



Proceedings of the European Conference
PHYSICS OF MAGNETISM 2011 (PM'11)

Poznań, Poland, June 27–July 1, 2011

Dedicated to the Memory of Professor Bogdan Fechner

Adam Mickiewicz University
Faculty of Physics



Institute of Molecular Physics
Polish Academy of Sciences



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The European
Conference



Physics of Magnetism 2011

27 June – 1 July 2011, Poznań, Poland



Participants of the European Conference PHYSICS OF MAGNETISM 2011 (PM'11)

(photo by M. Nowak)

Preface

The European Conference PHYSICS OF MAGNETISM 2011 (PM'11) was the thirteenth of the series that have been organized jointly by the Institute of Molecular Physics of the Polish Academy of Sciences and the Faculty of Physics of the Adam Mickiewicz University every three years since 1975 in Poznań. From the early beginning, the conferences were meant as an international forum for the presentation and discussion of novel scientific ideas in the field of broadly understood magnetic phenomena including experimental results and new materials. A special emphasis of the present Conference was on novel metallic oxides and anomalous magnetoresistive materials, low dimensional quantum magnets, heavy fermions, fluctuating valence and Kondo systems, magnetic multilayers, surfaces, nanostructures, and magnonic crystals, high temperature superconductors and electronic structure.

All conferences from this series were held in Poznań, the capital of Wielkopolska (Greater Poland), which for a long time has been known by our regular visitors as a place for frequent meetings of Polish and international “magnetic” community.

As for the earlier conferences of this series, the venue of the thirteenth PM'11 conference held on June 27–July 1, 2011 was again Poznań, in the modern buildings of A. Mickiewicz University, offering excellent conference facilities.

The Conference PM'11 was divided into several sessions chaired by scientists from the conference Programme and Advisory Committees. The program of the Conference consisting of 31 invited talks. They were presented by distinguished physicists from Europe, USA, Canada, and Japan.

One of the conference lecture was delivered by Prof. Peter Andreas Grünberg (Germany), co-discoverer of giant magnetoresistance effect. Prof. Grünberg together with Prof. Albert Fert (France) were awarded the Nobel Prize in Physics for their discovery of giant magnetoresistance effect in 2007.

It is also worth mentioning the visit of Prof. Jacek K. Furdyna (USA), who was not only invited by the organizers of the conference but also by the Mayor of Poznań and gave a lecture within the program *Academic Poznań*.

The invited speakers (in alphabetical order) included:

- F. Aliev (Spain) — *Conductance and Noise in Fully Epitaxial Magnetic Tunnel Junctions*
- C. Back (Germany) — *Non Local Magnetization Dynamics Due to Spin Pumping*
- A. Barthélémy (France) — *Towards an Electric Control of Spintronics Devices*
- K.W. Becker (Germany) — *Heavy Fermion Properties in the Kondo Lattice Model*
- B. Coqblin (France) — *Kondo Lattice Models for Rare-Earth and Actinide Systems*
- H.T. Diep (France) — *Spin Resistivity in Magnetic Materials*
- T. Dietl (Poland) — *Ferromagnetic Semiconductors at the Boundary of Holes' Localization*
- J.K. Furdyna (USA) — *Exchange Coupling in Magnetic Semiconductor Multilayers and Superlattices*
- P. Grünberg (Germany) — *From World Energy Problems to Giant Magneto Resistance and Spin Torque*
- G. Gubbiotti (Italy) — *Spin Wave Propagation Properties in Planar Magnonic Crystals*
- P. Horsch (Germany) — *Spin-Orbital Physics and Defect States in Doped Vanadates: $Y_{1-x}Ca_xVO_3$*
- G. Kamieniarz (Poland) — *Anisotropy, Geometric Structure and Frustration Effects in Molecule-Based Nanomagnets*
- R.K. Kremer (Germany) — *The Spin-1/2 Frustrated Helicoidal Antiferromagnetic Multiferroic System $LiCuVO_4$: Recent Results*
- C. Lambert (U.K.) — *Molecular-Scale Electronics and Mechanical Analogues of Spin Torques*
- S. Maekawa (Japan) — *Spin-Wave Spin-Current and Spin Seebeck Effect*
- M. Maška (Poland) — *Mutual Enhancement of Magnetism and Fulde-Ferrell-Larkin-Ovchinnikov Superconductivity in $CeCoIn_5$*
- A. Maziewski (Poland) — *Engineering of Magnetic and Magneto-optical Properties of Co Based Nanostructures*
- L.W. Molenkamp (Germany) — *Dirac Fermions in HgTe Quantum Wells*
- H. Ohno (Japan) — *MgO-CoFeB Interface Perpendicular Anisotropy for Spintronic Devices*
- M. Przybylski (Germany) — *Quantum Well States and Oscillatory Magnetic Anisotropy in Ultrathin Fe Films*
- R. Puźniak (Poland) — *Anisotropy of Superconducting State Properties in Cuprates, MgB_2 , and Pnictides*
- U.K. Rössler (Germany) — *Skyrmionic Matter — a New Type of Magnetic Order*
- K. Rogacki (Poland) — *Critical Currents of FeAs Based Superconductors in High Magnetic Fields: Hopes for Large Scale Applications*
- G.A. Sawatzky (Canada) — *New Magnetic Materials Based on Defects, Anion Substitution, Interfaces and Doping*
- D.J. Singh (USA) — *Magnetism and Superconductivity in Iron Pnictides*

I. Škorvánek (Slovakia) — *Recent Progress in FeCo Based Soft Magnetic Nanocrystalline Alloys*
 J. Spałek (Poland) — *Superconductivity in Strongly Correlated Systems and Comparison to Experiment*
 D.A. Tennant (Germany) — *Twists, Symmetries, and Topology in Quantum Magnetism*
 A. Thiaville (France) — *Domain Wall Dynamics Under Short Current Pulses: Spin-Transfer Torque and Other Effects*
 T. Toliński (Poland) — *From Heavy Fermion and Spin-Glass Behavior to Magnetic Order in CeT₄M Compounds*
 K.I. Wysokiński (Poland) — *Impurities and Correlations in the Boson-Fermion Model of Superconductors*

Besides the above, 228 contributions were presented in either oral (36 short talks) or poster form.

The papers which were submitted and accepted for publication after the referee procedure are published in the conference proceedings.

The success of PM'11 was due to the contribution to the program of 298 participants from different countries. The collaboration with the Editorial Staff of *Acta Physica Polonica A* was efficient and fruitful for both sides. The Guest Editors wish to thank the staff members for their effort and enthusiasm.

It is with great regret that we inform the readers that Professor Bogdan Fechner passed away on the 26th of December 2009. He and his achievements will long be remembered. This issue of *Acta Physica Polonica A* is dedicated to his memory.

Finally, we would like to take this opportunity to thank our colleagues from the Programme, Advisory and Organizing Committees, as well as the referees, who have ensured the scientific quality of the conference and of the proceedings. Our special thanks are also due to all the Sponsors of the Conference (see the relevant list).

M. Thomas, J. Barnaś, J. Dubowik, M. Bąk,
 R. Micnas, B. Idzikowski, R.J. Wojciechowski, A. Szajek

In Memoriam Professor Bogdan Fechner (1930–2009)



(photo by M. Nowak)

Professor Bogdan Fechner was born on March 27, 1930, in Bydgoszcz and passed away at the age of 79 on December 26, 2009, in Poznań. All his private and professional life was connected to Poznań. He joined the faculty of Adam Mickiewicz University (AMU) in 1954, to become first Assistant to Professor Szczepan Szczeniowski, the doyen of Polish physicists. Upon the defense of his dissertation in 1962, he was conferred a D.Sc. degree in physics and promoted to Assistant Professorship. Having earned his post-doctoral *Habilitation* degree in 1977, he worked as an independent researcher and in 1989 was awarded full professorship. The academic interests of Prof. Fechner were focused on phase transition theory, in particular in application to magnetic materials. In the mid-1960s, he spent some time at King's College, London, as member of a group working on phase transitions. In that period the physics of phase transitions was a hot and rapidly progressing field of research. His experience gained abroad fostered the

development of this field at Adam Mickiewicz University — the efforts of Prof. Fechner and his co-workers resulted in founding the Phase Transition Theory Division at the Faculty of Physics, AMU in 1987, headed by Prof. Fechner till 2000. The papers he published concentrated on the theory of phase transitions in different systems, mostly magnetic, dynamics in the critical region, and the properties of disordered and frustrated spin systems.

As a member of the Faculty of Mathematics, Physics and Chemistry, and later the Faculty of Physics, AMU, Professor Fechner was a highly appreciated academic teacher and advisor. In 1971–1975, he also lectured with great success on theoretical physics at the University of Halle, Germany.

Apart from his dedication to research work and teaching, Prof. Fechner showed a great sense of commitment to the academic profession: he was vice-Dean for Research at the Faculty of Mathematics and Physics, AMU in 1981–1984, and Dean of the Faculty of Mathematics and Physics AMU in the turbulent period of 1984–1987. In 1990–1993, he was a member of the University Senate. As Chair of the Committee for Scientific Research and Journals and member of the Presidium of the National Council of Higher Education in 1993–2002, he substantially contributed to the development of Polish academia.

Prof. Fechner (along with Prof. Janusz Morkowski) was one of the main organisers of regular national conferences on magnetism (Fizyka Magnetyków). The conferences on the Physics of Magnetism were first organised by the Institute of Physics and later, from 1975, by the Faculty of Physics, AMU in cooperation with the Institute of Molecular Physics of the Polish Academy of Sciences.

Since 1993, the meetings have become important international events known as the European Conferences – Physics on Magnetism. They have largely contributed to the integration of academic projects and research not only in the area of magnetism, but also in the fields of superconductivity, systems with strongly correlated electrons, and in nanophysics. Prof. Fechner significantly contributed to the success of the conference, especially in 1975–1993 when he was much engaged in determining the agenda of the event. Thanks to Professor's effort, it gained high prestige and attracted many leading scientists from all over the world.

Throughout all his life Prof. Bogdan Fechner was widely appreciated for his integrity and high ethical standards in academic research and education. His decorations include the Gold Cross of Merit, the Chevalier's Cross of Polonia Resituta, the Medal of National Education, and three individual awards of the Minister of Academic Research and Higher Education.