DMP/FAIP)

The field of spin-dependent phenomena in semiconductors is developing rapidly, with significant advances and challenges in a widening range of material systems (e.g., p-nictides, oxides, silicon, diamond, carbon nanotubes, graphene), in semiconducto nanostructures (e.g., self-assembled and lithographically-defined quantum dots), and in hybrid ferromagnetic/semi conductor device structures. This series of Focus Sessions solicits contributions aimed at understanding spin-dependent processes in magnetic and non-magnetic structures incorporating semiconducting materials. Topics include: (i) growth, characterization, electrical, optical and magnetic properties of (ferro-)magnetic semiconductors, nanocomposite and hybrid ferromagnetic-semiconductor structures including quantum dots, nanocrystals, and nano wires; (ii) high temperature ferromagnetism in semiconductors and semiconductor oxides; (iii) transport and dynamical effects in semiconductors with or without spin-orbit interactions; (iv) electrical and optical spin injection, spin Hall effects, spin interference, spin filtering, spin lifetime effects, spin dependent scattering, and spin torque; (v) manipulation, detection, and entanglement of electrical and nuclear spins in quantum systems such as dots, impurities and point defects; and (vi) spin-dependent devices and device proposals involving ferromagnets and semiconductors.

Organized by:
MARKUS WOHLGENANNT, UNIVERSITY OF IOWA (MARKUS.WOHLGENANNT@UIOWA.EDU)
ANTHONY CARUSO, UNIVERSITY OF MISSOURI – KANSAS CITY (CARUSOAN@UMKC.EDU)
6.14.8 Novel Magnetic Devices (DMP/GMAG)

This topic focuses on novel magnetic devices of all kinds, with a special interest in devices that make use of the spin torque effect. Of particular interest are spin torque switching of magnetic nanobits — which could be used in an advanced magnetoresistive random access memory (MRAM) — and spin torque nano-oscillators, both theoretically and experimentally. Other devices of interest include magnetic tunnel junctions, or spin valves with special properties that can enable advanced magnetic technologies such as thermal assisted MRAM, toggle MRAM, high density magnetic recording, or magnetic sensors for field detection and biological sensing. Less mature devices are also of interest, including semiconductor devices that make use of electron spin or that use magnetic semiconductors, as well as negative resistance magnetic devices to achieve power gain. Also of interest are the results of novel metrology techniques that have been applied to examine the underlying physics of the above devices. Examples of interest include high frequency/high speed electrical or optical measurements to examine magnetodynamics, and imaging techniques such as XMCD.

Organized by:

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Eric Fullerton, University of California – San Diego
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Johan Åkerman, KTH Royal Institute of Technology
akerman1@kth.se

GMAG Sponsored Symposia

From the many excellent submissions this year, the GMAG executive committee selected the following five symposia for the APS March Meeting in Portland, OR next year. The exact list of invitees will be published in the February GMAG Newsletter.

• Electric Voltages generated by Magnetization Dynamics
• Microscopic Physics of Magnetization Damping
• Magnonics: Spin Waves Processes in Magnetic Materials
• Room Temperature Semiconductor Spintronic
• Spin Transport in Carbon-based Materials

Magnetism-Related Tutorials

The tutorials at the APS March Meeting are not directly organized by GMAG (although many GMAG members are involved in their organization). Nevertheless, there are many magnetism-related tutorials that should be of interest to the GMAG membership. Specifically note:

Tutorial #1: Complex Oxide Thin Films and Superlattices
Organizer: Maria Varela, Oak Ridge National Laboratory

A rich variety of exciting, intriguing behaviors has been observed in complex oxides, many of which remain still far from understood. High Tc superconductivity, ferroelectricity or colossal magnetoresistance are just a few of them. When grown in the form of thin films, heterostructures or superlattices they may exhibit additional effects such as those of epitaxial strain, reduced dimensionality, 2D electron gases, proximity effects or interplay across interfaces.

Since all this phenomenology can deeply alter the macroscopic physical properties, their understanding acquires an special relevance. This tutorial will explore the physical properties of thin complex oxide films, heterostructures and superlattices, paying special attention to the role of interfaces. It also will focus on the mechanisms by which the macroscopic properties are affected, which may include strain, electronic phase separation, charge transfer or localization, structural defects, etc. All of them have an important role in the interaction between spin, charge and orbital degrees of freedom in films.

The lectures in this tutorial will provide a forum to discuss recent developments in these issues, ranging from growth, characterization, physical properties of complex oxide films and heterostructures based on oxides such as manganites, cuprates, titanates, multiferroics, etc.

Tutorial #2: Topological Insulators
Organizer: Shoucheng Zhang, Stanford University

Search for new states of matter has become the central focus of condensed matter physics. Most states known to date are characterized by the symmetries they break, for example, a crystal breaks the translational symmetry, a magnet breaks the rotational symmetry and a superconductor breaks gauge symmetry.

More recently, it has been recognized that topological insulators are new states of quantum matter distinct from conventional insulators. A topological insulator has a full energy gap in the bulk, and contains gapless surface states which can not be destroyed by any non-magnetic impurities. Three topological insulator materials have been theoretically predicted and experimentally discovered so far, the HgTe quantum well, the BiSb alloy and the Bi2Te3/BiSe3 compounds.

Topological insulators have unusual physical properties. Because of the time reversal symmetry, the surface states can not be scattered back by non-magnetic impurities and can conduct without dissipation. Therefore, these materials are promising candidates for low power electronic devices for logical processing. The spin and the charge degrees of freedom are intimately coupled in the surface states, such coupling can be used for electrical manipulation of the spin degrees of freedom — a central goal of spintronics. BiSb alloy and Bi2Te3/BiSe3 compounds are also excellent thermal electric materials.

Deeper understanding of these materials could lead to better design of thermal electric devices, for example by optimizing the surface to volume properties. When a thin magnetic layer is applied on the surface, a full insulating gap is opened on the surface. In this case, an electric charge close to the surface is predicted to induce an image magnetic monopole. Such an effect could be used to electrically read and write magnetic storage bits. When a thin superconducting layer is applied on top of the surface, elementary excitations are predicted to be Majorana fermions which can be used for topological quantum computing. History has taught us repeatedly that fundamental breakthroughs in science often lead to many useful applications.

Beyond potential applications, topological insulators extended into deepest realm of fundamental science. One deeply mysterious fact of quantum mechanics is the sign change of the electron wave function when its spin is rotated by 2pi. It is exactly this mysterious fact that protects the surface states of topological insulators. Therefore, investigation of topological insulators can help us understanding the mysteries of the quantum world, and use them to our advantage. Many exotic particles, such as the fractionally charge, spinon, holon, magnetic monopole, axion and Majorana fermion are predicted to appear as elementary excitations of topological insulators. Table top observation of these exotic particles reveals the deeper mysteries of the universe.
Tutorial #5: Emergent Phenomena in Bulk Complex Oxides  
ORGANIZER: JOHN MITCHELL, ARGONNE NATIONAL LAB, ARGONNE, IL

Few materials classes enjoy the remarkable diversity of physical properties of the solid oxides. Transition metal oxides in particular have proven to be a fertile area for modern condensed matter physics research, supporting striking phenomena such as high temperature superconductivity, colossal magnetoresistance, and multiferriciry. The multifunctional nature of these materials opens up many possibilities for basic research as well as exciting potential applications, e.g. in oxide electronics. This situation has sparked great interest in the field of complex oxides, with many areas advancing at an impressive pace.

In this tutorial we aim to provide an introduction to some of the most rapidly evolving areas of current research in this area, with an emphasis on correlated electron oxides such as manganites, cobaltites, etc. We will begin with an introduction to the complex oxide materials, focusing in particular on the all-important structural aspects and how function is intimately linked to the atomic arrangement. Magnetic and electronic transport properties will then be reviewed, covering aspects such as mechanisms of conduction and magnetic ordering, charge and orbital ordering, and phase separation.

Additionally, we will discuss issues of relevance to energy such as thermoelectric behavior. Recent advances in the theory of transition metal oxides will be the topic of the third talk, with links to heterostructures and thin film geometries. Finally, we will provide a view of correlated electron physics in transition metal oxides with an emphasis on how spectroscopies reveal the underlying electronic structure and descriptions beyond the one electron model.

Tutorial #8: Spintronics  
ORGANIZER: DR. STUART PARKIN, IBM ALMADEN RESEARCH CENTER, SAN JOSE, CALIFORNIA

“Spintronics” comprises the field of research which has emerged over the past decade that refers to nano-materials and nano-devices which have novel properties that arise from the manipulation and control of spin-polarized electrons and especially spin-polarized currents. This tutorial will discuss recent developments in this field, notably: (1) thermoelectric effects resulting from spin currents induced by temperature gradients, (2) the manipulation of magnetic moments by the transfer of spin angular momentum from photons and from spin-polarized currents and (3) the recent discovery of magnetoelastic effects in topological insulators, a new state of matter. Although many of these effects have potential important technological applications in magnetic memory, storage and logic, this course will emphasize the fundamental science underlying these spin-based phenomena.

Ask your colleagues to Join GMAG

For $7 additional dues APS members can become GMAG members with these benefits (students are free for one year):
• Quarterly GMAG newsletter.
• Eligibility for GMAG graduate student awards and sponsorship.
• Potential to increase the number of APS Fellows sponsored by GMAG.
• Potential to increase the number of invited talks on Magnetism at the March Meeting.
• Opportunity to help shape the voice and future of the Magnetism community (your community) in the US.

See the GMAG website: http://www.aps.org/units/gmag

TO JOIN: Go to the APS page for “Membership Units” (http://www.aps.org/membership/units/join-unit.cfm) and follow instructions for adding a unit to your membership. Or call the APS at 301-209-3280 and tell a Membership Rep that you want to join topical group GMAG.

Important Deadlines

Thanks for being involved with GMAG and please get actively involved in the many activities described above.

November 20, 2009

APS MARCH MEETING, CONTRIBUTED ABSTRACT SUBMISSION
abs.aps.org

December 31, 2009

ADDITIONAL NOMINATIONS FOR GMAG ELECTIONS
Maria Varela, mvarela@ornl.gov

June 1, 2010

FELLOWSHIP NOMINATION
fellowship.aps.org

Ongoing

OUTREACH PROPOSALS
Axel Hoffmann, hoffmann@anl.gov

GMAG Executive Committee

Chair: Axel Hoffmann hoffmann@anl.gov
Chair-Elect: Berend Jonker jonker@nrl.navy.mil
Vice-Chair: Andrew Kent adkl1@nyu.edu
Past-Chair: William Butler wbutler@mint.ua.edu
Secretary-Treasurer: Maria Varela mvarela@ornl.gov
Executive Committee Members-At-Large:
Peter Fischer
Michael Fitzsimmons
John Freeland
Eric Fullerton
Michael Pechan
Evgeny Tsymbal
Upcoming Conferences

COMPUMAG 2009 | NOVEMBER 22–26, 2009 | FLORIANÓPOLIS, BRAZIL
WWW.COMPU MAG2009.COM/

MATERIALS RESEARCH SOCIETY (MRS) 2009 FALL MEETING | NOVEMBER 30–DECEMBER 4, 2009 | BOSTON, MA
WWW.MRS.ORG

SPIN MANIPULATION IN COLD ATOMS AND CONDENSED MATTER | JANUARY 6–9, 2010 | UTRECHT, THE NETHERLANDS
WWW.ICAM-I2CAM.ORG/?P=451

JOINT MMM/INTERMAG CONFERENCE | JANUARY 18–22, 2010 | WASHINGTON, DC
WWW.MAGNETISM.ORG/

APS MARCH MEETING 2010 | MARCH 15–19, 2010 | PORTLAND, OR
WWW.APS.ORG/MEETINGS/MARCH/INDEX.CFM

INTERNATIONAL CONFERENCE ON SUPERCONDUCTIVITY AND MAGNETISM 2010 | APRIL 25–30, 2010 | ANTALAYA, TURKEY
WWW.ICSM2010.ORG/

CORRELATED ELECTRON SYSTEMS | JUNE 13–18, 2010 | MOUNT HOLYOKE COLLEGE, SOUTH HADLEY, MA
WWW.GRC.ORG/PROGRAMS.ASPX?YEAR=2010&PROGRAM=CORRELEC

INTERNATIONAL CONFERENCE ON STRONGLY CORRELATED ELECTRON SYSTEMS | JUNE 27–JULY 2, 2010 | SANTA FE, NM
WWW.CES.NEWMEXICOCONSORTIUM.ORG/

INTERNATIONAL SYMPOSIUM ON ADVANCED MAGNETIC MATERIALS AND APPLICATIONS | JULY 12–16, 2010 | SENDAI, JAPAN
WWW.ECEI.TOHOKU.AC.JP/JSAMMA2010/

INTERNATIONAL CONFERENCE ON HIGHLY FRUSTRATED MAGNETISM 2010 | AUGUST 1–6, 2010 | BALTIMORE, MD
WWW.PHYSICS-ASTRONOMY.JHU.EDU/HFM2010

MAGNETIC NANOSTRUCTURES | AUGUST 8–13, 2010 | LEWISTON, ME
WWW.GRC.ORG/PROGRAMS.ASPX?YEAR=2010&PROGRAM=MAGNANO

XXXIVTH INTERNATIONAL CONFERENCE ON MAGNETIC RESONANCE IN BIOLOGICAL SYSTEMS | AUGUST 22–27, 2010 | CAIRNS, AUSTRALIA
WWW.ICMRS2010.ORG/

2010 IEEE 7TH INTERNATIONAL SYMPOSIUM ON METALLIC MULTILAYERS | SEPTEMBER 19–24, 2010 | BERKELEY, CA
WWW.MML2010.LBL.GOV/

A more detailed list of magnetism related conferences can be found on the GMAG website:
WWW.APS.ORG/UNITS/GMAG/MEETINGS/INDEX.CFM