No. 33

GMAG NEWSLETTER

February 2010

Topical Group on Magnetism and its Applications http://units.aps.org/units/gmag/

Note From the Chair

Since it is the beginning of the year all GMAG members should be absorbed by election fever. As every year the GMAG elections are currently under way and will conclude on February 17th. Until then, you can make your voice heard and vote for the Vice Chair and two new Members at Large of the executive committee. Furthermore I would like to encourage you to attend the GMAG business meeting at the APS March Meeting on Tuesday, March 16th at 5:45 pm in Room E146 of the Oregon Convention Center. If the prospect of meeting the newest GMAG sponsored APS fellows and Student Dissertation Awards winner is not sufficient to get you interested in this meeting, then we also threw in food and drinks for good measure.

Speaking about the March Meeting; Berry Jonker has done an outstanding job in putting together the GMAG sponsored part of the March Meeting Program. Not only did he manage to organize excellent symposia, but also with a small army of volunteers he sorted through one of the largest sorting groups of the March Meeting. When you see him in Portland, make sure to thank him for his efforts!

The March Meeting will also contain a distinct highlight for myself. Namely, Berry Jonker will take over as the GMAG chair and I will retire into the less strenuous position of Past Chair. Therefore I would like to already take the opportunity to thank all the officers and members of the GMAG executive committee for their support and help during my 3-year rotation through Vice-Chair, Chair-Elect, and Chair of GMAG.

—Axel Hoffmann, GMAG Chair

Election of GMAG Officers for 2010

The GMAG nomination committee, chaired by Mike Fitzsimmons, has prepared a slate of candidates for the 2010 GMAG election. This year the committee has presented nominations for a new Vice Chair (who will become Chair-Elect, Chair and Past Chair) and two members at large. The nominees are:

Vice Chair:

Matthias Bode (Argonne National Laboratory)
Paul Crowell (University of Minnesota)

Member-at-Large:

Olav Hellwig (Hitachi GST)
Ale Lukaszew (College of William and Mary)
Patti Sparks (Harvey Mudd College)
Shufeng Zhang (University of Arizona)
Igor Žutić (State University of New York, Buffalo)

The elections are currently underway and the deadline for your vote is February 17th. Each GMAG member should have received an email from Maria Varela (GMAG Secretary/Treasurer) with an access code to the election web-site, which besides the ballot also contains a brief resume and statement of each candidate. Follow the web-link provided in this email and the rest of the voting procedure is fairly self-explanatory.

New GMAG Sponsored APS Fellows

In 2009 GMAG nominated five of its members for fellowship in the APS. We were very pleased that all five were approved by the APS General Fellowship Committee. We thank the GMAG Vice Chair, Andy Kent, for overseeing the nomination process. Congratulations to these new GMAG APS fellows!

Rolf Allenspach, IBM Zürich Research Laboratory
Citation: For his pioneering experimental work in the field of nanomagnetism leading to a fundamental understanding of the physical limits of magnetic behavior. His studies on oscillatory magnetic anisotropy, ultrafast magnetization reversal and current driven domain wall motion provide new implications for future magnetic storage and logic devices.

Jeffrey R. Childress, Hitachi San Jose Research Center
Citation: For fundamental contributions to the understanding of magnetism and mangnetotransport in thin-film and nanostructured materials, and their applications to magnetic recording sensor technologies.

Gernot Güntherodt, RWTH Aachen
Citation: For important contribution to the fields of Half Metallic Ferromagnets, Ultrathin Magnetic Films, Magnetic Semiconductors and Exchange Bias.

Robert D. McMichael, NIST
Citation: For broad contributions to the measurement, modeling, interpretation, and understanding of magnetization dynamics.

Andrei N. Slavin, Oakland University
Citation: For contributions to the understanding of linear and nonlinear spin wave dynamics in magnetic films and nanostructures, microwave magnetic envelope solutions, and magnetization dynamics induced by spin momentum transfer.

The new GMAG APS fellows will be honored at the GMAG business meeting during the APS March Meeting. This meeting will be held on Tuesday (March 16th) at 5:45 pm in room E146 of the Oregon Convention Center. Thus please join us in order to applaud their sustained contributions to magnetism research. Furthermore, you may start 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 me made on-line at http://fellowship.aps.org/.

GMAG Student Dissertation Awards

Each year GMAG presents 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 2010 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" (talk Y36, Friday March 19th at 8:24 am, Room E146) 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" (talk X39, Thursday March 18th at 3:42 pm, Room F150). Both awardees will also be honored at the GMAG business meeting during the APS March Meeting (Tuesday 16th, 5:45 pm, Room E146). Thus come to this meeting and meet these promising new young scientists in the magnetism community. Just for information, new nominations for the 2011 APS March Meeting will be due on September 1, 2010.

March Meeting 2010, Portland, OR

The APS March Meeting will be held in Portland, OR during March 15–19, 2010. As in the past sorting category 6 (magnetism) is one of the largest topics of the meeting, with 640 abstracts submitted and an additional 263 abstracts submitted to related categories co-sponsored by GMAG. GMAG is sponsoring 5 Invited Symposia (see details below) and 8 Focus Session Topics, comprising 78 invited speakers and 68 regular sessions. A convenient list of all of the GMAG sponsored sessions of the APS March Meeting is available at: http://meetings.aps.org/Meeting/MAR10/sessionindex2?SponsorID=GMAG. Kudos to the GMAG Program Chair, Berry Jonker, and his capable team for sorting through all the abstracts at the APS headquarters in early December. For more details see the announcement at the following APS website: http://www.aps.org/meetings/march/index.cfm. Any praise for the magnetism part of the APS March Meeting should go to Berry Jonker; any suggestions for improvements and new ideas should go to Andy Kent, who will be in charge of the meeting next year.

Please also remember that the GMAG business meeting will be held on Tuesday, March 16th at 5:45 pm in Room E146 of the Oregon Convention Center. Besides being an excellent opportunity to socialize with your fellow researchers in the magnetism community (appetizers and drinks will be served) this is also your best chance for providing direct input into the activities of GMAG. This way you can ensure that GMAG serves YOUR needs.

Below is the detailed list of the GMAG sponsored symposia at the upcoming March Meeting. As always more detailed information, such as abstracts, are readily available online. We hope that you find the program compelling and we are looking forward to seeing you in Portland next month!

GMAG Invited Symposia

Monday, March 15, 2:30–5:30 pm, Portland Ballroom 255
Session D8: Spin Transport in Carbon-based Materials
Chair: Jing Shi, University of California, Riverside

2:30 pm **D8.1:** Recipes for lateral spin transport between magnetic contacts, advantages of carbon-based materials
Albert Fert, CNRS/Thales Laboratory

3:06 pm **D8.2:** Electronic spin transport, spin precession and spin relaxation in graphene field effect transistors
Bart van Wees, University of Groningen

3:42 pm **D8.3:** Molecular Spintronics
Stefano Sanvito, Trinity College, Dublin

4:18 pm **D8.4:** Coherent spin dynamics in organic electronic devices
John Lupton, University of Utah

4:54 pm **D8.5:** Spin polarized tunneling and injection in organic semiconductors
Karthik V. Raman, Massachusetts Institute of Technology

Tuesday, March 16, 8:00–11:00 am, Oregon Ballroom 203
Session H3: Room Temperature Semiconductor Spintronics
Chair: Aubrey Hanbicki, Naval Research Laboratory

8:00 am **H3.1:** Multiferroic spintronics
Agnès Barthélémy, CNRS/Thales

8:36 am **H3.2:** Electrical creation of spin polarization in silicon at room temperature
Ron Jansen, University of Twente

9:12 am **H3.3:** Spin transport in graphene: Injection, relaxation, and electron-hole asymmetries
Roland Kawakami, University of California, Riverside

9:48 am **H3.4:** Quantum science with spin impurities in diamond
Mikhail Lukin, Harvard University

10:24 am **H3.5:** Spin Routes in Organic Semiconductors
Valentin Dediu, ISMN-CNR Institute of Nanostructured Materials

Wednesday, March 17, 11:15am–2:15 pm, Portland Ballroom 255
Session Q8: Magnonics: Spin Waves Processes in Magnetic Materials
Chair: Kristen Buchanan, Colorado State University

11:15 am **Q8.1:** Photo-magnonics: excitation of magnonic materials by femtosecond laser pulses
Markus Münzenberg, Universität Göttingen

11:51 am **Q8.2:** Magnetic excitations and ultrafast magnetization reversal
Roy E. Chantrell, The University of York

12:27 pm **Q8.3:** Magnon gases and condensates
Burkhard Hillebrands, TU Kaiserslautern

1:03 pm **Q8.4:** Modification of Spin Wave Propagation by Current Injection
Teruo Ono, Kyoto University

1:39 pm **Q8.5:** Current-induced spin wave Doppler shift
Matthieu Bailleul, CNRS-Universite de Strasbourg

Thursday, March 18, 11:15am–2:15pm, Oregon Ballroom 204
Session W4: Electric Voltages Generated by Magnetization Dynamics
Chair: Axel Hoffmann, Argonne National Laboratory

11:15 am **W4.1:** Detection of electromotive force induced by domain wall motion
Geoffrey Beach, MIT

11:51 am **W4.2:** Conduction electrons and the Landau-Lifshitz-Gilbert equation
Shufeng Zhang, University of Arizona

12:27 pm **W4.3:** Electric detection of magnetization dynamics through inverse spin Hall effects
Eiji Saitoh, Tohoku University

1:03 pm **W4.4:** Quantifying Spin Hall Effects from Spin Pumping
Oleksandr Mosendz, Argonne National Laboratory

1:39 pm **W5.5:** Quantitative measurement of spin transfer torque in magnetic tunnel junctions by spin-transfer-driven ferromagnetic resonance
Chen Wang, Cornell University

Friday, March 19, 8:00–11:00 am, Oregon Ballroom 204
Session Y4: Microscopic Physics of Magnetization Damping
Chair: Olle Heinonen, Seagate Technology - Stillwater

8:00 am **Y4.1:** Intrinsic spin-orbit contribution to precessional damping in transition metals
Mark D. Stiles, National Institute of Standards and Technology

8:36 am **Y4.2:** Ab-initio study of the resistivity, Gilbert damping and spin-flip diffusion in transition metal alloys
Paul Kelly, University of Twente

9:12 am **Y4.3:** Scattering Theory of Mesoscopic Gilbert Damping
Arne Brataas, Norwegian University of Science and Technology

9:48 am **Y4.4:** Gilbert Damping Mechanisms in Half-metallic Heusler Alloys
Shigemi Mizukami, Tohoku University

10:24 am **Y4.5:** Magnetic relaxation due to rare earth impurities in Ni80Fe20
Georg Woltersdorf, University of Regensburg

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. Be aware, that these tutorials require separate preregistration and that no on-site registration will be available. All of the tutorials will be held on Sunday, March 14th in the Oregon Convention Center. Specifically note:

Tutorial #1: Complex Oxide Thin Films and Superlattices, 8:30 am – 12:30 pm

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, 8:30 am – 12:30 pm

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 prom-

ising 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 can 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, 1:30 – 5:30 pm

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 multiferroicity. 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, cobaltitites, 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, 1:30 – 5:30 pm

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 magnetoelectric 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.

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@anl.gov). The GMAG Executive Board will review proposals on an ongoing basis.

Upcoming Conferences

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
sces.newmexicoconsortium.org/

COMA-RUGA 2010, 6TH INTERNATIONAL WORKSHOP ON NANOMAGNETISM AND SUPERCONDUCTIVITY
JUNE 30 – JULY 4, 2010 | TARRAGONA, SPAIN
www.ub.edu/gmag/comaruga/

INTERNATIONAL SYMPOSIUM ON ADVANCED MAGNETIC MATERIALS AND APPLICATIONS
JULY 12–16, 2010 | SENDAI, JAPAN
www.ecei.tohoku.ac.jp/isamma2010/

11TH INTERNATIONAL CONFERENCE ON SURFACE X-RAY AND NEUTRON SCATTERING
JULY 14–17, 2010 | EVANSTON, IL
www.sxns11.northwestern.edu/

INTERNATIONAL CONFERENCE ON HIGHLY FRUSTRATED MAGNETISM 2010
AUGUST 1–6, 2010 | BALTIMORE, MD
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.icmrbs2010.org/

2010 IEEE 7TH INTERNATIONAL SYMPOSIUM ON METALLIC MULTILAYERS
SEPTEMBER 19–24, 2010 | BERKELEY, CA
mml2010.lbl.gov/

55TH ANNUAL CONFERENCE ON MAGNETISM AND MAGNETIC MATERIALS
NOVEMBER 14–18, 2010 | ATLANTA, GA
www.magnetism.org/futureconf.html

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

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: www.aps.org/units/gmag. TO JOIN: Go to the APS page for "Membership Units" (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.

February 17, 2010

GMAG ELECTIONS FOR EXECUTIVE COMMITTEE

see your email inbox

June 1, 2010

FELLOWSHIP NOMINATION

fellowship@aps.org

September 1, 2010

STUDENT DISSERTATION AWARD NOMINATION

Berry Jonker, jonker@nrl.navy.mil

Ongoing

OUTREACH PROPOSALS

Axel Hoffmann, hoffmann@anl.gov

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