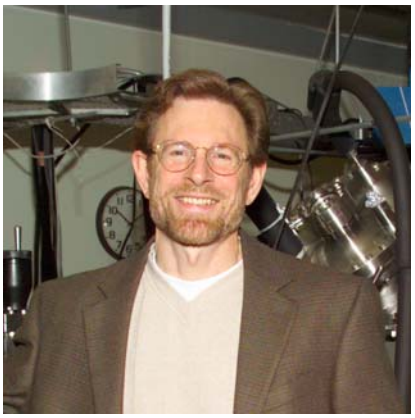
GMAG NEWSLETTER – October 2010
http://units.aps.org/units/gmag/

Note From the Chair



Much of the 2011 March Meeting organization has been completed at this point thanks to the efforts of Andy Kent (curently serving as the GMAG chair-elect and program chair), the Focus Topic organizers, and the many GMAG members who submitted nominations for invited speakers and symposia. This Newsletter provides a summary of the GMAG program and related activities.
In addition, we encourage (i) nominations of students for the GMAG Student Dissertation Awards, (ii) nominations for new candidates for the GMAG Executive Committee, and (iii) proposals for magnetism related outreach projects. This newsletter contains detailed information and deadlines for these activities, which help us maintain GMAG as one of the strongest Topical Groups of the APS.
Finally, we note with great sadness the passing of Bill Egelhoff on Aug 18, 2010.

As always, if you have additional ideas about how GMAG can support the magnetism and physics community with activities and programs, or have a suggestion for a new Focus Topic, feel free to contact any member of the GMAG Executive Committee.

Berry Jonker, GMAG Chair

March 2011 Meeting Program

The APS 2011 March Meting will be held March 21-25 in Dallas, TX. As in the past we expect that sorting category 6 (magnetism) will be one of the biggest topics of the meeting. The Chair-Elect and GMAG prgram chair, **Andy Kent** (andy.kent@nyu.edu), is coordinating the organization of both GMAG sponsored (or co-sponsored) Focus Topics and Invited Symposia. The GMAG Focus Topics, Invited Symposia and the magnetism sorting categories are summarized below, and a complete description of the Focus Topics is found near the end of this Newsletter.
The abstract dealine is Friday, November 19, 2010, and abstracts must be submitted directly to APS at http://abs.aps.org/.

Focus Topics

GMAG is co-sponsoring eight focus topics for the 2011 meeting. Each focus topic consists of multiple sessions of contributed and invited talks addressing a common theme. A special thanks to our volunteer Focus Topic organizers who have worked hard to coordinate and organize each topic. **Contributed talks relating to a focus topic should be submitted under the focus topic sorting category (number given below) and not to a general category.**

6.14.1 *Magnetic Nanostructures: Materials and Phenomena* (DMP/GMAG)
Stephane Mangin, Nancy-Universite, stephane.mangin@lpm.u-nancy.fr
Tiffany Santos, Argonne National Laboratory, tsantos@anl.gov

6.14.2 *Bulk Properties of Complex Oxides* (DMP/GMAG)
Rongying Jin, Louisiana State University, rjin@lsu.edu
Michelle Johannes, Naval Research Labs, michelle.johannes@nrl.navy.mil
Dmitry Reznik, University of Colorado, dmitry.reznik@colorado.edu

6.14.3 ***Magnetic Oxide Thin Films*** **(DMP/GMAG)**
Manuel Bibes, CNRS-National Center for Scientific Research, manuel.bibes@thalesgroup.com
Anand Bhattacharya, Argonne National Laboratory, anand@anl.gov
John Freeland, Argonne National Laboratory, freeland@anl.gov
Lane Martin, University of Illinois, Urbana-Champaign, lwmartin@illinois.edu

6.14.4 ***Spin Transport & Magnetization Dynamics in Metal Based Systems*** **(GMAG/DMP/FIAP)**
Shufeng Zhang, University of Arizona, zhangs@physics.arizona.edu
Tom Silva, NIST-Boulder, thomas.silva@nist.gov
Goran Mihajlovic, Hitachi Global Storage Technologies, goran.mihajlovic@hitachigst.com

6.14.5 ***Spin Dependent Phenomenain Semiconductors*** **(GMAG/DMP/FIAP)**
Michael Flatte, University of Iowa, michael_flatte@mailaps.org
Nitin Samarth, Penn State University, nsamarth@psu.edu

6.14.6 ***Frustrated and Low Dimensional Magnetism*** **(GMAG/DMP)**
Jason Gardner, NIST, jason.gardner@nist.gov
Stephen Nagler, Oak Ridge National Laboratory, naglerse@ornl.gov
Myriam Sarachik, CCNY, msarachik@sci.ccny.cuny.edu

6.14.7 ***Spin Dependent Physics in Organic-based Materials*** **(GMAG/DMP)**
Jing Shi, UC Riverside, USA jsjshi@gmail.com
Luis Hueso, CIC nanoGUNE, Spain, l.hueso@nanogune.eu
Barbaros Ozylimaz, NUS, Singapore, barbaros.oezyilmaz@gmail.com

6.14.8 ***Novel Magnetic Devices*** **(DMP/GMAG)**
Peter Fischer, CXRO/LBNL, Berkeley CA, USA, PJFischer@lbl.gov
Dafine Ravelosona, IEF, Orsay, France, dafine.ravelosona@u-psud.fr
William Rippard, NIST-Boulder, USA, william.rippard@nist.gov

Invited Symposia

GMAG sponsors five invited symposia at the March Meeting – this number is based upon the number of current GMAG members. The symposia are selected by the Executive Committee from those suggested by the GMAG membership, and provide a great opportunity for members to determine the program emphasis from year to year. Twelve nominations were received this year, and we thank those members who took the time to submit a suggestion. A Symposium consists of 4-5 invited speakers, and is intended to highlight a "hot topic" and/or address an area which spans more than one focus topic. The five Symposia selected for 2011 are as follows:

Bose-Einstein Condensation of Magnons and Related Phenomena
will highlight different realization of magnetic BECs, from spin-currents in He3 to quantum magnets.

Collective Effects in Molecular Magnets
While previous sessions have addressed one-molecule effects, this symposium will focus on collective effects that arise due to interactions between molecules and their environment.

Ultrafast Magnetization Dynamics: Where are We Today?
will highlight recent experimental advances in this field using laser and x-ray sources.

Spin Currents
will feature talks on the transport, detection and uses of spin-currents in semiconductors.

New Developments in Organic Spintronics
will feature talks on spin effects in organic semiconductors: injection and detection of spin, spin-diffusion and dynamics.

Tutorials of interest to GMAG members

The tutorials at the APS March Meeting are not directly organized by GMAG (although many GMAG members are involved as organizers and lecturers). There are several magnetism-related tutorials that will be of interest to the GMAG membership. **You must preregister for the tutorials**. Detailed information on all eight tutorials including the lecturers and topics covered can be found at http://www.aps.org/meetings/march/events/tutorials/index.cfm
Several tutorials are highlighted below, and run in parallel on Sunday, March 20, 8:30am – 12:30pm:

- Tutorial #1: ***Spintronics*** (organized by Arne Brataas and Gerrit Bauer)
- Tutorial #2: ***Complex Oxides*** (organized by Nicola Spaldin)
- Tutorial #3: ***Topological Insulators*** (organized by Xiao-Liang Qi)

Nominations for Student Dissertation Awards

In order to encourage students working in magnetism, every year GMAG sponsors **Outstanding Dissertation in Magnetism Awards**. GMAG will present up to three dissertation awards at the next APS March Meeting. These awards will recognize students who have conducted outstanding research leading to their dissertation and will consist of an invited talk in an appropriate session at the APS March Meeting, a $500 prize to the student, and up to $250 toward his/her travel expenses to the APS March Meeting. The student must be in the final year before graduating with a Ph.D., and both the student and the advisor must be current members of GMAG. Nominations will consist of: a nominating letter; an extended abstract of the research; the student's CV and publication list; and contact information for the student, all submitted by the student's advisor or another senior researcher who knows the student's work well. The nominating letter must address the following issues:

- Quality and independence of the student's work;
- Student's speaking ability;
- Year the student began graduate school;
- Student expected completion date (must be after September 1, 2010, but before September 1, 2011 to be eligible for the 2011 APS March Meeting);
- Assessment of the student's future potential as a research scientist.

Nominations should be sent by email as a single PDF file to **Berry Jonker** (jonker@nrl.navy.mil) by **November 19, 2010**. Evaluation of the nominations will be conducted by the GMAG Executive Committee.

Student Travel Awards

To increase student participation and involvement in activities essential to GMAG and APS as a whole, GMAG will sponsor four Student Travel Awards for the March Meeting. The award will consist of $250 in travel assistance to attend the meeting. The student will have lunch with a GMAG Executive Committee member, and is expected to attend the GMAG business meeting and serve one shift at the "Contact Congress" booth to support the APS outreach for congressional support for scientific research. The student must be a presenter at the March Meeting, and should submit the following information to Paul Crowell (crowell@physics.umn.edu) by **December 1, 2010**: name, advisor, abstract submitted to March meeting, and ~100 word justification. There is a limit of two applicants per advisor.

Other GMAG News & Business

Bill Egelhoff

It is with great sadness that we report that William F. (Bill) Egelhoff, Jr. passed away on August 18, 2010 of an apparent heart attack at the age of 61. Bill worked at NIST, Gaithersburg for many years, was a very familiar and active figure within the magnetism community, and was widely respected and well-liked. His most recent work addressed the growth and development of MgO-based spin torque transfer tunnel junctions for magnetic memory and logic applications. His enthusiasm and contributions will be sorely missed.

Nominations for GMAG Officers and members of the Executive Committee

GMAG requests nominations for Vice-Chair (who succeeds to Chair-Elect, Chair, and Past Chair), secretary/treasurer, and for two new at-large members of the Executive Committee. Nominations for these positions should be sent to Evgeny Tsymbal (tsymbal@unl.edu), chair of the Nominating Committee, by **November 21, 2010**. We thank the outgoing Officers and Executive Committee members for their years of service: Axel Hoffmann, Past Chair; Maria Varela, secretary/treasurer; John Freeland, member-at-large; Evgeny Tsymbal, member-at-large.

Nominations for APS Fellowships and Prizes/Awards

The nomination deadlines for APS fellowship and most prizes have passed for this year. However, it is a good time to consider nominations for next year. GMAG nominates 3–5 people (0.5% of our membership) for APS Fellowship each year. The next deadline is **June 1, 2011** and nominations should be made on-line at http:www.aps.org/fellowship/. APS prize descriptions and nomination deadlines are at http://www.aps.org/praw/.

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, Berry Jonker (jonker@nrl.navy.mil). The GMAG Executive Board will review proposals on an ongoing basis.

Important Deadlines 2010-2011

Date	Reason	Contact
November 19	Student Dissertation Award Nomination	Berry Jonker jonker@nrl.navy.mil
November 19	Contributed abstracts 2011 March Mtg	http://www.aps.org/meetings/march
November 21	Nominations for GMAG Executive Committee	Evgeny Tsymbal (tsymbal@unl.edu),
December 1	Student Travel Award	Paul Crowell (crowell@physics.umn.edu)
January 7	March Mtg program posted online	http://www.aps.org/meetings/march
January 14	Early registration deadline March 2011 Mtg	http://www.aps.org/meetings/march
February 18	Late registration deadline March 2011 Mtg	http://www.aps.org/meetings/march
February 18	Housing registration deadline March Mtg	http://www.aps.org/meetings/march
June 1	APS Fellowship Nomination	http:www.aps.org/fellowship/
Ongoing	Outreach Proposals	Berry Jonker jonker@nrl.navy.mil

Thanks for being involved with GMAG and please do not hesitate to get actively involved in the many activities described above.

The GMAG Executive Committee:
Chair: Berend Jonker (jonker@nrl.navy.mil)
Chair-Elect: Andrew Kent (andy.kent@nyu.edu)

Vice-Chair: Paul Crowell (crowell@physics.umn.edu)
Past Chair: Axel Hoffmann (hoffmann@anl.gov)
Secretary-Treasurer: Maria Varela (mvarela@ornl.gov)
Members-at-Large: Peter Fischer, John Freeland, Eric Fullerton, Olav Hellwig, Evgeny Tsymbal and Shufeng Zhang.

Encourage your colleagues to join GMAG

For only $7 additional dues APS members can become GMAG Members with the following benefits (students are free for one year):

- GMAG newsletter by email.
- 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.

We will be manning a membership desk at the 2010 MMM Meeting, 14-18 November, in Atlanta to sign up new members. If you are attending and would like to help out by staffing this desk for a few hours during that meeting, please contact Berry Jonker (jonker@nrl.navy.mil).

GMAG-sponsored/cosponsored Focus Topics, 2011 March APS Meeting

6.14.1 *Magnetic Nanostructures: Materials and Phenomena* (DMP/GMAG)

This topic focuses on magnetic nanostructures such as thin films, multilayers, superlattices, nanoparticles, nanowires, nanorings, nanocomposites, core-shell structures, hybrid structures, magnetic point contacts and self-assembled as well as patterned magnetic arrays. The sessions will include methods used to synthesize such nanostructures, the variety of materials used, and the latest, original theoretical and experimental advances. There is a special interest in novel properties that arise at the nanoscale, as well as synthesis and characterization techniques demonstrating nano- or atomic-scale control of properties. Phenomena and properties of interest include: spin-dependent magneto-transport, magnetization dynamics, current and field induced magnetization reversal or domain wall propagation, exchange coupling, magnetic quantum confinement, proximity and structural disorder effects, strain effects, microwave resonance and microwave assisted reversal, magnetic anisotropy, inter-particle interactions and thermal and quantum fluctuations.

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 nearly degenerate multiple ground states. Associated with this complexity is a tendency for new forms of orders 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. Note there is some overlap in topic with other DMP and GMAG focus sessions. Bulk oxides with interest predominantly for dielectric, ferroelectric or piezoelectric properties should be submitted to the session that focuses on those materials. The organizers of all of the related focus sessions will share information and will work together with the March Meeting Program Committee to create an optimal meeting program.

6.14.3 *Magnetic Oxide Thin Films* (DMP/GMAG)

Magnetism in complex oxide materials has long been a rich field of study in solid state physics as there are strong interactions between spin, charge, lattice, and orbital degrees of freedom at play in these materials. Furthermore, when magnetic oxide materials are grown as thin films they often exhibit additional effects resulting from epitaxial strain, reduced dimensionality, charge transfer, proximity effects, or phase competition and/or coupling across interfaces. This Focus Topic is dedicated to the investigation of advances in the understanding of electronic and magnetic properties of oxides thin films, heterostructures, superlattices, and nanostructures with an emphasis on growth, characterization, and theoretical modeling. Specific areas of interest include, but are not limited to ferromagnetic, antiferromagnetic, ferrimagnetic, and multiferroic materials. Topics to be discussed include growth of magnetic oxide materials, control of magnetic properties, domain structures, and dynamics with the growth process (i.e., epitaxial strain, interfaces, etc.), state-of-the-art techniques to probe and image different types of magnetic order in complex oxide thin films (including optical and electron-probes and neutron/synchrotron-based techniques), magneto-transport, and recent developments in theoretical

property simulation and materials-design approaches to magnetic oxide thin films, superlattices, and nanostructures. Note there is some overlap in topic with other DMP and GMAG focus sessions. As as a rule of thumb, if the magnetism plays a key role in the investigation or the properties observed, then the talk is appropriate for this session. The organizers of all of the related focus sessions will share information and work together with the March Meeting Program Committee to make an optimal meeting program.

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.
- Theoretical predictions and experimental discovery of half-metallic band structures, both in bulk solids and at the surfaces of thin films. Spin transport and magnetization dynamics in magnetic nanostructures (e.g. TMR, CPP-GMR and lateral spin valves) based on half-metallic materials.
- Effects of the spin-orbit interaction on steady-state and dynamical properties of nanostructures including: the (inverse) spin and anomalous Hall effects, microscopic mechanisms of magnetization damping, magnetic anisotropy manipulation by electric fields, and the effects of interface spin-orbit interaction.
- Ultrafast magnetization response to (and reversal by) intense laser pulses; magnetization dynamics at elevated temperatures and thermally assisted magnetization reversal.
- 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.

6.14.5 *Spin Dependent Phenomenain Semiconductors* (GMAG/DMP/FIAP)

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., oxides, silicon, diamond, graphene and organics), in semiconductor nanostructures (e.g., self-assembled and lithographically defined quantum dots, quantum wires and carbon nanotubes), and in hybrid ferromagnetic/semiconductor 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 ferromagnet/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.

6.14.6 *Frustrated and Low Dimensional Magnetism* (GMAG/DMP)

There is a robust framework for describing the low temperature structures, phase transitions, and excitations of conventional three dimensional magnetic materials. However, when fluctuations are enhanced by low dimensionality or competing interactions, qualitatively new behavior can emerge. This is well established in one and two dimensions where controlled theory and experiment have uncovered phases lacking long-range magnetic order but exhibiting novel statistical and quantum phenomena. Such phenomena include valence bond solids and various forms of spin liquid and spin ice phases. This Focus Topic solicits abstracts for presentations that explore both theoretical and experimental aspects of the field. Topics of interest include: low dimensional quantum magnetism, geometrical frustration and associated effects of quantum spin liquid and spin ice, magnetism in zero dimensions (e.g. quantum dots, single molecule magnets), order by disorder, the role of magnetoelastic coupling, quantum critical low dimensional spin systems, topological excitations, quantum tunneling of magnetization and novel field-induced behavior. Also of interest are the effects of strongly fluctuating spins on properties beyond magnetism including transport, thermal transport and ferroelectricity.

6.14.7 *Spin Dependent Physics in Organic-based Materials* (GMAG/DMP)

This focus topic is on spin transport and exchange in organic and molecular solids including all-carbon systems, transition-metal with and without organic radical systems, as well as π-conjugated polymeric systems. Research at the intersection of several forefront areas in condensed matter and material physics are of interest: spin injection at the inorganic to organic interface, the degree of spin polarization attainable by organic based solids, understanding and demonstrating the low Z attributes to spin transport including hyperfine interaction betweenthe electronic spin and nuclear magnetic moments, and novel forms of magnetic exchange that may be adapted to inorganic dilute magnetic semiconductors. Phenomena and materials of interest include hybrid ferromagnetic/organic structures, spin transport in graphene and carbon nanotubes, Kondo effect, spin qbits in diamond, quantum tunneling, triplet states and coherence in molecular nanomagnetics, organic magnetoresistance and magneto-electroluminescence, and all related topics.

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, magnetic semiconductors, negative resistance to achieve power gain, voltage control of the magnetization, and other novel mesoscopic structures. 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.

Upcoming Conferences (see http://aps.org/units/gmag/meetings/index.cfm)

ICMM-2010 — International Conference on Magnetic Materials
October 25-29, 2010

Asia-Pacific Data Storage Conference (APDSC'10)
October 27-29, 2010

Asia-Pacific Magnetic Recording Conference 2010 (APMRC2010)
November 10-12, 2010

55th Annual Conference on Magnetism and Magnetic Materials
November 14-18, 2010

2010 MRS Fall Meeting
November 30-December 2, 2010

Physical Phenomena in High Magnetic Fields VII
December 4-8, 2010

International Conference of the Asian Union of Magnetics Societies
December 5-8, 2010

International Conference on Quantum Effects in Solids of Today (I-ConQuEST)
December 20-23, 2010

38th Conference on the Physics & Chemistry of Surfaces & Interfaces
January 16-20, 2011

Aspen Winter Conference 2011: Contrasting Superconductivity of Pnictides and Cuprates
January 22-28, 2011

Fifth International Conference on Advanced Materials and Nanotechnology (AMN-5)
February 7-11, 2011

APS March Meeting 2011
March 21-25, 2011

Capri 2011 7th Capri Spring School on Transport in Nanostructures: Topological Insulators
April 10-17, 2011

8th International Conference on Computation in Electromagnetics
April 11-14, 2011

INTERMAG Conference
April 25-29, 2011

APS April Meeting 2011
April 30-May 3, 2011

12th International Conference on Muon Spin Rotation, Relaxation and Resonance
May 16-20, 2011

International Materials Research Congress (IMRC) 2011
August 14-18, 2011

Moscow International Symposium on Magnetism
August 21-25, 2011

Nanomaterials Symposia, European Materials Conference (EUROMAT 2011)
September 12-15, 2011

Soft Magnetic Materials 2011
September 18-22, 2011

56th Conference on Magnetism and Magnetic Materials
October 30-November 3, 2011

APS March Meeting 2012
February 27-March 2, 2012

APS April Meeting 2012
April 28-May 1, 2012