

IEEE Magnetics Society Newsletter

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John Nyenhuis and Richard Dee, Editors

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Magnetics Society Officers for 2000

For 2000, the President of the Magnetics Society is Prof. Edward Della Torre, Electrical and Computer Engineering Department, George Washington University, Washington, DC 20052 USA. The Administrative Committee (ADCOM) elected new members. The new chair of the Technical Committee is Hans J. Richter of Seagate. He has rejuvenated the Technical committee with several new members. Can Korman of George Washington University is the new chair of the Education Committee. A listing of Magnetics Society Officers and Technical Committee Chairs is below.

President: Edward Della Torre dellator@seas.gwu.edu
Vice President: Robert Fontana, Jr. fontana@almaden.ibm.com
Secretary/Treasurer: Ron Indeck rsi@ee.wustl.edu
Past President: Daniel D. Stancil stancil@gauss.ece.cmu.edu

• Elected Administrative Committee Members

Terms Expire 31 December 2000

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E.D. Dahlberg

R. Gerber
R.S. Indeck
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Terms Expire 31 December 2001

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K. Mohri
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P. Wigen

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IEEE US Activities Board: C.E. Johnson and A.B. Smith

Technical Committee Chairs

R. Schaefer	IFW-Dresden	schaefer@ifw-dresden.de	Magnetic Imaging
Shoogo Ueno	University of Tokyo	ueno@medes.m.u-tokyo.ac.jp	Biomagnetism
Ryusuke Hasegawa	Allied Signal Inc.	Ryusuke.hasegawa@alliedsignal.com	Soft Magnetic Materials
Bruce Gurney	Almaden Research Center	gurney@almaden.ibm.com	Magnetic Recording Heads, Multilayers, GMR
Richard Josephs	Innovative Instruments Inc.	rjosephs@innovinst.com	Magnetic Measurements
Lawrence Bennett	George Washington University	lbennett@seas.gwu.edu	Magneto-Optics
Kevin O'Grady	University of Bangor	ogrady@sees.bangor.ac.uk	Magnetic Materials
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Herbert Leupold	Army Research Laboratory	hh3416@exmail.usma.army.mil	Permanent Magnets, Electromagnetics
Manfred Schabes	IBM	manfred@almaden.ibm.com	Micromagnetics
Ken Johnson	MMC Technology USA	KenJohnson@MMCTechnology.com	Magnetic Media

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IEEE Magnetics Society Distinguished Lecturers for 2000-2001

Perpendicular Magnetic Recording: Beyond 100 to 1000 Gigabits per Square Inch

Jack H. Judy
University of Minnesota



The challenges facing perpendicular magnetic recording beyond an incredibly high areal density of 100 to 1000 gigabits/in² are to achieve high thermal stability with high signal amplitude and high media signal-to-noise ratio for low bit-error rate. Meeting these challenges will require double-layer, 50 to 25 nm thick media with extremely uniform magnetic clusters, 10 to 5 nm in diameter; a low-noise magnetic underlayer with high saturation flux density of 10 to 20 kG and permeability of 100 to 50; average surface roughness of 0.2 to 0.1 nm; remanent magnetization of 200 to 400 emu/cm³; unity squareness without any demagnetizing field correction; and remanent coercivity of 5 to 10 kOe. Such media will be written with sub-nanosecond rise times of 0.5 to 0.25 ns using a microstrip, single-turn, perpendicular-pole head, and read with a 10 to 20 percent giant magnetoresistance spin-valve head. The lecture will review the physics and development of perpendicular and longitudinal magnetic recording. The key problems encountered in the development of each will be discussed. In particular, the fundamental differences and limitations imposed by recorded bit demagnetizing fields; superparamagnetic, thermally-activated time decay of remanent magnetization; crystalline and superlattice multilayer surface magnetic anisotropies; grain size distribution; and media bit, transition, and track-edge noise will be illustrated with experimental data and micromagnetics simulations. A storage roadmap will be used to show how perpendicular magnetic recording may be able to achieve an areal density of 1 terabit/in² by 2005.

Jack H. Judy received the S.B., S.M., and E.E. degrees in electrical engineering from the Massachusetts Institute of Technology in 1957, 1959, and 1961, respectively, and the Ph.D. degree from the University of Minnesota in 1965. He worked on a magnetic thin film memory in the IBM Systems Development Laboratory, Poughkeepsie, New York, and on a magneto-optical recording system in the IBM Advanced Technology Laboratory, Boulder, Colorado. Since 1969, he has been with the Department of Electrical Engineering at the University of Minnesota, becoming a full Professor in 1979. He has directed research on magneto-optics of soft magnetic films and experimental studies of the micromagnetics of bit transitions of digital magnetic recording in high-coercivity thin film media. In 1984, he established The Center for Micromagnetics and Information Technologies at the University of Minnesota. He has published over 200 papers on magnetic information storage technology. Dr. Judy is a Senior Member of the IEEE.

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Magnetization Processes and Microstructure in Modern Magnetic Materials

Helmut F. Kronmueller
Max Planck Institut fuer Metallforschung



Improvements in materials synthesis and microstructure analysis have resulted in materials with outstanding magnetic properties. Successful products of interdisciplinary collaboration include materials with very high permeability, supermagnets with coercivities above 2 T and remanences over 1.5 T, and improved giant magnetostrictive and giant magnetoresistive materials. The theory of micromagnetism has become a basic requisite for the development of these materials. In particular, during the last decade, computational micromagnetism has made significant progress in the calculation of spin structures and magnetization processes in small particles, thin platelets, and ensembles of grains. Spin structures and magnetization processes are determined by the interplay among particle dimensions, microstructures, and three characteristic lengths, functions of dipolar energy, magnetocrystalline energy, and magnetostatic energy.

The differences between soft and hard magnetic materials will be discussed for examples relevant to permanent magnets, recording media, and magnetic sensors. The stability boundaries between single-domain particles and multi-domain states, as well as their intrinsic coercive fields for the reversal of magnetization, will be described. In real materials, the coercive field obeys a universal relation, $H_c \propto \sqrt{K}$, where H_c and K correspond to microstructural parameters that describe modifications of the ideal nucleation fields in nanocrystalline, microcrystalline, granular, and thin-film materials. Whereas magnetic states are determined by the minimum of the magnetic Gibbs free energy in static problems, the Landau-Lifshitz-Gilbert equation with damping has to be solved in dynamic problems. Examples of dynamic demagnetization processes for spherical particles will be given, showing that the time dependence of the thermally activated reversal of magnetization follows a Weibull distribution.

Helmut Kronmueller received the Dr. rer. nat. degree in 1958 from the Technische Hochschule, Stuttgart, Germany. In 1968 he became lecturer, and in 1974 professor, in physics at the University of Stuttgart. In 1970 he was appointed Member of the Board at the Max Planck Institute of Metals Research, Stuttgart. Since 1987 he has been Director of the Institute. He was awarded the Physics Prize of the Deutsche Physikalische Gesellschaft in 1968 and the Heyn-Denkmenze of the Deutschen Gesellschaft fuer Materialkunde in 1992. His main research interests are the relations between the microstructure and the properties of magnetic and superconducting materials and the application of adaptive finite-element computational micromagnetism to magnetization processes.

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Consideration of the Spherical Cow: The Realities of Magnetodynamics in an Imperfect World

Thomas J. Silva
National Institute of Standards and Technology



The topic of magnetodynamics is once again the subject of intense interest in anticipation of ultrafast disk drives and magnetic random access memories. Theoretical consideration of the problem has often started with rather broad approximations that lead to sweeping generalizations. These approximations often include assumptions of sample uniformity, idealized geometries such as the ellipsoid, and the applicability of phenomenological parameters such as the gyromagnetic damping constant. However, recent experimental evidence argues for a more rigorous treatment of the problem, one that includes effects due to imperfect sample structure, finite size, and anharmonic energetics. Results suggest that sample imperfections play more of a role than mere perturbations in high speed magnetic switching. As most practical devices rely on polycrystalline alloys abounding with structural defects and non-ellipsoidal geometries, the need to understand magnetodynamics under such "imperfect" conditions is all the more urgent. Much of these new data rely on novel experimental methods that allow the researcher to delve further into the details of the magnetic reversal process. I will review some of the latest work in this field and how it is affecting our understanding of fast magnetic response, including some description of the techniques in question and their relative strengths and weaknesses. Topics will include quantitative Kerr microscopy, time-resolved linear and nonlinear magneto-optics, inductive sampling, and high speed switching in spin-valves.

Tom Silva received the B.S. degree in engineering science from the University of California at Berkeley in 1987 and the Ph.D. in electrical engineering (applied physics) from University of California at San Diego in 1994. He has been a National Research Council Postdoctoral Associate and then a research physicist at the National Institute of Standards and Technology in Boulder, CO, working on near-field optical microscopy and time-resolved nonlinear magneto-optic measurements. In 1997, he received a Presidential Early Career Award for Science and Engineering. He currently leads a program to study the fundamental limits to data rate for the magnetic recording channel. He has published 25 papers in near-field and nonlinear magneto-optics, time-resolved magnetometry, magnetodynamics, and magnetic viscosity.

Dr. Silva is a member of the IEEE, the American Physical Society, and the Optical Society of America.

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In Memory of Alex Hubert

Professor Alex Hubert died on February 16, 1999 on the South Erlangen campus of the Friedrich-Alexander-Universität Erlangen-Nürnberg, suffering a fatal heart attack during the lunch hour. We have lost an outstanding scientist who has made significant contributions to the understanding of magnetic structures and their technical implications.

Alex Hubert was born on May 14, 1938 in Darmstadt. His father, Alois Hubert, was an engineer. Alex received his high school diploma in Leverkusen and became a physics student at the University of Bonn in 1957. He moved to the University of Munich where he received his diploma in physics in 1962. He continued his studies in Munich under the direction of Professor Jakob Kranz, completing his doctoral studies in 1964 with the dissertation "Zur Analyse der magnetischen Bereichsstrukturen des Eisens" (On the analysis of magnetic domain structures in iron).

I first met Alex Hubert during a visit to Munich, then one of the centers of research in magnetism in Germany at both universities and at the Siemens Research Laboratory. This first encounter started a long friendship which later, after we married and had children, included both of our families. At the time of my visit, reprints of Alex's first publication had just become available: J. Kranz and A. Hubert "Die Moeglichkeiten der Kerrtechnik zur Beobachtung magnetischer Bereiche [The potential of the Kerr technique for observing magnetic domains], Z. angew. Phys. 15, 220- 232 (1963), which prominently graces my extensive library of important reprints. After two years as an assistant in Dr. Kranz's laboratory, two important events took place in Alex Hubert's life in 1966. He married Heidemarie Fiedler in Ottobeuren and he accepted a position as scientific collaborator at the Max-Planck-Institute fur Metallforschung in Stuttgart, in the Physics Department, directed by Professor Alfred Seeger. Among his many distinguished colleagues were Helmut Kronmüller, as well as Takao Suzuki who held a post-doctoral position at the same institute.

In 1973/74 Alex Hubert was a guest scientist at the Thomas J. Watson IBM Research Laboratory in Yorktown Heights. He wrote his "Habilitationsschrift" (a dissertation written to qualify for an academic career in Germany) on the "Theory of Domain Walls in Ordered Media" in 1974 – it was published by Springer. (A. Hubert " Theorie der Domaenenwande in geordneten Medien", 386 pages [Springer, Berlin-Heidelberg-New York, 1974].)

In 1975 Alex Hubert accepted a position in Materials Sciences as an assistant professor (Akademischer Rat and Privatdozent) at the University of Erlangen-Nürnberg, advancing to the position of Professor in 1983. In 1981, he again spent six months with IBM Research in Yorktown Heights.

Alex Hubert was not only an outstanding scientist but also took his obligations as an educator very seriously, including activities in the faculty management of the affairs of the university. At the time of his death, he was a member of the Senate of the university, Head of the examining committee of the technical faculty, headed a study group in material science education, to name just a few of his university activities. Alex Hubert set an outstanding example of a top scientist taking on an unusually large share of the more mundane but equally important duties of an educator.

In 1986, Alex Hubert was a guest professor for six months at Carnegie Mellon University. He also spent sabbatical semesters at the Institute for Physikalische Hochtechnologie in Jena in 1991 and at the IFW (Institut fur Festkoerper- und Werkstofforschung) in Dresden 1996/1997.

It will not be possible to do full justice to his numerous scientific contributions in the short space allotted here. His first paper, cited above, has remained an important reference on the enhancement of the Kerr effect in magneto-optic observation. The method described to obtain improved contrast in domain observations is also employed in Faraday effect observations and remains an important technique applied in magneto-optic memory applications. Alex Hubert continuously perfected domain observation techniques, which became a major tool in his investigations of magnetic domain and wall structures. His studies of magnetic domain and wall structures ranged from bulk materials to single and multilayer thin films. He was an early pioneer in the use of numerical micromagnetic calculations made possible by the availability of modern computers. His calculations provided magnetization models which he was able to verify experimentally with the tools of domain and wall observation that he perfected.

Alex Hubert has been an author or co-author of 145 publications, many of them invited. The many students who obtained their doctorate under his guidance bear witness to his genius as a magnetician and educator.

In 1998, Hubert published a book on which he devoted many years of his life. I recall discussions with him on the early chapters in the 1980s. One of his former students, Rudolf Schäfer, collaborated with him in the production of "Magnetic Domains: The Analyses of Magnetic Microstructures". The book is truly outstanding. It is a most thorough, carefully researched work on this subject in the entire literature of magnetism. Not long before his death, in an exchange of e-mail with me, Alex was already considering a "second edition" with additional material (or a sequel). Needless to say, Alex frequently presented papers and contributed discussions at national and international conferences, which always displayed his extraordinarily thorough knowledge of the subject and his insight into all the

details of the physical phenomena. At the St. Paul Intermag Conference in 1985, I was able to organize a special evening session on behalf of the education committee of the IEEE Magnetic Society dealing with domain observations in which the principal speakers were Alex Hubert and Bernell Argyle. It was the first time that some of Alex's early works (published in German) were presented in North America.

With the untimely death of Alex Hubert, the international magnetics community has lost one of its most distinguished members and I have lost not only a colleague who was often able to guide me through difficult concepts in domain and wall structure but also a good friend. Our deepest sympathy goes to his widow, Heidemarie, his daughters, Barbara, Eva (Dumsky) and family, Birgit, and his son, Christian.

F. J. Friedlaender with acknowledgement to Helmut Kronmüller for his help.

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TMRC '99 Conference Report

The 10th annual TMRC conference was held August 9-11, 1999, on the campus of the University of California, San Diego (UCSD) and was chaired by Ken Johnson. The sole topic of this year's conference was media. Thirty-seven invited papers were presented in six sessions. The topics covered were 100 Gb/in² and Beyond, Media and Microstructure, Recording Physics, Tribology, High Data Rate and High RPM issues, and finally Tape and Optical Assisted Recording. This TMRC marked the third time the conference has focused on media related issues. Areal density capability is always a topic of much interest and this TMRC was no exception. Seagate presented details on a 16 Gb/in² areal density demonstration, and HMT/ReadRite showed data on a 26 Gb/in² demonstration in the poster session.

The poster sessions contained all the invited talks as well as selected work from other contributors with an emphasis on student presentations. Dr. Tu Chen, Chairman of the Board of Komag Inc., gave a special luncheon keynote speech entitled "The Evolution of Magnetic Film Disks: Past, Present, and Future." The conference reception was held at the Aerospace Museum in Balboa Park, San Diego.

TMRC '99 marked the first "all electronic" Magnetics Society conference. Author instructions, digests, reviews, and final manuscripts were handled completely by e-mail, Internet web page access, and diskette. The refereed articles will be published in the January 2000 version of IEEE Transactions on Magnetics.

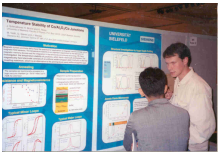
MMMM '99 Conference Report

The 44th Annual Conference on Magnetism & Magnetic Materials was held at the Fairmont Hotel in San Jose, California on Sunday through Thursday, November 14-18, 1999. The MMM conference is held annually to allow the international scientific and engineering community to present and learn about recent developments in fundamental and applied magnetism. The conference included nearly 1000 invited and contributed papers given in 95 oral sessions, poster sessions and invited symposia. Three special evening sessions were held, "Magnetism and Living Systems" held Sunday evening before the main body of the conference, "Tutorial on Challenges in Magnetic Recording" on Monday evening, and "Symposium on Imaging and Magnetic Reversal" on Wednesday evening.

In addition to the scientific program, attendees contacted vendors in an exhibit of services, equipment, materials, software and books from a variety of companies that was held adjacent to the poster sessions. In the same area, attendees gathered for the morning coffee service and the late afternoon bierstube. The conference social event was a reception at the Tech Museum of Innovation, held Tuesday evening.

The conference was sponsored jointly by the American Institute of Physics and the Magnetics Society of the IEEE with cooperation from the Minerals, Metals and Materials Society and the American Ceramic Society with contributions from Motorola Labs, EMTEC Magnetics GMBH, Hewlett-Packard, Imation, TDK Corp., Toda Kogyo Corp., NEC Corp., Quantum, Komag, Lake Shore Cryotronics, Inc., Innovative Instrumentation and San Diego Magnetics.

The next MMM conference will be held jointly with the INTERMAG conference at the San Antonio Marriott Rivercenter in San Antonio, Texas, USA, January 7-11, 2001.



An interesting and colorful poster presentation at MMM 99.



The majestic San Jose Fairmont Hotel, where MMM 99 was held.



Conference attendees experimented with the exhibits at the San Jose Tech Museum.

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History and Significance of the IEEE Logo



The Institute of Electrical and Electronic Engineers, pars pro toto, "The Institute" is also warmly known to its members as aye-tripple-ee: IEEE. The beginnings of this organization date back to 1884 as the AIEE, the American Institute of Electrical Engineers. In 1963 the AIEE and the Institute of Radio Engineers, IRE, which had existed since 1912 merged. Because these two groups had a large number of members in common, they had come to realize that their general interests in electrical and electronic engineering lay together. So those common members joined forces to form the IEEE, with the determination to make it the premier scientific and educational organization. Such is the vision of IEEE: to advance global prosperity by fostering technological innovation, enabling members' careers and promoting community worldwide. Since the merger, electrical engineering has proven to be the learned profession at the forefront in most, if not all, modern technological development. The breath of the technologies involve are represented by 37 societies of IEEE. These technologies have proliferated into every facet of human endeavor and are largely responsible for the quality of life enjoyed in the world today. As the breath of these technologies from nuclear and oceanic science to computer hardware and software is viewed, it seems quite distant to remember the work of Faraday, Maxwell, Gauss, Heaviside, Joule, Ohm, Ampere, Volta, Watt, Weber, Tesla, Marconi and the other 19th century founders of this profession. However, that all may know, we celebrate the work of these founders symbolically in the logo of IEEE.

When the founding organizations were joined in 1963 there was considerable effort expended to unify and simplify logos of these organizations while at the same time retaining their historical significance. The result of this work is the IEEE logo that we know today. It is the symbol we often refer to in familiar terms as the kite and right-hand rule. And symbolic it is:

A committee headed by Alexander Graham Bell in 1893 designed the AIEE's first logo. It was a kite shaped badge with a periphery marked by a coil of gold wire. The midpoints were spanned by a galvanometer complete with a blued steel needle on an amber disk. In 1897 another AIEE logo was developed using two linked circles to describe the relationship between the electric and magnetic fields. In 1912 the IRE logo was developed using a triangle and arrows to represent these same electrical and magnetic forces using the configuration of the right-hand rule.

The use of the right-hand rule in the IEEE logo captures, in simplistic terms, the great mathematical foundations of the profession as described in Maxwell's Equations. The right-hand rule is symbolic of the mathematical relationship between the electric and magnetic fields. It serves as a reminder that electrical engineering, and the technologies that flow from it, are based on the calculus and higher orders of mathematics as would be expected of a learned profession.

In a similar manner the kite, as found in the original logo of the AIEE, represents the kite used by Benjamin Franklin when he discovered electricity in lightning. So the kite immortalizes discovery as an essential element of the engineering profession. One is immediately drawn to the effort expended by Edison as he tried filament after filament leading to the discovery of the incandescent lamp. Today, discovery remains the essential tool of a technologist. The kite represents discovery just as Edison's work provides us a definitive example of the discovery process.

The IEEE kite logo is shown without the tail and in a symmetrical diamond form. The geometry of diamond shaped kite with its right-hand rule can also be viewed as a stylized form of the Wheatstone bridge. It has been said that this bridge with its galvanometer also depicts the earliest observation of electrical phenomena by Thales, and the source of the word electricity. The bridge is used as a precise measurement tool. Folklore surrounding the Wheatstone bridge reminds us that the linemen of yesteryear used it to predict the location of a break in a telegraph line to within the distance between two poles. And further, they would often bet coffee on which pole the break was closest to. Hence, the diamond symmetry of the IEEE logo represents the technologist's use of precision instrumentation and exact measurement as indispensable tools of the profession.

The logo of the IEEE serves as a reminder to our diverse membership, that today, we but stand on the shoulders of the giants who founded our profession. As part of the master brand of IEEE, the logo serves as a reminder of the underlying unity of the technologies that have flooded to fill the world as the result of the practice of electrical and electronic engineering. Transcending language, this symbol has become known worldwide. It is expressive of those engineering tools that will continue to be used to foster technological innovation: advanced mathematics, measurement, instrumentation, and discovery. And in the end, providence willing, this logo will represent the engineers, scientists and technologists who will be known for promoting community worldwide.

Written by
W. Cleon Anderson
Director, Region 6

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Book Announcement: Introduction to Magnetism and Magnetic Recording

A new book, "Introduction to Magnetism and Magnetic Recording" by Prof. R. Lawrence Comstock of San Jose State University is now available. Prof. Comstock is well-known in the magnetic recording community in part for being co-author with M.L. Williams on the seminal paper "An Analytical Model of the Write Process in Digital Magnetic Recording", AIP Conf. Proc., Part 1, no. 5, 1971, pp. 738-742. (Magnetic recording has come a long way since 1971!)

This book serves as an introduction to the physics and materials science of magnetism together with an up-to-date coverage of digital magnetic recording fundamentals, components and systems. Theory and applications are covered as well as fabrication of components. Key topics include:

- The ferromagnetism of the transition metals
- Antiferromagnetism and ferrimagnetism
- Magnetic anisotropies and magnetostriction
- Properties of ferromagnetic thin films
- The fundamentals of digital magnetic recording technology
- Magnetic recording heads, including magnetoresistive and giant magnetoresistive heads
- Thin film recording media
- Magneto-optical recording

The book can be ordered through www.wiley.com/electrical or amazon.com. The ISBN number is 0-471-31714-4.

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Intermag '2000 to be held April 9-13, 2000 in Toronto, Canada

The 2000 International Magnetics Conference (INTERMAG 2000) will be held at the Royal York Hotel in Toronto, Canada, from Sunday, April 9, through Thursday, April 13, 2000. The program committee has assembled an interesting and eclectic program of contributed and invited papers and the Advance Program Book will be available in early February. All members of the Magnetics Society should be on the mailing list for the Advance Program Book.

There will be an active schedule of evening events at Intermag 2000.

There will be a tutorial session entitled "From East to West: 2000 Years of Magnetism on Monday evening, April 10 from 8:00 - 10:00 pm. This session is sponsored by the IEEE Magnetics Society Education Committee and it is chaired by Profs. Martha Pardavi-Horvath and Can Korman from The George Washington University. A distinguished group of speakers from East to West will trace the historical development of magnetism from the ancient Orient to the Western world. The tutorial will be of interest to everyone involved in magnetism, from the beginning student to the seasoned specialist.

The Social Evening on Tuesday, April 11, will feature a dinner to be served in the elegant Concert Hall of the Royal York. Prior to the dinner, attendees will be able to meet colleagues in the Concert Hall Foyer for drinks and conversation. This will be a cash bar. The dinner itself will conclude with a dessert buffet that will again afford attendees the opportunity to mingle with colleagues. Tickets for the Social Evening are \$45 US per person and can be ordered in advance when pre-registering. Tickets will also be available on site at the Registration Desk until Monday evening.

On Wednesday, April 12, from 8:00 - 10:00 pm, there will be a special workshop on New Directions in Preisach Modeling. It is chaired by Prof. Larry Bennett from The George Washington University. The purpose of this workshop is to evaluate and elaborate on the recent advances on the Preisach modeling of magnetic materials and to discuss the most fruitful directions for future work. The following topics will be emphasized:

1. Preisach modeling and micromagnetics.
2. A proposal for a standard problem (a model system).
3. Preisach modeling in the marketplace.
4. Magnetic aftereffect.

Complete details regarding hotel reservations, conference registration fees and the necessary forms will be available both in the Advance Program and on the conference web site at <http://www.intermagconference.com>. The deadline for advance registration at reduced fees (\$400 for IEEE Member, \$500 for non-member) is March 20. The deadline for advance room reservations at the Royal York Hotel is March 1. Room rates start at \$185 CANADIAN.

See <http://yara.ecn.purdue.edu/~smag/Smag/smagjoin.html> for information on how to join the IEEE and save on conference registration.)

For additional information please contact:

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TMRC 2000 to be held August 14-16, 2000 in Santa Clara, California

The eleventh Magnetic Recording Conference (TMRC 2000) will be held August 14-16, 2000 at the Institute on Information Storage Technology of the Santa Clara University, Santa Clara, CA.

TMRC 2000 will focus on SIGNAL PROCESSING for MAGNETIC RECORDING. This includes hard disk, magneto-optic and tape systems. About thirty papers of the highest quality will be orally presented and subsequently considered for publication in the IEEE Transactions on Magnetics. (Selected speakers are expected to submit manuscripts.) The topics to be presented include:

Equalization, detection, and timing
Data rate and implementation issues (including head-to-preamp interconnection)
Coding and iterative detection
Channels with DC-response (vertical and magneto-optical recording)
Channel characterization (experimental)
Other codes (ECC, trellis, etc.)
Signal processing for servo

Speaker nominations should be sent, preferably by e-mail, to bob_swanson@notes.seagate.com before FEBRUARY 29, 2000; and should contain the nominee's name, the topic, reason for nomination, and contact information.

For the most current information on TMRC 2000, please visit [href=http://www.iist.scu.edu](http://www.iist.scu.edu)

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About the Newsletter

The objective of the IEEE Magnetics Society Newsletter is to publicize activities, conferences, workshops and other information of interest to the Society membership and technical people in the general area of applied magnetics. Copy is solicited from the Magnetics Society membership, organizers of conferences, officers of the Society and local chapters and other individuals with relevant material. The Magnetics Society Newsletter is published approximately four times a year at the [Magnetics IEEE Magnetics Society Web Page](#).

Please send articles, letters and other contributions to one of the co-editors:

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CEFC 2000 to be Held June 4-7 in Milwaukee

The Ninth Biennial IEEE Conference on Electromagnetic Field Computation (CEFC) will be held at the Hyatt Regency Hotel, Milwaukee, Wisconsin, USA, during June 4-7, 2000. The last Conference was held in Tucson Arizona, USA in 1998. The aims of the IEEE CEFC are to present the latest developments in modeling and simulation methodologies for analysis of electromagnetic field and wave interactions, with the application emphasis being on the computer-aided design of low and high frequency devices, components and systems. The Conference will feature oral and poster presentations.

For information, visit the conference web site or <http://cefc2k.aln.fiu.edu> or contact:

CEFC'2000-Secretariat
Florida International University
College of Engineering
10555 W. Flagler Street
Miami, FL 33174, USA
E-mail: cefc2k@aln.fiu.edu

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ICM 2000 to be held August 6-11 in Recife, Brazil

The International Conference on Magnetism (ICM) belongs to a series of triennial conferences held under the auspices of the International Union for Pure and Applied Physics (IUPAP). The most recent conferences were held in Cairns (1997), Warsaw (1994), Edinburgh (1991), Paris (1988), San Francisco (1985) and Kyoto (1982). In the year 2000, ICM will be held in Brazil. The main conference will take place in Recife, on the Northeastern coast of Brazil, from Sunday, August 6, until Friday, August 11, Incorporating the Symposium on Strongly Correlated Electron Systems (SCES 2000).

Satellite conferences and workshops will be held in Campinas, Rio de Janeiro, Belo Horizonte and Natal. Members of the international scientific and engineering communities are invited to attend ICM2000 and the satellite meetings and contribute to their technical sessions. Detailed information about the satellite conferences are available on their web sites, which can be reached through the ICM site.

ICM is designed to bring together the international community of scientists and engineers interested in recent developments in all branches of fundamental and applied magnetism, as well as to provide a forum for the presentation and discussion of new concepts, properties and developments in materials research and magnetic applications. In addition to the contributed oral and poster presentations, there will be plenary lectures, invited talks and symposia. To celebrate the turn of the century, some sessions will be devoted to reviewing the progress made in magnetism and its applications during the twentieth century and to discuss what can be expected in the near future.

For more information, visit the conference web site at <http://www.icm2000.org.br> or contact:

ICM2000 Conference Secretariat
Departamento de Fisica
Universidade Federal de Pernambuco
50 670-901, Recife, PE, Brazil
Phone/Fax: +55 (81) 271.8456
icm2000@df.ufpe.br

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Conference on Finite Elements for Microwave Engineering to be held June 8-9 in Boston

The 5th Finite Elements Workshop for Microwave Engineering will be organized by Electrical and Computer Engineering Department, Worcester Polytechnic Institute in cooperation with University of Florence, Italy and will be held on June 8-9, 2000 at John Hancock Conference Center, Boston, Massachusetts, U.S.A. The workshop provides an international forum for reporting and discussing recent progresses and advances in the finite element technologies for microwave engineering. The details of the workshop can be found in <http://ece.wpi.edu/~jinlee>

ONE-PAGE ABSTRACT MUST BE RECEIVED BY FEBRUARY 1, 2000 Authors are invited to submit an original (camera-ready) one-page abstract of no less than 250 words. The abstract should explain clearly the content and

relevance of the proposed contribution. No acknowledgments should be included. Your cover letter should include the complete mailing address, telephone, fax number, and e-mail address (if available) for the corresponding author. Please mail abstracts - do not send via facsimile. The abstract deadline is February 1, 2000.

The abstract should be submitted to Prof. Lee, who may be contacted for additional information.

Prof. Jin-Fa Lee
ECE Department, WPI
100 Institute Road
Worcester, MA01609, USA
Tel: 508-831-5778 Fax: 508-831-5491
jinlee@ece.wpi.edu

NATO Advanced Study Institute on Magnetostriction to be held May 22 - June 2 in Crimea

The NATO Advanced Study Institute, "Modern Trends in Magnetostriction Study and Application" will be held May 22, 2000 - June 2, 2000 in Partenit, Crimea, Ukraine.

The conference will take place in beautiful and historic Crimea. The weather should be quite pleasant in late May though swimmers may find the water in the Black Sea to be a bit chilly! NATO has provided the following information on their Advanced Study Institutes.

An Advanced Study Institute (ASI) is a high-level teaching activity where a carefully defined subject, systematically presented, is treated in depth by lecturers of international standing, and new advances in a subject, not taught elsewhere, are reported in tutorial form. A NATO ASI is not intended to be an international conference or symposium, but rather a short course contributing to the dissemination of knowledge and the formation of international scientific contacts. The teaching in ASIs is aimed at scientists at the postdoctoral level with an appropriate scientific background who wish to learn of recent developments in their fields of science.

NATO experience has shown that ASIs should have a minimum duration of 10 working days in order to give adequate time for the development of a topic and allow for sufficient interaction between the scientists. The presentation of contributed papers at ASIs is normally limited to a maximum of one half day. If the programme includes poster sessions these should normally take place in the evening.

For information on the ASI on Modern Trends in Magnetostriction Study and Application, please contact one of the following individuals.

Prof. M.R.J. Gibbs
The University of Sheffield Department of Physics and Astronomy
Sheffield S3 7 RH, UK
Fax: 0114 272 80
m.r.gibbs@sheffield.ac.uk

Prof. V. Eremenko
National Academy of Sciences of Ukraine
Kharkov Ukraine
<http://www.ilt.kharkov.ua/INFO/asi-2000/ms.htm>

ASI-2000@ilt.kharkov.ua

Conference Calendar

- **February 13-18, 2000**
Third Gordon Research Conference on Magnetic Nanostructures
Ventura, California USA

For information, visit:

<http://www.lcr.thomson-csf.com/cnrs/umr-0137/grc/grc.html>

- **March 13-17, 2000**

Montreux, Switzerland

Montreux Joint Meeting of the European, Japanese and Swiss Physical Societies

Featuring Colloquia on Low Dimensional Magnetic Systems, Magnetic Oxides and Mesoscopic Magnets

For information, visit:

http://www.eps-cmd18.ch/eps-cmd18_hn/mclist.htm#mc20

March 27-30, 2000 NASA and IEEE Mass Storage Conference

8th NASA Goddard Space Flight Center Conference on Mass Storage Systems and Technologies

17th IEEE Symposium on Mass Storage Systems

University of Maryland University College Conference Center

College Park, MD

- **April 9-13, 2000**

Intermag Conference, Toronto, Canada

For information:

Courtesy Associates

2000 L Street NW, Suite 710

Washington, DC 20036

TEL: 202 973-8668

FAX: 202 331-0111

email intermag@courtesyassoc.com

<http://www.intermagconference.com>

- **April 24-28, 2000**

MRS 2000 Meeting, San Francisco

Featuring Magnetic Materials, Structures, and Processing for Information Storage Symposium

For information, visit: <http://www.mrs.org/meetings/spring00/cfp/symposia/f.html>

<http://www.mrs.org/meetings/spring00>

- **May 3-6, 2000**

Third International Conference on the Scientific and Clinical Applications of Magnetic Carriers

Rostock, Germany

For information, visit:

<http://www.magneticmicrosphere.com>

May 17-18, 2000

Symposium on Magnetic Materials for Magnetoelectronic Devices

For information:

J.E. Snyder

Ames Laboratory

205 Metal Development

Iowa State University

Ames, Iowa 50011

TEL 515-294-4312 FAX 515-294-8727

Email: jesnyder@iastate.edu

<http://www.lifelearner.iastate.edu/conference>

- **May 22-24, 2000**

Nineteenth Annual Conference Properties and Applications of Magnetic Materials

For information, contact:

Bonnie Dow

Illinois Institute of Technology

TEL 312-567-6809 FAX 312-567-8976

bonnie@ece.iit.edu

- **May 22 - June 2, 2000** Partenit, Crimea, Ukraine
NATO Advanced Study Institute: Modern Trends in Magnetostriction Study and Application
For information, contact:
Prof. M.R.J. Gibbs
The University of Sheffield Department of Physics and Astronomy
Sheffield S3 7 RH, UK
Fax: 0114 272 80
m.r.gibbs@sheffield.ac.uk

Prof. V. Eremenko
National Academy of Sciences of Ukraine
Kharkov Ukraine
<http://www.ilt.kharkov.ua/INFO/asi-2000/ms.htm>

ASI-2000@ilt.kharkov.ua

- **June 4-7, 2000**
Milwaukee, Wisconsin USA
CEFC 2000: Conference on Electromagnetic Field Computation
For information: cefc2k@aln.fiu.edu
<http://cefc2k.aln.fiu.edu>
- **June 8-9, 2000**
5th International Workshop on Finite Elements for Microwave Engineering
Boston, MA USA
For information:
LeeandLam@aol.com
<http://www.ece.wpi.edu/~jinlee/workshop/boston.html>
- **June 12 - 23, 2000**
Rhodes, Greece
Nato Magnetic Storage Advanced Study Institute
For information, visit:
<http://www.physics.udel.edu/wwwusers/natoasi/>
- **June 27-29, 2000**
Coil Winding, Insulation and Electrical Manufacturing 2000
Berlin, Germany
For information:
CWIEME
PO Box 936
Alder Hills
Poole Dorset BH12 4YA
United Kingdom
TEL +44 (0) 1202 380661 FAX +44 (0) 1202 736018
coilwind@bournemouth-net.co.uk
www.coilwindingexpo.com
- **July 5-14, 2000**
[Progress in Electromagnetics Research Symposium \(PIERS 2000\)](#)
Royal Sonesta Hotel, Cambridge, MA, USA
Abstract deadline: December 1, 1999.
For information:
Hsiu C. Han
TEL +1-515-294-5320

hsiu@iastate.edu

<http://www.piers.org/piers2k>

- **August 6-11, 2000**

International Conference on Magnetism, ICM 2000

Recife, Brazil

For information:

icm2000@df.ufpe.br

<http://www.icm2000.org.br>

- **August 7-10, 2000**

The 8th Asia Pacific Physics Conference

Tapai, Taiwan

For information, contact:

Miss Opheila Huang

Institute of Physics

Academia Sinica

Taipei 11529, Taiwan

TEL + 886-2-27899602 FAX + 886-2-27826680

appc2k@phys.sinica.edu.tw

- **August 8-12, 2000**

Berkeley, California USA

Eight International Conference on Electronic Spectroscopy and Structure

For information, visit:

<http://www.lbl.gov/Conferences/icess-8.html>

email: icess@lbl.gov

- **August 14-16, 2000**

TMRC 2000, Santa Clara, CA

Topic: *Signal Processing for Magnetic Storage*

For information, visit: <http://www.iist.scu.edu> or phone: (408) 554-6853.

- **August 14-16, 2000**

Workshop on Applications of Synchrotron Light to Magnetic Materials

(an ICM'2000 Satellite Conference)

Laboratório Nacional de Luz Síncrotron (LNLS)

Campinas, Brazil,

<http://www.ifi.unicamp.br/~waslmm/>

- **September 17-22, 2000**

Applied Superconductivity Conference

Pavilion Conference Center

Virginia Beach, VA

For information, visit:

<http://www.ascinc.org>

- **September 18-21, 2000**

The International Conference on Ferrites, Kyoto, Japan

For information:

Prof. Masahiko Naoe

Dept. of Physical Electronics, Tokyo Institute of Technology

2-12-1, O-okayama, Meguro-ku

Tokyo 152-8552 Japan

TEL: +81-3-5734-2575 FAX: +81-3-5734-2513

naoe@pe.titech.ac.jp

<http://spin.pe.titech.ac.jp/icf8/>

- **September 25,27, 2000**

DataStorage2000

Fairmont Hotel, San Jose, CA

For information contact:

Conferences Etc.

2680 Bayshore Parkway, Suite 214

Mountain View, CA 94043

Ph: (650) 968-2836, FAX: (650) 968-5392

E-mail: darlene@conferencesetc.com

<http://www.dsforum.com>

- **October 22-27, 2000**

6th International Symposium on Magnetic Materials, Processes and Devices (a part of the 198th Meeting of The Electrochemical Society, Inc.)

Phoenix Civic Plaza & Hyatt Regency, Phoenix, Arizona

Deadline for submission of papers: June 1, 2000

For information on the Symposium and on submission of papers visit:

<http://www.electrochem.org/meetings/198/cfp.html#j1>

To obtain the Proceedings of the 5th International Symposium on Magnetic Materials, Processes and Devices (published 1999) visit:

<http://www.electrochem.org/meetings/198/pv98-20.html>

- **October 30 - November 2, 2000**

Joint MORIS/APDSC 2000

Magneto-Optical Recording International Symposium/Asia-Pacific Data Storage Conference

Nagoya, Japan

For information, contact:

Prof. Takao Suzuki

Toyota Technological Inst.

Information Storage Materials Lab.

2-12-1 Hisakata, Tempaku-ku

Nagoya, 468-8511

Japan

TEL: +81-52-809-1870 FAX: +81-52-809-1874

tsuzuki@toyota-ti.ac.jp

<http://c-linkage.co.jp/moris-apdsc>

- **November 6-8, 2000**

Asia Pacific Magnetic Recording Conference

Tokyo, Japan

For information, contact:

Dr. Roger Wood

IBM, Storage System Division, AE5/0282

5600 Cottle Road, San Jose CA 95193 USA

TEL +1-408-256-4131 FAX +1-408-256-2653

wroger@us.ibm.com

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4-1-1 Kamikodanana Nakahara

Kawasaki 211-8588 Japan

TEL +81-44-754-2120 FAX +81-44-754-2849

yoshimasa-miura@cs.fujitsu.co.jp

<http://www.fujitsu.co.jp/hypertext/hdd/apmrc/apmrc2000hpe.html>

- **January 8-11, 2001**

8th Joint MMM-Intermag Conference

San Antonio, Texas USA

For information:

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2000 L Street NW, Suite 710

Washington, DC 20036

TEL: 202 973-8668

FAX: 202 331-0111

email magnetism@courtesyassoc.com

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