GMAG NEWSLETTER

A Focused Group within The American Physical Society

N^0 3, February 1998, Edited by R Bruce van Dover

GMAG - Looking to the future

My term as chair of GMAG is now drawing to a close. Carl Patton will be taking over as the new Chair at the March Meeting, but I will still be involved in a formal capacity for another year as the "Past Chair". I would like to take this final opportunity of thanking all of you within GMAG for your help and cooperation in making this such a successful year. I am pleased to have an acknowledged leader in the field like Carl take over as the new Chair. Carl and I have been working closely together over the last year to scope out future directions for the group, how we will make our presence felt during the APS Centenary Celebrations next year and on which areas of magnetism to focus attention.

As I look back over the last couple of years, first as Interim Chair while we struggled to establish this new entity, and then subsequently as elected Chair getting things moving, I have been truly impressed by the enormous efforts of so many of you in helping this new group grow strong. Particular thanks go to Bernie Argyle, Larry Bennett, Si Foner, Carl Patton, Larry Rubin, Marty Sablik and Bruce Van Dover. These efforts must have reflected the need that had existed for some time in the Society to represent magnetism in a more complete way. I know from discussion with many of you how strong the sentiment was to get the new group established. Perhaps this was because somehow magnetism seemed to be getting marginalized in physics in recent years. Well, now we're back! Magnetism is the hot topic, and the support from the industrial side has shown how critical this subject area and its derived technologies are.

And this is <u>your</u> group. It is your representation within our professional society as physicists working in magnetism. As a new group GMAG doesn't have too much inertia. In many respects being small is good. We can be more responsive to our members' needs, so that each individual member can have greater influence through this group than through some of the larger divisions. Your vote over the direction of GMAG is proportionately more important with us.

I was reminded again that until GMAG emerged many of us were uninvolved with APS, because the InterMag and MMM conferences provided the only regular forum for discussion of our subject.These are fine conferences which many of us attend regularly, and we should continue to do so because they have provided us with opportunities and professional contacts. We would like to further strengthen the involvement of APS with the MMM conference in particular and we are proposing that APS becomes a sponsor of the International Conference on Magnetism (ICM) which will be held next in Brazil in

the year 2000. Phil Wigen has graciously agreed to be our liason person with that conference. But still there was something missing before. Magnetism in its broadest meaning had somehow slipped below the event horizon in physics meetings here in the US. There were always condensed matter physics sessions which addressed certain aspects of magnetism, but this seemed to be only as far as the overlap would allow. Yet magnetism goes beyond the limits of traditional condensed matter physics, although there are clearly many areas of overlap; and applications of magnetism had decamped to the other societies. Well, now we're back!

Magnetism is clearly destined for a higher profile in physics research and teaching because of its obvious applications coupled to the new climate in education with its greater emphasis on doing something useful. Often we are put in an ambivalent position. What does it mean to be involved in applications of physics? The old question arises: is it somehow less valuable or intellectual than physics for its own sake? The clear answer is that applied physics problems are in general more complex than pure physics problems. They often come with additional constraints that can not just be swept aside by simply being able to change initial assumptions at will. To tackle some of these applied problems a physicist usually has to know the underlying physics at least as well (if not better), and then be able to take into account the other constraints. Are there any real boundaries between pure and applied physics? No, any boundaries are only of our own imagination, but as we look to the future we can be sure that the new opportunities in physics will emerge in those areas which have greater impact on society at large.

I was once asked what defines an "interesting" problem. Well, we all have our subjective viewpoints on this based on our personal preferences. But after thinking about his for a long while my response was that the more people whose lives are influenced by the solving of a problem the more "interesting" it is. This removes most of the subjectivity, and also makes us realize that the eventual use of our ideas by others is the measure of how "interesting" our work is. Isn't this ultimately what we seek - for our work to be recognized and used by others? Perhaps as physicists we should be careful not to try to separate the fundamental and applied aspects of our work. If there are more applications of magnetism so much the better - because that's where the future lies. We are well and truly back!

-David Jiles
gauss@ameslab.gov

From the incoming Chair—

It is an honor and a pleasure to become the GMAG Chair for 1998. I would like to publicly and enthusiastically thank David Jiles for his very effective leadership over the

past several years in getting our Topical Group on Magnetism and its Applications established under the auspices of the American Physical Society and moving GMAG forward as a viable unit. I, for one, have for many years lamented the lack of visibility of many aspects of magnetism and magnetic materials within the APS and at the March meeting. David saw the same issues and did something about them! The range of magnetics talks at the 1997 March meeting in Kansas City, the focus sessions and talks at the upcoming meeting in Los Angeles, and our participation in the plans for the Centennial meeting in March of 1999 in Atlanta illustrate GMAG's involvement.

My appreciation also goes out to Bernie Argyle, Bruce van Dover, Marty Sablik, Alison Chaiken, Si Foner, Bob O'Handley, Yaacov Shapira, Ron Goldfarb, Dave Sellmyer, Larry Rubin, and Larry Bennett for their work in helping GMAG to get off to a strong start.

Last year, as I watched GMAG take shape, Larry Rubin called to ask if I would stand for Chair for 1998. I was honored. I envision GMAG as a way to serve both the basic and the applied branches of the magnetics community from a new and useful vantage point. Before the founding of GMAG, I was never much involved in the APS. Along with many of our members, I participated mostly in activities of the IEEE Magnetics Society, including INTERMAG, and the Conference on Magnetism and Magnetic Materials. It has always been one of my goals to bring an awareness of the applied aspects of magnetics to MMM aficionados and an awareness of the basic aspects to Intermag devotees. The existence of GMAG within the framework of the APS, and the role it is beginning to play in the March meeting, makes it possible to extend this mission beyond the spheres of these two traditional bastions of magnetics.

I see my role as the Chair of GMAG for the next year in several ways: (1) to follow in David's footsteps and foster the continued and steady growth of the group; (2) to solicit broad support and participation of the membership in the program and activities of the Atlanta APS Centennial Year March meeting (more below on this); (3) to work with all of you to identify and bring fresh leadership into the group; and (4) to encourage those members with such interests to address the serious issues which face magnetics education (and other areas of science and engineering education). I welcome your ideas and your thoughts on these matters, and on any other issues which you believe should be our concern.

Longer term goals, as I presently see them, might involve a more effective liaison with the MMM and Intermag communities. We could become more involved in the nomination of APS Fellow candidates in the fields we represent. We could become more involved in the triennial International Congress on Magnetism. All of these things will happen as they need to happen, based on the growth of the membership, the evolution of the next generations of GMAG leadership, and the collective articulation of our mission as we move forward.

Right now, we are still relatively small. I would be delighted to hear from any of you with ideas and suggestions on the direction of the group. I would particularly like to hear

from you with ideas (and offers to help!) with two rather immediate matters: (1) A GMAG display booth as part of the APS Unit Centennial Displays for the 1999 Atlanta meeting. More information on this is contained in the article in this newsletter by Si Foner. WE NEED YOUR HELP AND YOUR IDEAS! (2) Suggestions for possible invited speakers, focus sessions, and special topics for the Atlanta meeting. In this area, I have always liked to work through consensus rather than unilateral decision making. Let us have your suggestions. These will be collected and circulated to the membership for comment and feedback, but the process needs to begin NOW.

My "coordinates" are: Professor Carl E. Patton
Department of Physics
Colorado State University
Fort Collins, CO 806523
TEL: (970) 491-5083 (office), (970) 223-6288 (home)
FAX: (970) 491-7947
E-MAIL: patton@lamar.colostate.edu

1999 Centennial Plans

The 1999 Centenary of the American Physical Society to be held in Atlanta in conjunction with the joint March and Spring APS Meetings will be held from March 20-26, 1999. Numerous events are scheduled during the Atlanta meeting, including an International Day on Saturday, March 20, a Moment of Discovery Day on March 21, Plenary Speakers, and Centenary Symposia developed by each APS unit. Year-long events are also planned for 1999. The Topical Group on Magnetism and Its Applications will have two Centenary Symposia at the Atlanta meeting; these talks should be tutorial and reflect the historical and technological developments of magnetism and magnetic materials. Suggestions for topics and speakers should be forwarded to the Chair of the Executive Committee. In addition there will be many special events developed for the Atlanta meeting including an exhibit on science. GMAG is planning to have an exhibit displayed during the meeting. Carl Patton has the responsibility for developing this display; if you have suggestions and/or can volunteer to help, contact Carl. A Speakers Booklet is being assembled by the APS with a group of more than 200 outstanding lecturers who will act as APS Centennial Speakers and give lectures of a general nature at colleges and Universities throughout the United States during the 1998-1999 academic year.

Meeting Report: Intermag/MMM

The 8th Joint Intermag-MMM Conference was held in San Francisco on Jan, 6-9, 1998 (Tues.-Fri.). In all, there were 48 oral sessions and 39 poster sessions. Special tutorial sessions on magnetic imaging and on magnetic storage were convened on Tuesday and Thursday evening. On Wednesday the conference reception comprised a sitdown dinner at a local restaurant located about 4 blocks walking distance from the Embarcadero Hyatt-Regency, which was the conference hotel.

I've been asked to present my impressions of the conference. It was of course physically impossible to be present at all the sessions so this reflects my personal perspective. I like to interact with others about their work, and enjoy the conversations at posters. I also in fact like to present my own work that way. I scan the talks mostly for what is directly related to my own work (which is a broad area) and go only to such talks, saving my time for poster interaction. With that caveat, here is what made an impression with me.

One oral session at which I did spend a lot of time was the one on Hysteresis Modeling. Many good talks were presented there. A second session which was essentially an extension of the one on Hysteresis Modeling was the one on Micromagnetic Modeling. In these sessions, a significant body of work pertained to that developed by Giorgio Bertotti and his group at the Galileo Ferraris national laboratory in Torino, Italy. Over the past year, Dr. Bertotti has found a way to relate the Preisach model to thermodynamics, and from that has constructed a new relaxation model of hysteresis, developed from ideas that the group previously generated on Barkhausen noise and domain wall motion. These ideas were presented in the hysteresis session. In the micromagnetic modeling session, Massimo Pasquale of Bertotti's group presented a paper which linked the new hysteresis model to the Jiles-Atherton hysteresis model. This is a significant step because it not only provides a physical picture for the Preisach model, but also now enables the Preisach model to be linked to phenomenological models that in the past have been described as physical (in contrast to the Preisach model, which in the past was described as mathematical). It was also significant that David Jiles was coauthor of the latter paper. In the poster sessions, there was yet another paper by the Galileo Ferraris group, relating the new model to thermal activation effects observed for hysteresis. It is a fortunate happenstance that Dr. Bertotti has been named Distinguished IEEE speaker on Magnetics for the coming year because many groups will now be made conversant with his new model and will come to appreciate the work he and his group has done. His new text (scheduled for 1998 publication) ought to be quite valuable.

Two other presentations on hysteresis that caught my attention were the poster papers CQ-04 and FQ-02. In CQ-04, by J.Pearson and P.T. Squire, measurements of irreversible magnetization changes were made as a function of applied field and stress magnitude. Two contributions driving the changes were identified. At low tensile stress, a contribution proportional to the field derivative of the magnetostriction was identified (first found by Pravdin); at higher stresses, wall pinning was dominant and the changes were found to be proportional to the difference between the anhysteretic magnetization and the initial magnetization, in a manner somewhat similar to the Jiles-Atherton model. It will be important to compare these findings to the models presently available for describing such changes. In FQ-02, Francoise Liorzou, with Y. Yu and D.L. Atherton as co-authors, presented experimental measurements of the magnetostriction components along three orthogonal axes in a magnetized material.

There of course were many other papers in many other areas of magnetism that were significant. In the future, it is my suggestion that at conferences other than the APS meeting, where it is possible to summarize the various sessions (because there are fewer

of them), that we invite different persons to present their impressions of each conference in the GMAG newsletter.

—Marty Sablik
marty@espsun.space.swri.edu

Editors note: I think Marty's suggestion of meeting reports is a great one. These would be explicitly personal perspectives, with the aim of being interesting and stimulating, but with no expectation of comprehensiveness. If you would like to prepare a few hundred words reporting on a magnetism conference, please email or phone me and we can work together.

—R. Bruce van Dover
rbvd@bell-labs.com

1997 Business Meeting

Here are some photos (shot by Marty Sablik) from the dinner at the Savoy Grill held after the 1997 Business Meeting in Kansas City. A good time was had by all! Members are welcome to come to the dinner to be held after this year's business meeting in Los Angeles. Come and join us!

left to right: Peggy Hill, Jeff Lynn, Lance Miller, Jeanne Pernicka, Carl Patton

left to right: Mark Novotny, Bruce van Dover, David Jiles, Larry Rubin, Joe Budnick, Dave Sellmyer

---

APS March Meeting
March 16-20, 1998

Los Angeles, CA
GMAG Sessions

Monday March 16

A1: Magnetism at the nanoscale, (5 inv.), Chair: Puru Jena 8:00, Room 502A

C16: Colossal magnetoresistance: theory and calculation, Chair: Jeff Byers 11:00, Room 406B

E16: Tunneling magnetoresistance I, (1 inv.), Chair: John Snyder 14:30,Room 406B

Tuesday March 17

G16: Tunneling magnetoresistance II, (1 inv.), Chair: Phil Trouilloud) 8:00, Room 406B

I16: Properties of doped lanthanum manganites, (2 inv.), Chair: Valerie Browning 11:00, Room 406B

K1: Spin polarized transport in magnetic heterostructures, (5 inv.), Chair: David Awschalom 14:30, Room 502A

K16: Magnetic measurements, Chair: Dan Dahlberg 14:30, Room 406B

Wednesday March 18

M16: New developments in magnetic measurements, (2 inv.), Chair: Carl Patton 8:00, Room 406B

O6: Magnetic measurement techniques using force methods, (5 inv.), Chair: Larry Rubin, 11:00, Room 408 B

Q5: Magnetocaloric effect and magnetic refrigeration, (5 inv.), Chair: Karl Gschneidner, 14:30, Room 408A

2A: GMAG Business meeting, Chair: David Jiles 17:30, Room 408A

Thursday March 19

S16: Magnetic modeling, Chair: Sitaram Jaswal 8:00, Room 406B

U16: Rare Earth Transition metal alloys, Chair: George Hadjipanayis 11:00,Room 406B

W16: Spin glasses and frustrated moment systems, Chair: Derek Walton 14:30, Room 406B

Friday March 20

X16: Magnetooptics, Chair: Roger Kirby 8:00, Room 406B

Y16: Magnetic materials, Chair: Conrad Williams 11:00, Room 406B

GMAG Officers

Chair Executive Committee (Term ends March xxxx)

David Jiles *gauss@ameslab.gov*
Alison Chaikin (1998) a*lison@wsrcc.com, http://www.wsrcc.com/alison/*

Chair-Elect Simon Foner (1998) *sfoner@slipknot.mit.edu*

Carl Patton *patton@lamar.colostate.edu*
Robert O'Handley (1999) *bobohand@athena.mit.edu*

Yaakov Shapira (1999) *shapira@slipknot.mit.edu*

Vice-Chair Ron Goldfarb (2000) *goldfarb@boulder.nist.gov*

Bernie Argyle *argyle@watson.ibm.com*
David Sellmyer (2000) *cmra@ulinfor.unl.edu*

Secretary-Treasurer

Bruce van Dover *rbvd@bell-labs.com*

Committee Chairs

Larry Rubin, Nominating Committee *lrubin@slipknot.mit.edu*

Lawrence Bennett, Program Committee (1998 March Meeting) *larry@nist.gov*

Bernie Argyle, Fellowship Committee *argyle@watson.ibm.com*

1998 Elections

following is the 1998 election slate

Vice-Chair:

Lawrence Bennett, NIST; George Washington University

James Tobin, Lawrence Livermore Laboratory

Executive Committee (3 yr. term) (elect 2)

Brad Dodrill, Lake Shore Cryotronics
Jagadeesh Moodera, MIT
Martin Sablik, Southwest Research Institute
Philip Wigen, Ohio State University

(Note that there was a typographical error on the ballots: the executive committee terms are for 3 years, not 1 year.)