Invited Speaker: Manfred Albrect, University of Augsburg,

Title: FePt-based bit patterned media

Contains: Magnetic nanostructures are of considerable interest both from the point of view of fundamental science as well as industrial applications. This is because of the novel magnetic properties that such nanostructures can exhibit and the possibility to engineer structures with specific properties. As a consequence, potential uses have arisen in a range of technological applications such as information storage called bit patterned media (BPM). Several ways to create regular nanodot arrays do exist and combining patterned structures with the deposition of magnetic film systems with high anisotropy seems to be a promising way to achieve such media. In this presentation, I will focus on FePt-based BPM including exchange couple composite (ECC) material. Sputter-deposited FePt/Cu bilayer films were transformed to the L10 ordered phase by rapid thermal annealing (RTA). It was found that for thin film samples, which were RTA processed at 600°C for 30 s, the addition of Cu strongly favors the L10 ordering and (001) texture formation, which results in a strong perpendicular magnetic anisotropy. Nanoimprint lithography was employed to pattern these films into nanodot arrays. The structural and magnetic properties will be presented. Furthermore, the most recent advances and prospects of the bit patterned magnetic recording technology will be discussed.

Short CV: Manfred Albrecht received his PhD in physics from the University of Konstanz in 1999 with a study on epitaxial thin films and superlattices. Thereafter he switched to the field of magnetic thin alloy films and nanostructures where he participated in the development of bit patterned media for magnetic storage applications as postdoctoral research fellow at the IBM Almaden Research Center in San Jose (USA). In 2007 he became Full Professor for Experimental Physics at the Chemnitz University of Technology. In 2013 he was appointed Full Professor for Experimental Physics at the University of Augsburg. His current research activities include magnetic thin films and nanostructures, magnetic coupling phenomena as well as thermoelectric thin films.

Invited Speaker: Johan Akerman, University of Gothenburg

Title: Dynamical solitons in spin-torque and spin-hall effect driven nano-oscillators

Contains: Nano-contact spin-torque nano-oscillators (STNOs) and spin Hall effect nano-oscillators (SHNOs) provide excellent playgrounds for the study of highly non-linear and nano-scopic spin wave modes and phenomena. While originally studied for their potential as highly broadband microwave signal generators, these devices now attract a rapidly growing interest as spin wave generators in magnonic devices and as skyrmion injectors in magnetic nanowire based memories. In my talk I will give an overview of how magnetodynamical solitons, such as spin wave bullets, magnetic droplets, and dynamical skyrmions, can be nucleated and controlled in both STNOs and SHNOs.

Short CV:
Education and degrees
PhD: 1999, PhD in Materials Physics, KTH Royal Institute of Technology, Sweden
MSc#2: 1996, MSc in Engineering Physics, LTH Lund Institute of Technology, Sweden
MSc#1: 1994, Ing. Physicien Diplomé, EPFL Ecole Polytechnique Fédérale the Lausanne, Switzerland
Current and previous positions
2008-current Full Professor (100% research), Department of Physics, University of Gothenburg.
2012-current Guest Professor, School of ICT, KTH Royal Institute of Technology, Kista
2005-2012 Senior Researcher, School of ICT, KTH Royal Institute of Technology, Kista
2001-2005 Senior Staff Scientist, Motorola/Freescale, Tempe/Chandler, Arizona, USA
1999-2001 Postdoctoral Fellow, University of California – San Diego, California, USA
Distinctions, scholarships and awards
2005-2010 SSF Future Research Leader 2
2006 Göran Gustafsson Foundation's Young Physicist Prize
2008-2013 Royal Swedish Academy of Sciences KAW Research Fellow
2010 Young Science Leader, World Economic Forum, Tianjin, China
2011 Founding Member of The Global Young Academy
2011 University of Gothenburg Science Faculty Prize
2012-2017 SSF Successful Research Leader
2012 ERC Consolidator Grant
2012 Founding Member of The Young Academy of Sweden
2014 Göran Gustafsson Physics Prize
Supervising experience
7 graduated PhD students (main supervisor); 9 current PhD students (8 of which as main supervisor)
6 supervised Postdocs; 6 current Postdocs.
National and international assignments of importance
Vice Chair of the Swedish Research Council committee on Applied Physics, 2010 & 2012
Evaluator of ERC Advanced Investigator Grant, 2009
Editor and Program Committee Member,10th Joint MMM/Intermag Conference, 2007
Program Committee Member, 52nd MMM Conference (2007), 55th MMM Conference (2010), 56th MMM Conference (2010), INTERMAG 2011, Magnonics 2015, and ICMFS 2015.
Organizer & Chair, NordicSpin'08/'10/'12, Int. Symposium on Spintronics and Nanomagnetism
Chair, 3rd International Workshop on Magnonics, Varberg, Sweden, August 2013
Publications
Over 190 papers, h-index: 33, total citations >3900.
For full list of publications, see http://scholar.google.se/citations?user=2NBG3P0AAAAJ&hl=sv

Invited Speaker: Gerardo Bertero, Western Digital Technologies, San Jose, USA

Title: Particle Size Effects in Media for Heat Assisted Magnetic Recording

Contains: To sustain recording areal density growth in the hard disk drive (HDD) industry, heat assisted magnetic recording (HAMR) technology is being developed and expected to be commercialized in 2018. Since the recording temperature in HAMR writing is very near the Curie temperature of the magnetic media material, the physics of the switching process incorporate strong thermal effects which for small particle size, become even more prominent. The most likely media candidate is a complex, stack structure incorporating thermal and optical functional layers as well as the main magnetic storage layer based on L10 ordered FePt. Because of the small size of the L10 FePt crystallites, the Curie temperature, degree of atomic ordering and the ability to sustain high magnetic anisotropy of these media grains becomes no only solely dependent on their size but also their environment. In this presentation, we will describe the HAMR media structure, the physics of the switching process, and some of the most relevant structure-property relationships as they relate to particle size effects strongly impacting the recording process.

Short CV: Gerardo Bertero has over 20 years of work experience in the magnetic recording industry starting at Komag. Inc. in San Jose, California, now the Magnetic Media Division of Western Digital, Co. Gerardo served as Vice President in R&D developing advanced magnetic recording media. Currently, Dr. Bertero holds a Senior Director position in the Advanced Technology Office of Western Digital performing research in magnetic recording media and recording heads topics. He specializes in the synthesis, performance and characterization of magnetic materials and thin film structures. He earned an Engineering degree in Metallurgy from the Catholic University of Cordoba, Argentina in 1986 and in 1989 graduated with a Master of Science degree in Materials Science and Engineering from Vanderbilt University. In 1995 he earned a Ph.D. degree in Materials Science and Engineering from Stanford University where he investigated Co/Pt and related high anisotropy metallic multilayer structures. He has authored over 50 peer-review technical papers and has given multiple invited talks at conferences, seminars and short courses. Dr. Bertero served as conference chair of TMRC in 2004 and 2014 and is active in the organization of HDD industry related conferences and symposia. He is a member of the IEEE Magnetics Society where he also served as a Society Technical Advisor. In 2003, Gerardo chaired the IEEE Magnetics Society Santa Clara Valley chapter. He holds over 30 US issued patents and has numerous patents pending.

Invited Speaker: Alberto Brambilla, Dipartimento di Fisica, Politecnico di Milano

Title: Magnetic properties of CoO/Fe(001) with controlled interfacial properties

Contains: Intriguing magnetic properties can be obtained in systems containing antiferromagnetic (AF) transition metal (TM) oxides both by low-dimensionality and by proximity to ferromagnetic (F) layers. So far, we have investigated both chemical and magnetic properties of a rich record of Fe/AF (NiO, CoO) layered structures. One of the most critical issues concerning the interfaces between TM mono-oxides and a reactive TM is the high degree of chemical mixing at the interfaces. Exploiting a metastable Co buffer layer, we have recently succeeded in obtaining a CoO/Fe interface free of any Fe oxide. Such samples are, intriguingly, also characterized by a dislocation-driven nanostructuration of CoO. On such samples we observe, by magneto-optical Kerr effect (MOKE), particularly strong uniaxial anisotropies induced by tiny amounts of deposited CoO. Such a magnetic behavior was further investigated by performing element specific hysteresis loops by X-ray Magnetic Circular Dichroism (XMCD),and by magnetization-induced second harmonic generation (MSHG), revealing that the source of the magnetic anisotropy resides indeed at the very interface, similarly to what was recently observed for the Fe/MgO interface.

Short CV: Alberto Brambilla graduated in Physics with full marks (110/110 cum laude) at Università degli Studi of Milan (Italy) in 2001, with an experimental subnuclear physics thesis carried out at CERN laboratories (Geneve, Switzerland). He then got a Ph.D. in Physics at Politecnico di Milano (Italy) in 2005, with an experimental activity focused on the investigation of thin films and interfaces of magnetic materials, oxides and semiconductors through ultra-high vacuum spectroscopy and microscopy techniques. From 2005 to 2007 he obtained two post-doc grants at Physics Department of Politecnico di Milano for projects related to organic/inorganic semiconductor interfaces and ot magnetic nanostructures. After one year (2007-2008) as researcher at Consorzio Nazionale Interuniversitario per le Scienze fisiche della Materia (CNISM, national university pool for condensed matter physical sciences), he got the position of Assistant professor (2008) and then Associate professor (2014) at the Physics Department of Politecnico di Milano.
His research activity has developed in the fields of Surface Physics and Condensed Matter Physics, by focusing on the growth and characterization of thin films, surfaces and interfaces of magnetic materials and semiconductors (both inorganic and organic), by means of several experimental techniques, including the use of synchrotron radiation.
He is author of about 60 ISI scientific publications with more than 400 citations and an h-index of 12.
Alberto is also a member of the Italian Association of Magnetism (AIMagn).

Invited Speaker: Giuseppe Campobello - Department of Engineering, University of Messina.

Title: Spintronics, telecommunications and petascale computing: a necessary alliance.

Contains: Several research works highlight possible applications of spintronics in the areas of data storage, low-power computing, logic devices, magnetic sensors, neurocomputing and microwave oscillators . However the potential of spintronic is not yet fully realized. In particular only few and recent works focus on spintronics for telecommunications applications. To give just few examples, radiation immunity of spintronic devices could be highly profitable in satellite communication equipments where radiations which affect CMOS electronic devices could have disastrous consequences; moreover spin waves could solve one of the major challenges of low-density parity-check (LDPC) codes, i.e. design efficient message passing schemes by avoiding complex wiring to perform global routing of messages; finally, memristors are revitalizing analog signal processing and could drive compressive sensing, a new paradigm for signal acquisition and processing. In this paper we will discuss current state and challenges of petascale computing systems and show how recent advances in telecommunications and spintronics can contribute importantly to accelerate the path to exascale computing. Moreover relationships between telecommunications and spintronics are highlighted showing that the start of a collaborative research program involving scientists in above research fields would be very desirable if not necessary. In particular we try to answer to the following questions:
1) Why spintronics and telecommunications-related fields (i.e. signal processing, communications and network information theory) have an important role to play in high performance computing ?
2) Why exascale computing is necessary for spintronics and telecommunications ?
3) How spintronics can contribute to telecommunications ?
Case studies will be used to provide concrete examples.

Short CV: Giuseppe Campobello was born in Messina, Italy, in 1975. He received the Laurea degree (summa cum laude) in Electronic Engineering and the Ph.D. degree in Advanced Technologies for Information Engineering from the University of Messina, Italy, in 2000 and 2004, respectively. From 2004 to 2006 he was a research fellow at the Department of Matter Physics and Advanced Physical Technologies (University of Messina, Italy), at the Department of Industrial Chemistry and Materials Engineering (University of Messina, Italy) and at the Department of Mathematics and Informatics (University of Catania, Italy) where he was involved in several national and international research projects (EUREKA-MEDEA, SINAVE, TriGrid). In 2005 he was responsible for the design and development of telecommunications and information infrastructures of the European project HELLODOC, co-financed by the European Community programme eTEN and related to the design and validation of a tele-rehabilitation system. From 2004 to 2006 he was also an adjunct professor of the Faculty of Engineering and of the Faculty of Sciences of the University of Messina, Italy where he thought courses in digital electronics, communication systems and networks, network programming, cryptography and information security.
In 2006 he joined the Department of Matter Physics and Advanced Physical Technologies (University of Messina, Italy) as a researcher in Telecommunications. As researcher he has been principal investigator in collaborative and multi-disciplinary projects as well as industry funded projects spanning from system-on-chip and reconfigurable computing to wireless sensor networks for energy efficiency. Currently he is with the Department of Engineering at the University of Messina, Italy, where he is senior researcher and assistant professor in Telecommunications.
His current research interests deal with wireless sensor networks, channel and network coding, signal processing for telecommunications and biomedical applications, reconfigurable circuits and systems for telecommunications applications. He is author of more than thirty papers published on international journals and conference proceedings.
He is member of the Scientific Council of the National Telecommunications and Information Technologies Group (GTTI) and member of the Microwave Engineering Center for Space Applications (MECSA).

Invited Speaker: Jingsheng Chen - National University of Singapore, Singapore

Title: Control of microstructure of FePt-X (001) films for HAMR through interface modification and doping

Contains: The main challenge of the application of $L1_0$ FePt thin films as magnetic recording media is the simultaneous fabrication of FePt (001) thin films with high perpendicular anisotropy and small grain size. $L1_0$ FePt (001) granular films with grain size of 5-6 nm were achieved on MgO underlayer by doping C and Ag. However, RF sputtering of the insulating MgO underlayer layer is not preferred for industrial applications due to its low deposition rate and particle contamination on the media surface. The large opening-up of in-plane hysteresis loop was observed in the FePt film grown on polycrystalline MgO underlayers that would increase the switching field distribution and thus reduce the signal-to-noise ratio. We found that the large opening-up of the in-plane hysteresis loop was caused by the smaller surface energy of MgO (1.1 J/m^2) with comparison with FePt (2.9 J/m^2) which resulted in a large contact angle between FePt grain and MgO and is not favorable for epitaxial growth. The situation became worse when polycrystalline MgO underlayer was used. Any small deviation of texture of underlayer and roughness change will cause deviation of the crystal orientation of FePt overlayer from film normal (001) orientation. Based on this, we proposed to use TiN and TiON as intermediate layers or underlayers to promote the (001) texture of FePt film and grain isolation. The highly (001) textured FePt-SiO_2-C films with high magnetocrystalline anisotropy and in-plane hysteresis loops with small opening-up and well-isolated grain with size of 5.7 $\pm$ 0.9 nm. With introducing new doping materials, we have developed columnar structured FePt-X (001) films with well-isolated small grains and large coercivity on TiON intermediate layer. The FePt grains with size of 5.6 nm showed very good columnar structure with aspect ratio of around 2.6. The out-of-plane coercivity of the film deposited at 500^{o}C is as high as 23.2 kOe.

Short CV: Prof. Jingsheng Chen is an Associate Professor in Department of Materials Science and Engineering, National University of Singapore. He obtained his Ph.D degree in Department of Modern Physics, Lanzhou University in 1999. From 1999-2001, he worked as post-doctoral fellow in Nanyang Technology University. During 2001-2007 he led a team as a senior research scientist in Data Storage Institute working on emerging technology toward 1 Tbits/in^2 magnetic recording. Since he joined National University of Singapore in 2007, he was constantly sponsored by Seagate Technology - the largest hard disk company in the world and totally secured more than 1 million US dollars from Seagate Technology, USA. The technologies he developed have been used in the Seagate's products. He also secured more than 12 million Singapore dollars from Agency of Science and Technology, Ministry of Education and National research foundation. Especially, now he is leading a big program of 9 million Singapore dollars to exploit the low power information storage device-electric field controlled magnetic memory. Prof Chen's research areas include nanostructured magnetic materials for information storage, spintronics, multiferroics, strong electron correlated oxide materials, optical and magnetic properties of nanoclusters. He is an editorial board member of several Journals, e.g. Scientific Report (Nature publisher), Spin (World Scientific publisher) etc. He is the managing committee member of SG-SPIN consortium. He has authored/co-authored more than 200 refereed journal papers with H-index of 24, 3 book chapters, over ten patents. He has presented a number of invited talks in international conferences.

Invited Speaker: Stefano Chiappini, Italian National Institute for Geophysics and Volcanology (INGV), Sezione Roma2.

Title: Adaptive distributed HPC infrastructure for massive scientific computations: limitations and challenges

Contains: Historically, one of the primary drivers of computer performance has been CPU clock speed increases, we saw this trend over many years. But this growth could not continue without limit, mainly because technology has produced transistor smaller and smaller, so power density (heat dissipation) has emerged as possibly the most important factor in modern processors design. Therefore, industry now has turned to building smaller but more efficient processors in terms of power, instead of more complex and faster ones. Modern GPUs now can include a very large number of parallel compute units, which individually are small, simple and power efficient and theoretically are able to perform a large amount of computations. The other side of the coin is that we have to change the traditional approach of serial programming in order to take advantage of all this processing power . The challenge is now to program all those units in such a way that they can work together to solve complex problems in a shorter time, and allow scientists to solve harder problems. The goal is then to build an advanced HPC infrastructure which can enhance science through computational methods. Test clusters based on Intel Xeon processors and Nvidia Tesla cards are setup, nodes are connected with Infiniband and 10Gb Ethernet intarfaces, with Linux CentOS as operating system and MVAPICH2 from Ohio State University as middleware, which supports MPI 3.0 standard, delivers high performance, scalability and fault tolerance for high-end computing systems and servers using InfiniBand and 10GigE networking technologies. In addition, a dedicated private cloud storage system is deployed to provide a secure distributed storage for data collection and sharing. Custom software for scientific simulation is developed according to CUDA programming technology, to exploit the full power of the Tesla CUDA cores. Performance benchmarks are reported for various parallel configuration: using all CUDA cores in the same host, using different nodes in a cluster, using more clusters geographically distributed.

Short CV: Senior Technologist at the Italian National Institute for Geophysics and Volcanology (INGV), Sezione Roma2. Degree in Physics, University of Rome “La Sapienza” – 110/110 *cum Laude.*

Current activities

Architect and administrator of the Italian National Data Center (IT-NDC) for CTBT verification and international security management. Expert in data center planning and management, system administration, networking and security, software development, database design and administration.

Professional expertise

Research and development in information technology, new solutions for management and integration. Virtualization infrastructure and cloud computing (VMWare certifications in 2009 and 2015). Relational database, datawarehouse, Oracle database administrator and trainer on SQL and PL/SQL, backup & recovery, administration, tuning (Oracle DBA certification in 2002). Operating systems (linux, unix, Microsoft, Vax/Vms), programming languages (SQL, PL/SQL, PHP, Python, VB.NET, ASP, C, Fortran, Html), development tools (Wolfram Mathematica, Visual Studio). Networking and information technology security (Information Security Manager IQNET certificate in 2008). Gamma radiation spectrometry, HPGe lab detectors and airborne NaI detectors, spectra analysis.

Teaching experience

- 2000-2004 Several Oracle DBA courses (Administration, Backup & Recovery, SQL & PL/SQL, Performance & Tuning, Networking).
- 2006 Hardware infrastractures and relational databases, CRATI srl (Lamezia Terme, Italy).
- 2009 Virtualization, IT security and datacenter management, CRATI srl (Lamezia Terme, Italy).
- 2011-2013 Gamma spectroscopy and detectors, “CBRN Master Course” (Roma, Italy)
- 2015 Corso Idrologo, Aesseffe srl (La Spezia, Italy).
- 2015 Advanced training course on environmental security (FORTEMIA, funded by EU), INGV (Palermo, Italy).

Invited Speaker: Sergej Demokritov, University of Muenster, Germany

Title: Excitation of magnetization dynamics by pure spin currents

Contains: Injection of pure spin currents generated due to the spin Hall effect (SHE) has recently become recognized as an efficient route for the excitation of coherent magnetization auto-oscillations in magnetic nanostructures. In contrast to the devices operated by spin-polarized electrical currents, spintronic devices driven by pure spin currents are expected to be less affected by the heating and electromigration effects caused by the charge flow through the active magnetic layer. Separation of charge and spin flows also eliminates a number of constraints on the geometry and thus on the magnetic characteristics of devices.
In addition to the SHE, pure spin currents can be also generated in nonlocal spin valve structures, where charge and spin currents are separated by providing an additional current path that bypasses the active magnetic layer. This approach eliminates the detrimental effects of layers with strong spin-orbital coupling, utilized in the SHE devices, on the dynamic damping in active magnetic layers.
Here we review our recent experiments on the excitation of magnetization auto-oscillations by injection of pure spin currents in SHE-based devices and in nonlocal spin valve structures. We show that nonlocal-spin-injection oscillators exhibit a number of unique features making them significantly more promising in comparison with the spin-Hall oscillators.

Short CV: Name: Sergej O. DEMOKRITOV - Date of birth 22 April 1959 - Place of birth Uzlowaya, Russia - Citizenship German Marital status Married, one child Present address Institut für Angewandte Physik, Westfälische Wilhelms-Universität Münster Corrensstr. 2-4 48149 Münster, Deutschland Tel: +49-251-83-33551 Fax: +49-251-83-36229 E-Mail: demokrit@uni-muenster.de Home address Mersmannsstiege 18 48341 Altenberge, Deutschland Languages I am fluent in ENGLISH, GERMAN, and RUSSIAN. Academical Degrees Degree: Habilitation (venia legendi) in Experimental Physics, 2000 Place: Fachbereich Physik, Universität Kaiserslautern, Kaiserslautern, Germany.
Degree: Ph.D in Physics, 1987 Place: Kapitza Institute for Physical Problems, Russian Academy of Sciences, Moscow, Russia.
Degree: Master of Science in Physics (Honors), 1982 Place: Kapitza Institute for Physical Problems, Russian Academy of Sciences, Moscow, Russia and Moscow Institute of Physics and Technology (FIZTEX), Dolgoprudnyi, Russia.
Publications h-index: 40 22 books, book chapters, monographs, and review articles 205 original papers in peer reviewed journals, Sum of the times cited: 5627
Academical Positions
2004 – Universitätsprofessor (C3) Institut für Angewandte Physik, Westfälische Wilhelms-Universität Münster
2001-2004 Lecturer (Hochschuldozent, C2) Fachbereich Physik, Universität Kaiserslautern, Kaiserslautern, Germany.
1995 – 2001 Wissenschaftlicher Assistent (C1) Fachbereich Physik, Universität Kaiserslautern, Kaiserslautern, Germany.
1987 – 1995 Research Fellow (member of staff) Kapitza Institute for Physical Problems, Russian Academy of Sciences, Moscow, Russia
Visiting Positions
1993 – 1995 Visiting Researcher Institut für Festkörperforschung, Forschungszentrum Jülich, Jülich, Germany
1990 –1991 Alexander von Humboldt Fellow Institut für Festkörperforschung, Forschungszentrum Jülich, Jülich, Germany
1988 Visiting Researcher Wihuri Research Laboratory, Department of Physics, University of Turku, Turku, Finland.

Invited Speaker: Claudia Felser, Max Planck Institute for Chemical Physics of Solids

Title: Design scheme for Tetragonal Heusler compounds

Contains: Heusler compounds are a remarkable class of materials with more than 1,000 members and a wide range of extraordinary multifunctionalities including half-metallic high-temperature ferri- and ferromagnets, multiferroic shape memory alloys, and tunable topological insulators with a high potential for spintronics, energy technologies and magnetocaloric applications. The tunabilty of this class of materials is exceptional and nearly every functionality can be designed. Recently a high spinpolarisation for spintronic applications was proven by angle resolved photoemission. The development of efficient spintronic devices is based on the spin transfer torque (STT) phenomenon. In 2007 $Mn_{3-x}Ga$ was identified as a potential electrode for STT applications.In general Manganese-rich Heusler compounds are attracting much interest in the context of spin transfer torque, spin Hall effect, non collinear magnetism and rare-earth free hard magnets. Here we give a comprehensive overview of the magnetic properties of non centrosymmetric Mn2-based Heusler materials, which are characterized by n antiparallel coupling of magnetic moments on Mn atoms. Such a ferrimagnetic order leads to the emergence of new properties that are absent in ferromagnetic centrosymmetric Heusler structures. Tetragonal Heusler compounds with large magneto crystalline anisotropy can be easily designed by positioning the Fermi energy at the van Hove singularity in one of the spin channels. The Mn^{3+} ions in Mn_2YZ cause a Jahn Teller distortion. New properties can be observed such as, large exchange bias, non-collinear magnetism topological Hall effect, spin gapless semiconductivity and Skyrmions.

Short CV: Prof. Claudia Felser studied chemistry and physics at the University of Cologne (Germany) and completed her doctorate in physical chemistry there in 1994. After postdoctoral fellowships at the MPI in Stuttgart and the CNRS in Nantes (France), she joined the University of Mainz and became a full professor at the University of Mainz (Germany) in 2003. She is currently director at the Max Planck Institute for Chemical Physics of Solids in Dresden (Germany). She was honored as the distinguished lecturer of the IEEE Magnetic Society and in 2011 she received an ERC Advanced grant. She won the Nakamura lecture award of the UC Santa Barbara, the 2014-Alexander M. Cruickshank Lecturer Award of the Gordon Research Conference and received the SUR-grant Award of IBM. She is a fellow of the American Physical Society and the Institute of Physics, London. In 2014 she received the Tsungmin Tu Research Prize (75 000$) by the Ministry of Science and Technology of Taiwan, the highest academic honor granted to foreign researchers in Taiwan.

Invited Speaker: Giovanni Finocchio, Università d Messina

Title: Improvement of the MTJ based oscillators and detectors by controlling the trade-off between the interfacial perpendicular anisotropy and the demagnetizing field.

Contains: The interfacial perpendicular anisotropy (IPA) between the ferromagnetic electrodes and the tunnel barrier of magnetic tunnel junctions (MTJs) employing the material combination of CoFeB/MgO is a key ingredient to improve the dynamical properties of MTJ based devices. The IPA can be used to orient the magnetization of both the free and polarizer layers out of the film plane, to reduce the out-of-plane demagnetizing field while maintaining the orientation of both of the two magnetizations in the film plane, or achieve an asymmetric MTJ consisting of an in-plane polarizer and a perpendicular free layer. Here it will be shown how to use IPA for the realization of MTJs for storage applications with high thermal stability and low switching current, nanoscale oscillators with very large emitted power or ultralow critical currents and microwave detectors with giant sensitivity. A review of recent experimental and theoretical advances will be presented.

Short CV:Assistant Professor of Electrical Engineering. (09/E1 – S.S.D. ING-IND/31) University of Messina, Messina, Italy. Degree in Electronic Engineering – Summa cum Laude; PhD in "Advanced technologies for optoelectronics, photonics and electromagnetic modeling". University of Messina.
Actual research interests
Numerical computing and programming. Numerical methods for scientific computation. Design and realization of simulation tools for spintronic devices. Modeling of materials for spintronic applications. Theoretical and applied spintronics. Modeling of thermally-assisted-magnetic-recording. Nanomagnetism. Spin-transfer torque effects.
International Teaching experiences
Lecturer for PhD and master students, at Suzhou Institute of Nanotech and Nanobionics, Suzhou, China.
STA/ERASMUS lecturer at University of Salamanca, Spain. Visiting professor at the Department of Physics - Bogazici University. Istanbul, Turkey. Visiting professor at the Department of Physics - University of Lorraine. Nancy, France. Series of seminaries about Spintronics and spin-orbitronics.
Start-up company. 2010 - GoParallel s.l. (Spain): Organization and committee member of conferences and schools
General chair for the conference "9th International Symposium on Hysteresis Modeling and Micromagnetics". Taormina (ME), Italy, 13-15 May 2013 (http://ww2.unime.it/hmm2013/).
Co-Chair of the conference "Frontiers in Magnetism" IEEE Magnetic Society. Messina, Italy, 17-18 June 2010.
Member of the Organizing Committee of the School NATO ASI. Magnetic nanostructures for micro-electromechanical systems and spintronic applications. Catona (RC), Italy, 2-15 July 2006.
Member of Organizing Committee of Scientific Conference ET2002. Messina, Italy, 27-29 June 2002.
Member of the Advisory Committee of the Italian Association of Magnetism.
Member of the Steering Committee of the conference series Hysteresis Modeling and Micromagnetics (HMM).
Member of the Steering Committee of the conference series Advances in Magnetism (AMAG).
Editorial activities
Since 2015 – Associate Editor of Nature Scientific Reports (IF 5.6).
2014-2015 – Associate Editor of IEEE Magnetics Letters (IF 1.69).
Other information
Session chair for several conferences: INTERMAG, HMM, ISMANAM. Vice-coordinator of the Magnetism Laboratory at University of Messina, Italy. I'm co-author of more than 110 international journals, 180 contributions at International conferences.
ISI web of Science. H-index 21. Number of citations >1100. More than 10 invited.
Senior Member IEEE (Institute of Electrical and Electronics Engineers). 12/2012 – to date.

Invited Speaker: Jens Haueisen - TU Ilmenau

Title: Defect reconstruction approaches in Lorentz Force Evaluation

Abstract: Lorentz Force Evaluation (LFE) is a new contactless, nondestructive evaluation method for conductive materials. The Lorentz force exerting on a permanent magnet moving relative to the conductive material specimen is measured. If a defect is present in the specimen, perturbations in the measured force signals are observed. These perturbations allow for the reconstruction of the defect geometry. We use the defect response approach, where the signals obtained from a specimen without defect are subtracted from the signals of the specimen with a defect. The resulting defect response signals serve as input for defect reconstruction. Reconstructions are performed based on either minimum norm estimations or differential evolution algorithms. Simulations and the analysis of measurement data on both monolithic and laminated composite materials show geometry reconstruction errors in the range of 4-15%. LFE is especially suitable for electrically conducting laminated composites.

Short CV:
Date & Place of Birth: 22. April 1966, Jena, Germany
Marital Status: Married, two children
Nationality: German
Position: Full Professor for Biomedical Engineering (W3), Ilmenau University of Technology and Adjunct Professor, Department of Neurology, University Hospital Jena
Address: BMTI, TU Ilmenau, Gustav-Kirchhoff-Str. 2, 98693 Ilmenau, Tel. +49-3677-692860, Fax: +49-3677-691311, E-mail: Jens.Haueisen@tu-ilmenau.de
Education:
1987 - 1992 Ilmenau University of Technology, Germany (Electrical Engineering)
1990 – 1991 Slovak Technical University, Bratislava, Slovakia, (Electrical Engineering)
1992 - 1994 Ilmenau University of Technology, Germany (Numerical Field Calculation)
1994 University of Washington, Seattle, USA, (Biomedical Engineering)
Scientific Degrees:
1992 M.S. in Electrical Engineering, Ilmenau University of Technology, Germany
1996 Ph.D. in Electrical Engineering, Ilmenau University of Technology, Germany
2003 Habilitation, Ilmenau University of Technology, Germany
Professional Appointments:
2010 – 2013 Visiting Professor, King Saud University Riyadh, Saudi Arabia
Since 2005 Full Professor and chair of the Institute of Biomedical Engineering and Informatics
Since 2005 Adjunct Professor, Biomagnetic Center, Department of Neurology, Medical Faculty, University Jena
1998 – 2005 Biomagnetic Center, University Jena, Head
1996 – 1998 Biomagnetic Center, University Jena, Post-Doc
1994 – 1996 Biomagnetic Center, University Jena, Research student
Research interests
• Investigation of active and passive bioelectric and biomagnetic phenomena.
• Analysis, forward and inverse modeling of bioelectric and biomagnetic data (especially MEG).
• Numerical computation of bioelectric and biomagnetic fields.
• Methods for validation and verification in bioelectromagnetism.
• Information transfer and high frequency oscillations in the somatosensory system.
• Neuro-ophthalmology.

Professional Activities:
Member of editorial board in scientific journals: “Biomagnetic Research and Technology” 2004-2008 ● “Biomedizinische Technik” since 2006 ● Associate Editor “Medical Physics” 2010
Guest Editor: Journal of Physiology (Paris) 2006 ● COMPEL (2009) ● International Journal of Applied Electromagnetics and Mechanics (2009) ● Editor in Chief IEEE Transactions on Magnetics (2014)
Reviewer for journals: Acta Obstet Gyn Scan, Australas Phys Eng S, Appl Num Math, BioMed Eng OnLine, Biomed Tech, Biophys J, Brain Topogr, Clin Neurophsiol, COMPEL, Epilepsia, Exp Neurol, Expert Opin Med Diag, Hum Brain Mapp, IEEE T Biomed Eng, IEEE T Mag, IEE P Sci, J Neurol, J Neurophysiol, J Med Imag Health Inf, J Physiol (P), Lect Notes Comput Sc, Meas Tech, Med Biol Eng Comput, Med Eng Phys, Meth Inf Med, Metrol Meas Syst, Neuroimage, Neurosci Lett, Nuclear Inst Meth Phys Res, Pain, Phys Med Biol, Physiol Meas, Rev Sci Inst, Z Med Phys
Reviewer for funding organizations: Academy of Finland● DAAD● Deutsche Forschungsgemeinschaft● EU● Ministry for Science and Technological Development of Serbia● Ministerium für Innovation, Wissenschaft und Forschung des Landes Nordrhein-Westfalen● Natural Sciences and Engineering Research Council of Canada● Projektträger Jülich● Research Foundation – Flanders● The Netherlands Organisation for Health Research and Development
Definition of the European standard for foetal Magnetocardiography
Chair of the board of the notified body of the EU Nr. 0118 at the Thuringian State Authority for metrology and verification 2007 – 2013
Member of the Saxon Academy of Sciences since 2014

Publication Statistics
Author of >200 Peer-reviewed scientific articles ● 3 Book chapters ● Editor of 3 books and 3 journal special issues ● Inventor of 12 patent ● > 2000 ISI citations ● ISI H-index = 24 ● Current citation rate ~200 cites/year.

Invited Speaker: Mathias Kläui - Institut für Physik Johannes Gutenberg-Universität Mainz

Title: Multiscale modelling of spin – orbit effects

Contains: The study of spin-orbit effects including the switching of chiral spin structures using spin-orbit effects in a combined experimental and numerical study. The displacement and switching of vortices and skyrmions is considered and modelled using a multiscale approach.

Short CV:

Date of birth:	18. August 1976	Nationality:	German
Place of birth:	Zürich (CH)	Marital status:	Married, 1 child

2014 - Elected Fellow of the Institute of Physics
2012- Director of the Graduate School of Excellence: Materials Science in Mainz (MAINZ)
2011- Full Professorship at the Johannes Gutenberg-Universität Mainz
2010 - 2011 Associate Professorship in the ETH-domain (SwissFEL - PSI & ICMP EPFL)
2008 – 2013 Leader of an European Research Council Starting Independent Researcher Grant project
2003 - 2008 Senior Scientist at the Universität Konstanz (Habilitation 2008)
2003 - 2005 Postdoctoral Researcher at the IBM Zurich Research Laboratory, Rüschlikon, Switzerland
2001 - 2003 PhD in Physics at the University of Cambridge, Great Britain
2001 Diploma in Physics at Rheinisch-Westfälische Technische Hochschule Aachen
1999 - 2000 Master of Philosophy in Physics at the University of Cambridge, Great Britain
1996 - 2001 Studies of Mathematics and Physics at Rheinisch-Westfälische Technische Hochschule Aachen.

Professional Activities: ● >150 reviewed publications (h-factor 34), 5 patents, >15 reviews, >80 invited presentations at universities, >75 invited conference presentations >75 other contributions including tutorials, summer school lectures, etc.

● >5 Mio. € third party funding in the last 5 years.
● Director Materials Science in Mainz and Gutenberg Nachwuchskolleg
● Leader of a research group on low power IT devices and renewable energies within the think tank “Neue Verantwortung”
● Development of courses on ethical research practices in academia, and courses on conception and planning of research projects.
● Organization, chairman and program committee member of various conferences (Heraeus Meeting, Quantum Coherence Workshop, British- German Frontiers of Science Workshops, MMM, Intermag, NewSpin…)
● Reviewer for various journals (Nature family PRL, Nano Lett, etc.) Reviewer for projects (NSF, ANR, AERES, DFG, EPSRC, FAS, etc.)
● Senior Member of the IEEE, Member of the IEEE Magnetism Society Technical Committee, Advisory board of CINEMA, COMATT,...
● Major awards: Nicholas Kurti Prize for Research in Physical Sciences; Starting Independent Researcher Grant of the European Research Council
Physics Prize of the Academy of Sciences Göttingen
Distinguished Clerk Maxwell Scholar of the Cavendish Laboratory, Cambridge
Springorum Medal of Excellence (RWTH Aachen).

Invited Speaker: Stavros Komineas, Department of Mathematics and Applied Mathematics, University of Crete.

Title: Dynamics of skyrmions in chiral ferromagnets

Contains: We will give a description of the dynamics of topological and non-topological solitons in ferromagnetic films. We study materials with a Dzyaloshinskii-Moriya interaction and easy-axis anisotropy.
Our analysis is based on an important link between topology and dynamics which is established through the construction of unambiguous conservation laws.
In particular, we study the motion of a topological skyrmion with skyrmion number Q=1 and a non-topological skyrmionium with Q=0 under the influence of an applied field gradient (which plays the role of a force).
The Q=1 skyrmion undergoes Hall motion perpendicular to the direction of the field gradient with a drift velocity proportional to the gradient.
In contrast, the non-topological Q=0 skyrmionium is accelerated in the direction of the field gradient, thus exhibiting ordinary Newtonian motion.
When the applied field is switched off the Q=1 skyrmion is spontaneously pinned around a fixed guiding center, whereas the Q=0 skyrmionium moves with constant velocity v.
We give a numerical calculation of a skyrmionium traveling with any constant velocity v that is smaller than a critical velocity vc.
We derive virial relations for static and traveling skyrmions and also analytical formulae for the dynamics of skyrmions under forces. The accuracy of numerical results is tested against these analytical results.

Short CV: Assistant Professor, Department of Mathematics and Applied Mathematics. University of Crete, Heraklion, Greece. Previous positions: Research Fellow with Max-Planck Institute for the physics of complex systems (Dresden), Cavendish Laboratory University of Cambridge, University of Bayreuth.
PhD in Theoretical Physics. Thesis on **"**Dynamics of Topological Magnetic Solitons**"** - University of Crete.

Research interests

Nonlinear Dynamics in condensed matter. Mathematics and physics of solitons in higher dimensions.
Dynamics of topological and non-topological magnetic solitons. Spin dynamics and spintronics.
Nonlinear Schroedinger equations. Quantized vortices, solitons and vortex rings in Bose-Einstein condensates. Solitons in Polariton condensates.

Organization of workshops/conferences:

✓ Organiser of the Workshop ***"Domain Microstructure and Dynamics in Magnetic Elements"***. Heraklion, Crete, Greece, 8-11 April 2013.

✓ Organiser of the Workshop and Seminar ***"Topological Patterns and Dynamics in Magnetic Elements and in Condensed Matter"*** Max-Planck Institute for the physics of complex systems. Dresden, Germany, 27 June - 8 July 2016.

Invited Speaker: Alessandra Manzin, Istituto Nazionale di Ricerca Metrologica (INRIM),Torino

Title: Towards large-scale micromagnetic simulations of static and dynamic properties of magnetic nanostructured films for magnetosensing applications

Contains: The recent advances in nanofabrication techniques push the study of artificially patterned magnetic thin films for emerging applications in high density magnetic storage, sensor technology, and magnonic-crystal based systems. Interesting properties can be provided by magnetic antidot arrays (magnetic thin films with embedded holes), whose static and dynamic behavior is strongly influenced by the lattice geometry, which can be artificially tuned by varying hole shape, size, arrangement and packing fraction. In such scenario, the accurate control of the structural features at the microscopic scale is of fundamental importance to avoid alterations of expected hysteresis, anisotropy and magnetoresistance properties as well as magnetization dynamics and resonance modes.
In this talk, massive and high-resolution micromagnetic simulations will be presented as a powerful tool to investigate the role of microstructural properties and randomly distributed lattice defects on the static and dynamic behavior of large-scale magnetic antidot arrays, in perspective of future applications in nano-scale biosensing and lab-on-chip systems.

Short CV: Alessandra Manzin received the Master Degree, cum laude, and the PhD Degree in Electrical Engineering from Politecnico di Torino (Italy), respectively in 2000 and 2004. Since 2002, she is researcher at the IEN Galileo Ferraris of Torino (now Istituto Nazionale di Ricerca Metrologica, INRIM). Her main current interests concern the development of mathematical models and numerical codes for the study of nano/micro-structured materials and electronic devices for sensors, spintronics and magnonics applications. She is author of more than 85 papers in peer reviewed international journals; she has been involved, also as WP leader, in several national and international research projects, including iMERA-Plus and EMRP projects in the framework of the European Association of National Metrology Institutes.

Invited Speaker: Eric Maslen, James Madison University

Title: Computational Electromagnetics for Magnetic Bearings and Levitation

Contains: General introduction to magnetic bearings and levitation, Differences between bearings and general levitation problems, Common topologies of magnetic bearings and magnetic levitation systems, Classes of computational problems: general design, saturation, linearization, dynamic effects, Where the art is and what remains challenging.

Short CV: Dr. Eric Maslen earned his Bachelor of Science in Mechanical Engineering from Cornell University in 1980 and his Doctorate in Mechanical Engineering from the University of Virginia in 1991. He joined the faculty of the University of Virginia in 1990, was promoted to Associate Professor in 1996 and Full Professor in 2003. He joined James Madison University in 2010 as the Head of the Department of Integrated Science and Technology. Dr. Maslen has held visiting appointments at the Technical University of Vienna (Austria), the Technical University of Darmstadt (Germany), the University of California at Berkeley (USA), and Shandong University(China). Dr. Maslen's research has focused on magnetic bearings and rotor-dynamics. He has published 55 journal papers, 110 conference papers, 6 patents, and one book on these subjects. Dr. Maslen received the Jorgen Lund Memorial Award in 2010 and the Rudolf Kalman Best Paper Award in 2007.

Invited Speaker: Thomas Schrefl, Danube University Krems

Title: Micromagnetics for rear earth reduced permanent magnets magnets

Contains: Permanent magnets are key elements for power conversion for sustainable technologies. The increasing demand of permanent magnets for wind power, hybrid and electric vehicles led to a search for novel permanent magnets with reduced amount of (heavy) rare earth elements. Micromagnetic simulations give a basic understanding of the magnetization reversal process at the nano- and microscale that determine the coercivity of a permanent magnet. In the talk I will give an introduction into the micromagnetic theory of permanent magnets. I will address several concepts for rare earth reduced magnets: (1) Grain boundary engineering in NdFeB based magnets, (2) Core-shell structured (Fe,Co)B based magnets, and (3) MnAl based magnets.

Short CV

Personal Data

Date of Birth	26.03.1965
Place of Birth	St. Pölten, Austria
Nationality	Austria

Education

1991	Diploma Degree in Technical Physics, Vienna University of Technology
1993	Doctoral Degree in Technical Physics, Vienna University of Technology
1999	Habilitation in Computational Physics, Vienna University of Technology

Positions

1994 – 1999	Post-Doc at Vienna University of Technology
2000 – 2005	Project Leader, START Prize, Principal Investigator Project
2001	IBM Almaden Research Center, IBM Watson Research Center (Parallelization of magnetics software on the Blue-Gene supercomputer)
2004 – 2012	Professor of Functional Materials, University of Sheffield, UK
since 2009	Professor, St. Pölten University of Applied Sciences, Austria
starting 7/2014	Senior Researcher, Center for integrated Sensor Systems, Danube University Krems, Austria

Awards

START prize by the Austrian Science Fund, 1999

Wohlfarth memorial lecturer, 2004

Invited Speaker: Konstantin Skokov, Technische Universität Darmstadt,

Title: Re-thinking rare earth magnets for energy applications: Demand, sustainability and the reality of alternatives

Contains: Due to their ubiquity, magnetic materials play an important role in improving the efficiency and performance of devices in electric power generation, conversion and transportation. Permanent magnets are essential components in motors and generators of hybrid and electric cars, wind turbines, etc. Magnetocaloric materials could be the basis for a new solid state energy efficient cooling technique alternative to compressor based refrigeration.

The talk focuses on rare earth, rare earth free permanent magnets and magnetocaloric materials, with an emphasis on their optimization for energy and resource efficiency in terms critical element utilization. The concept of criticality of strategic metals is explained by looking at demand, sustainability and the reality of alternatives of rare earths. Modelling, synthesis, characterization, and property evaluation of the materials will be discussed considering their micromagnetic length scales and phase transition characteristics.

Invited Speaker: Andrei Slavin, Oakland University.

Title: Autonomous and Non-Autonomous Dynamics of Spin Hall Auto-Oscillators

Contains: A novel type of spin-torque nano-oscillators driven by pure spin current generated via the spin Hall effect has been demonstrated recently. The study of the effects of external microwave signals on these Spin Hall oscillators (SHO) is reported. It is shown that SHO can be efficiently synchronized by applying a microwave signal at approximately twice the frequency of the auto-oscillation, which opens additional possibilities for the development of novel spintronic devices. It is found that the synchronization exhibits an apparent threshold determined by magnetic fluctuations pumped above their thermal level by the spin current, and is significantly influenced by the nonlinear self-localized nature of the auto-oscillatory mode.

Short CV: Andrei Slavin received his Ph.D. in Physics in 1977 from the St.Petersburg Technical University in St. Petersburg, Russia. Dr. Slavin developed a state-of-the-art theory of spin-torque oscillators, which has numerous potential applications in the computer and communications industries. His current research support includes multiple grants from the U.S. Army, DARPA, SRC and the National Science Foundation. This research involves international collaborations with leading scientists in many countries, including Germany, Ukraine, France, Italy, and the United States. Dr. Slavin is a frequently invited speaker at magnetism and multidisciplinary conferences around the world. Andrei Slavin is Fellow of the American Physical Society, Fellow of the IEEE and Distinguished Professor of the Oakland University.

Invited Speaker: Alexandr Stupakov, Institute of Physics CAS, Prague, Czech Republic

Title: Physically accurate magnetic measurements versus the industrially adapted techniques

Contains: Recently we developed a unique setup for precise and accurate measurements of the magnetic hysteresis, the magnetic Barkhausen noise and the magneto-acoustic emission. A novelty of this setup consists in a combination of two main features: a precise local determination of the magnetic field and a feedback control of the magnetization process. Firstly, the tangential component of the surface magnetic field is measured by two Hall sensors at different distances above the sample. The sample field is determined by a linear extrapolation of these measured fields to the sample surface. Secondly, a digital feedback loop adjusts the time dependence of the magnetic induction or field. This provides stable and physically accurate results, which are independent of a specific experimental configuration. In particular, the measurements can be correctly performed in the magnetically open configurations, which was considered to be a real technical challenge so far. For the hysteresis measurements of the soft electrical steels, a strong linear relation between our results and the standard IEEE data was obtained. However, for the Barkhausen noise, the comparison of our measurement results with those obtained by an industrial device is not so univocal. Our latest results demonstrated that the Barkhausen noise and the magneto-acoustic emission should be driven by the rate of change of the magnetic field and the differential permeability of the tested material.

Short CV: Alexandr Stupakov received his M.Sc. degree in Physics from the Donetsk State University, Ukraine, in 1999 and Ph.D. degree in Physics of Condensed Matter and Material Research from Charles University in Prague, Czech Republic, in 2006. From 2006 to 2008, he was a JSPS postdoctoral fellow at the Institute of Fluid Science, Tohoku University, Japan. In 2012 he was awarded by the Czech Science Foundation for a successful realization of his second postdoctoral project. At present, he is a scientist at the Institute of Physics, Czech Academy of Sciences. He is a co-/author of >35 publications in the impacted journals. His fields of interest are a non-destructive evaluation of structural materials by the magnetic inductive methods; a stabilization and a unification of the magnetic hysteresis and the Barkhausen noise techniques; measurement systems and a digital signal processing.

Invited Speaker: Chengjun Sun, Argonne National Laboratory

Title: Investigation of Heat Assisted Magnetic Recording Media with Hard X-Rays

Contains: Heat-assisted magnetic recording (HAMR) is one of the most promising approaches to achieve extremely high density magnetic recording. A laser is used to temporarily heat the recording media film to reduce its switching field to below the magnetic field of the writing head. After writing, the film material is cooled down to room temperature for data storage. In this dynamic writing process, the challenge is to tailor and optimize the time resolved structural/thermal/magnetic properties of the media films and their correlations during/after the laser heating. In this talk, I will present an investigation of the lattice dynamics and nanoscale thermal transport in HAMR media using beamline 20-ID-C in Advanced Photon Source at Argonne National Laboratory. Furthermore, the studies of enhancing magnetic moment and tuning Curie temperature of $L1_0$ ordered FePt thin films will also be described, respectively.

Short CV: Chengjun Sun obtained his Ph.D. in Materials Science from National University of Singapore (NUS) in 2004, he started the research on CoCrPt perpendicular media film for high density magnetic recording at Data Storage Institute (DSI) in 1999, initially as NUS graduate research scholar, and later as DSI research staff member. He was a postdoctoral research associate at Oak Ridge National Laboratory from 2006-2008. He joined in the Magnetic Media Division of Western Digital, Co. in San Jose, California in 2008 to initiate the research and development of the $L1_0$ FePt based media films for heat assisted magnetic recording. He is currently a Physicist in Advanced Photon Source at Argonne National Laboratory. Dr. Sun holds 2 US patents, he has published more than 60 peer-reviewed articles, and he gave multiple invited talks at major international magnetic conferences. He was the organizer and chair of the symposium of “Advances in Heat-Assisted Magnetic Recording” at IEEE International Magnetics Conference-INTERMAG 2015, he also served as reviewer for a number of journals.

Invited Speaker: Paola Tiberto, Divisione Nanoscienze e Materiali, INRIM

Title: Nanofabrication by nanolithography process in magnetic thin films

Contains: Synthesis of nanopatterned magnetic materials offers advanced capabilities in tailoring material structures and opens up new opportunities for engineering innovative devices (i.e. electronic and biomedical). Applications for nanomagnetic materials include non-volatile magnetic random access memory (MRAM), highly sensitive magnetic field sensor, field programmable spin logic, and patterned media for ultra-high density data storage. Progress in nanomagnetism has been recently achieved by the simultaneous advances either in nanotechnology allowing to fabricate nanoscaled devices or in enhanced computing performance allowing carefully predictive micromagnetic simulations. One of the major challenges for technological applications is represented by the precise control of the magnetic switching processes occurring in nanostructures. A good understanding of the magnetization reversal process is therefore needed in order to tailor novel magnetic devices.
In this talk, a variety of nanostructures on magnetic thin films obtained either by top down (i.e. Electron Beam lithography or Focused Ion Beam) or bottom up nanolithographical techniques will be shown. The use of such techniques allow to easily design a wide variety of nanostructures arrays having different geometry (i.e. diameters ranging from 10 nm up to 1 □m) and compositions, as will be shown. Particular attention will be given to experimentally study the magnetization switching and magnetotransport behavior taking advantage of micromagnetic simulations on differently ordered, wide area nanostructures arrays. The effect of morphological properties taking into account different magnetic anisotropy value and investigating the influence of lattice order (presence of nanodomains and local defects, as dot interconnections) will be discussed in many configurations.

Short CV: Paola Tiberto got the degree in Physics at the University of Torino in 1989. In 1993 she got a a Ph.D in experimental physics from the Physics Department of Torino Politecnico discussing a thesis on "Non-Conventional Phase Transformation in ferromagnetic glasses". Since 1994 she is working at the Istituto Nazionale per la Ricerca Metrologica (INRIM, formerly Istituto Elettrotecnico Nazionale Galileo Ferraris) as a senior researcher. She is member of the INRIM Scientific Council and she is responsible of the Research Program “Nanomagnetism” for INRIM. She focused her recent scientific activity basically on the following topics: synthesis and characterisation of magnetic nanostructures, magnetisation dynamics and magnetotransport proporties in nanostructures. She is author of more than 220 scientific papers published in International Journals in the field of magnetism. She has been involved in several research projects national and international mainly focused on the properties of metastable nanostructured materials and thin films. She has been the coordinator for several national and international projects (EU-FP7 MNP Program; H2020 ITN Marie Curie Actions).

Invited Speaker: Manuel Vazquez, Institute of Materials Science of Madrid, CSIC

Title: Cylindrical Nanowires: from applications of their arrays to the spin reversal of individual wires

Contains: Magnetic nanowires and their arrays are widely investigated owing to the broad range of their applications including magnetic sensors, biomedical functionalization, or alternative families of RE-free permanent magnets and 3D magnetic storage media. The low cost of synthesis and processing together with a high degree of reproducibility of the magnetic behavior are important aspects in those technological applications. The electrochemical route enables the growth of cylindrical nanowires (15 to 200 nm diameter and up to tens of microns long) into ordered nanoporous templates. A deep knowledge of the magnetization reversal process of individual nanowires becomes essential for the design and control of those applications.

We focus on Co and CoFe nanowires whose *hcp*, *fcc* or *bcc* crystalline structure, as observed by HRTEM, determines the magnetocrystalline anisotropy and finally the spin reversal mechanism. Two spin reversal modes are identified by micromagnetic simulations: nucleation of a vortex-like structure at the ends followed by its propagation, and additional rotational mode in wires with strong perpendicular anisotropy. Electron holography and Lorentz microscopy allows one to visualize the magnetic flux distribution and infer the stability of the spin configuration. Individual nanowires with periodical modulations in composition (multilayer/multisegment) and diameter are particularly analyzed. Their spin configuration, imaged by magnetic force microscopy reveals the wall pinning at diameter modulations. These images are correlated to local hysteresis loops of nanowires measured by magnetooptic Kerr effect. XMCD-PEEM imaging, usually used on 2D samples, has allowed us to unveil additional magnetic information of the inner spin distribution profiting of the mean free path of secondary electrons.

Short CV: Prof. Manuel Vazquez is the Head of the group on Nanomagnetism and Magnetization Processes at the Institute of Materials Science of Madrid, CSIC. After receiving his PhD at Complutense University of Madrid he performed postdoctoral studies in Max-Planck-Institut für Metallforschung, Stuttgart. His research activity has been focused towards various aspects of magnetism and magnetic materials particularly on the magnetic domain structure, magnetic anisotropy, magnetization process and sensing applications in nano and microwires. Prof. Vazquez has co-authored over 400 scientific publications (h=45) and 20 patents, supervised more than 30 PhD works and coordinated a number of national and international projects. He was Chair of Intermag 2008 in Madrid and Program Chair of ICM'15 in Barcelona. He is currently President-elect of the IEEE Magnetics Society.

Invited Speaker: Augusto Visintin , Dipartimento di Matematica, Università di Trento.

Title: Mathematical models of hysteresis phenomena

Containts:Interdisciplinary research in the physics and in the mathematics of hysteresis have been ourishing in the last decades, and for a number of years has been at the focus of the series of meetings Hysteresis Modeling and Micromagnetics. This talk will briey illustrate some of those models, especially addressing an audience which will mainly consist of non-mathematicians. Classical models of hysteresis in magnetism and elasto-plasticity were proposed by applicative scientists: Duhem, Prandtl, Ishlinski, Preisach and others. In the 1970s the Russian school of Krasnosel'ski, Pokrovski and others introduced and investigated the notion of hysteresis operators: these are characterized by rate-independent memory.
An issue apart if the classical model of micromagnetism of Landau and Lifshitz. This model represents relaxation and precession, and is thus rate-dependent; but it goes to the heart of ferro-magnetism, which is an essentially rate-independent phenomenon on the macroscopic scale.
A rate-independent amendment of that model will be illustrated.

Short CV: Resident in Trento. Italian nationality
Education and Main Stays
July 1975: "laurea" in mathematics at the University of Pavia, with a thesis on the Stefan problem (advisor E. Magenes)
Oct. 1978 -- June 1979 (on leave from C.N.R.): fellowship at the Laboratoire Associe' d'Analyse Numerique de l'Universite' de Paris VI (advisor J.L. Lions)
Dec. 1981 -- June 1983 (on leave from C.N.R.): researcher position at the S.F.B. 123 at the University of Heidelberg (collaboration with W. Jaeger and S. Luckhaus).
Positions
Oct. 1975 -- June 1977: fellowship at the Istituto di Analisi Numerica of C.N.R., in Pavia
July 1977 -- May 1987: researcher at the Istituto di Analisi Numerica of C.N.R., in Pavia
Dec. 1981 -- June 1983 (on leave from C.N.R.): researcher at the S.F.B. 123 at the University of Heidelberg
May 1987 -- present: full professor of mathematical analysis at the University of Trento.
Memberships
1975 -- present: member of the Unione Matematica Italiana
1980 -- present: member of the G.N.A.F.A. of C.N.R. and then of the G.N.A.M.P.A. of the Istituto di Alta Matematica
1996 -- present: member of the International Society for the Interaction of Mechanics and Mathematics
1997 -- present: corresponding member of the Istituto Lombardo di Scienze e Lettere
2000 -- present: member of the European Mathematical Society.
Boards
1999 -- 2000: member of the scientific council of the Istituto di Analisi Globale Applicata of C.N.R., in Florence
2001 -- 2012: member of the Executive Committee of the International Society for the Interaction of Mechanics and Mathematics
2013 -- present: president of the International Society for the Interaction of Mechanics and Mathematics
Editorial Boards
1992 -- present: journal "Advances in Mathematical Sciences and Applications"
1993 -- present: book series "Gakuto Monographs in Mathematics", with the Japanese publisher Gakkotosho
2000 -- present: journal "Bollettino dell'Unione Matematica Italiana".