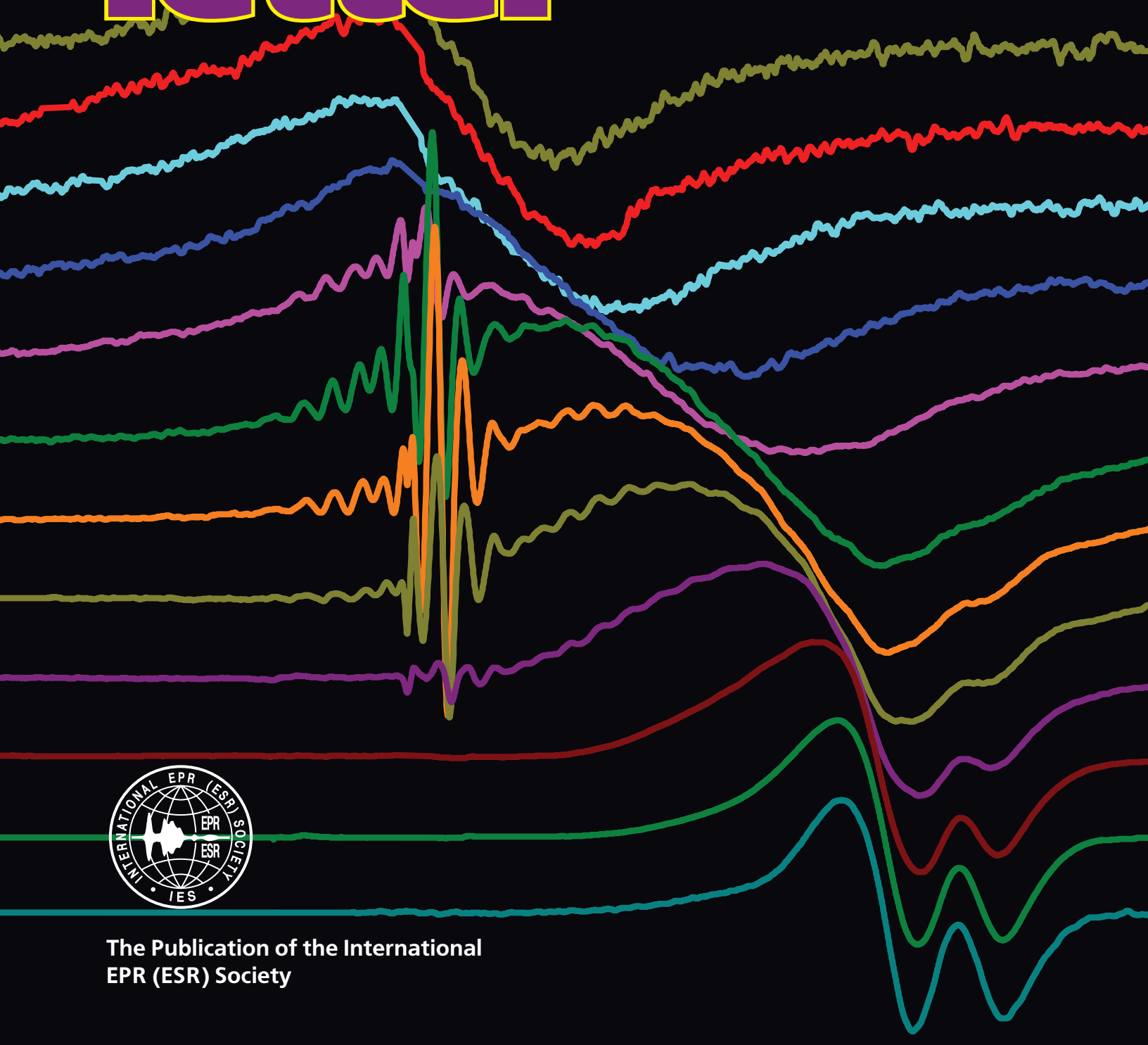
epr newsletter

2011
volume 21 number 3



The Publication of the International
EPR (ESR) Society

Officers of the International EPR (ESR) Society

Fellows of the International EPR (ESR) Society

Anatole Abragam (1914–2011)
John Michael Baker
Brebis Bleaney (1915–2006)
James R. Bolton
Harvey A. Buckmaster
Anders Ehrenberg
Gareth R. Eaton
Sandra S. Eaton
George Feher
George Fraenkel
Erwin Hahn
Karl Hausser (1919–2001)
Noboru Hirota
Clyde A. Hutchison, Jr. (1913–2005)
James S. Hyde
Lowell Kispert
Daniel Kivelson (1929–2003)
Melvin P. Klein (1921–2000)
Harry Kurreck
August H. Maki (1930–2008)
Bruce R. McGarvey
Keith A. McLauchlan
Klaus Möbius
Yuriy N. Molin
James R. Norris
John R. Pilbrow
Charles P. Poole, Jr.
Aleksandr M. Prokhorov (1916–2002)
Tengiz I. Sanadze
Charles P. Slichter
Leslie H. Sutcliffe
Harold M. Swartz
Martyn C. R. Symons (1925–2002)
Yuri D. Tsvetkov
Joan H. van der Waals
George D. Watkins
John A. Weil (1929–2010)
Samuel I. Weissman (1912–2007)
David Whiffen (1922–2002)
Hans C. Wolf

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www.epr-newsletter.ethz.ch

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Please feel free to contact us with items (news, notices, technical notes, and comments) or ideas for the *EPR newsletter*.

The *EPR newsletter* is published quarterly by the International EPR (ESR) Society and is available in electronic and printed form to all members of the Society. The deadlines for submission of news for upcoming issues: Spring March, 15; Summer June, 15; Fall September, 15; Winter December, 15.

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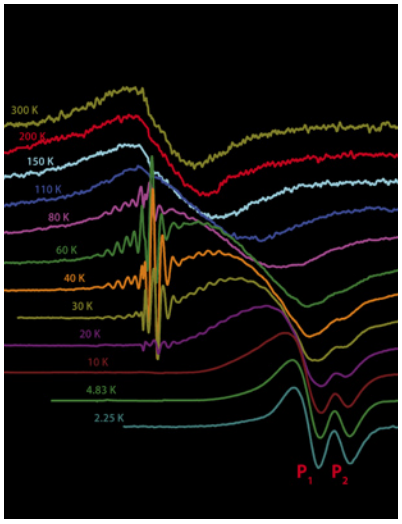


The cover picture illustrates aspects of the research carried out by Naresh Dalal, recipient of the 2010 IES Silver Medal for Physics/Materials Science (see also *EPR newsletter*, 20/1, p. 3). It shows 240 GHz EPR spectra of a Mn_7 complex with a ground state spin $S = 29/2$, straddling the boundary of classical and quantum mechanical spin space (J. Am. Chem. Soc, 2011, 133, 17586–17589).

epr newsletter

The Publication of the International EPR (ESR) Society

volume 21 number 3 2011

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Editorial

Dear colleagues,

When I look at the cover of this issue, I feel like I am looking at a black sky on New Year's Eve when it is richly decorated with the traces of fireworks. Or perhaps these spectral lines are colored paper streamers of a joyful New Year carnival... it looks terrific, doesn't it?

The highlight of this last issue of 2011 is a report about the Annual General Meeting 2011 that took place in Frankfurt-am-Main at the EUROMAR2011. This report summarizes the recent activities of the IES (pp. 3–6).

On the initiative of Sushil Misra, Secretary of the IES, we asked Ron Mason, the IES Gold Medal 2011, Keith Earle and Graham Smith, the joint IES Silver Medal 2011Instrumentation, Enrica Bordignon, IES Young Investigator Award 2011and Alexei Silakov, IES Young Investigator John Weil Award 2011, to prepare articles describing their relevant research (pp. 8–12). We did not specify the form of the presentation, only gave a rather wide word limit. Interestingly, their articles not only illustrate their research but also bear the touch of their personalities.

An important issue was that the Young Investigator Award laureates were told in plain words that some time later they will be requested to contribute a story to the *EPR newsletter* about the progress in their lives and research. Hopefully, this will also stimulate the former IES Young Investigator Award laureates to share with us their current activities as well. An Award is not only a distinction from the IES but also an obligation to the IES.

Hisaaki Tanaka, SEST Young Investigator Awardee 2011, commented on his award research as it is already a tradition with SEST Awards (p. 13).

We congratulate all of them, and IES Fellows Michael Baker, Lowell Kispert, Klaus Möbius (p. 7), Zavoisky Award 2011 laureate Seigo Yamauchi (p. 13), and Sandra and Gareth Eaton (p. 14), who celebrated their birthdays recently.

Please note that the relevant conference reports (EUROMAR2012, "Spin Physics, Spin Chemistry and Spin Technology", and "Advanced ESR Studies for New Frontiers in Biofunctional Spin Science and Technology"), the reports on RMC and the First Turkish Bruker Magnetic Resonance Workshop were shifted to the forthcoming issue 21/4.

On behalf of my colleagues from the Editorial Board of the *EPR newsletter*, Candice Klug, Hitoshi Ohta, Thomas Prisner, Associate Editors, and Sergei Akhmin, Technical Editor, I wish you, our dear readers, all the best in 2012! And the best present for us will be a regular flow of your contributions to the *EPR newsletter*. Consider this: is so easy for you to make us happy. Just do it!

Laila Mosina

ANNUAL GENERAL MEETING 2011

Held at the 2011 Euromar Magnetic Resonance Conference, Franfurt, Germany on 24th August 2011. The meeting was opened by Sushil Misra, Secretary, IES at 13:00 hrs.

The agenda of the meeting and minutes of the AGM 2010 were distributed to those present, along with the attendance sheet and membership forms. (Everyone was invited to attend the meeting even if he/she was not a member of IES).

1. Attendance and Apologies

Attendance: Marina Bennati, Robert Bittle, Aharon Blank, Bela Bode, Enrica Bordignon, Johnathan Cole, Nicholas Cox, Anna Dimitrova, John Enemark, Nikolay Enkin, Alistair Fielding, Jack H. Freed, Daniella Goldfarb, Etienne Goovaerts, Astrid Gräslund, Edgar Groenen, Renny Hall, Graeme Hanson, Martina Huber, Gunnar Jeschke, Valery Khramtsov, Daniel Klose, Kamila Lipiszko, Irina Lobysheva, Wolfgang Lubitz, Sushil Misra, George Mitrikas, Klaus Möbius, Laila Mosina, Veronica Mugnaini, Thomas Nick, Yevhan Polyhach, Thomas Prisner, Boris Rakvin, Edward Reijerse, Thomas Risse, Emil Roduner, Ines Garcia Rubio, Yiannis Sanakis, Olav Schiemann, Deniz Sezer, Alexey Silakov, Alex Smirnov, Tatyana Smirnova, Graham Smith, Hans Wolfgang Spiess, Heinz-Jürgen Steinhoff, Wolfgang Trommer, Maurice van Gastel, Henk Vrielink.

Apologies: The Vice Presidents Mike Bowman and Michael Davies send their apologies for not being able to attend.

2. Adoption of Agenda and 2010 Minutes

The minutes of the General Meeting held on 2 May 2010 were presented. It was moved by K. Möbius, seconded by W. Lubitz that they be accepted as a true record of the previous meeting. The motion was approved unanimously.

3. President's Report

Dear Colleagues,

On behalf of the IES Executive Committee, I wish to welcome all participants to the 2011 General Meeting of the IES and EUROMAR 2011's joint meeting with the 33rd Discussion Meeting of the MR Spectroscopy Division of the GDCh and the 8th European Federation of EPR Groups Meeting.

I would like to express my gratitude to the conference organizers of this meeting, especially to the Thomas Prisner and Organizing Committee Members: Volker Dötsch, Clemens Glaubitz, Peter Güntert, Harald Schwalbe, and Jens Wöhnert for allowing our General Meeting to take place during this Conference.

This General Meeting marks the 22nd year of the IES. The previous two meetings were in Snowmass (Colorado, USA) and Puerto Rico.

Over these past 22 years, the ESR/EPR field has witnessed a real renaissance. These include new instrumental & theoretical technologies which realize its potentials of:

- High Spin Sensitivity
- Excellent Spectral Resolution
- High Sensitivity to Molecular Motion
- Ability to Measure Short & Long Distances Within & Between Molecules
- Medical Imaging & Microscopy Down to Micron Dimensions
- Limited Degree to which the Measurement Disrupts the Host
- Availability of Spin Labels for a Wide Range of Applications
- Convenience of Measurement

Applications of these capabilities include:

- Both chemical and biological applications including the study of free radicals, metalloenzymes and organo-metallic compounds, polymers, protein and membrane structure and dynamics, molecular dynamics in complex fluids, electron transfer reactions, and spin-trapping.
- In the physics/materials field, new applications such as superparamagnetism, quantum dots, and quantum computing have emerged and add to studies of ferromagnetism, semiconductors, and defect centers.
- Surely, the audience will be able to add to this extensive list.

Over the last 22 years, the IES has provided encouragement to these and other EPR developments worldwide in all scientific fields and aided in the dissemination of new ideas and methods in EPR spectroscopy throughout the scientific community.

The IES will continue to actively support and participate in the numerous national and international conferences and workshops and encourage new.

The IES will support established EPR groups and centers to maintain, and to re-establish where needed, ties amongst these EPR activities in a true international spirit.

The IES will continue to foster its accessibility to its members, providing them with the latest information on the many activities in the field of EPR.

A major function of the IES is to honor distinguished contributors to the EPR/ESR field.

These awards were initiated in 1992 with the Gold Medal and extended in 1994 to include the Silver Medals in various specialized areas of EPR.

They are Silver Medals in Chemistry, Biology/Medicine, Physics/Materials Science, Instrumentation, and the Young Investigator Award.

Gold Medal

1992 George Feher
1993 James Hyde
1994 Jack Freed
1995 Sam Weissman
1996 Kev Salikhov
1997 Harden M. McConnell
1998 Arthur Schweiger
1999 Brian M. Hoffman
2000 Wayne L. Hubbell
2001 Klaus Möbius
2002 Keith McLauchlan
2003 No Award
2004 No Award
2005 Wolfgang Lubitz
2006 No Award
2007 No award
2008 Jan Schmidt
2009 No Award
2010 No Award
2011 Awarded to Ronald Mason

- IES Award 2011

Dr. Ronald P. Mason

NIEHS/NIH, Laboratory of Toxicology & Pharmacology

in recognition of many outstanding contributions to the field of EPR over a long career including the development of spin trapping and, in particular, the development of in vivo methods for detecting radical formation in normal physiology and a wide range of pathological conditions and toxicology. He also pioneered the use of spin traps in vivo and methods for ascertaining true radical formation data.

Silver Medal: Chemistry

1994 Keith McLauchlan
1995 Clyde Hutchison

1996 Klaus Möbius
1997 Hanns Fischer
1998 Richard Fessenden
1999 Yuri Tsvetkov
2000 Larry Kevan
2001 Carlo Corvaja & Seigo Yamauchi
2002 Daniella Goldfarb
2003 Michael Bowman
2004 No Award
2005 No Award
2006 Kálmán Hideg
2007 No Award
2008 No Award
2009 Takeji Takui
2010 No Award
2009 Garry Buettner
2010 No Award
2011 No Award
NEXT: 2012

Silver Medal: Physics/Materials Science

Silver Medal: Physics/Instrumentation

1994 Wojciech Froncisz
1995 Jan Schmidt
1996 Johann-Martin Spaeth
1997 Roger Isaacson
1998 William Mims
(Split into 2 medals after 1998)

Silver Medal: Physics/Materials Science

1999 George Watkins
2000 Klaus-Peter Dinse

Jack Freed (left) and Graham Smith (right). Taken by Wolfgang Lubitz.

2011 No Award
NEXT: 2012

Silver Medal: Biology/Medicine

1994 Harold Swartz
1995 Lev Blumenfeld
1996 Ron Mason
1997 Anatole Vanin
1998 Ed Janzen
1999 Jack Peisach
2000 Lawrence J. Berliner
2001 Balaraman Kalyanaraman
2002 Ohara Augusto
2003 Michael Davies
2004 No Award
2005 No Award
2006 Periannan Kuppusamy & Jay Zweier
2007 No Award
2008 No Award
2001 Gert Denninger
2002 CAJ (Rob) Ammerlaan
2003 Edgar Groenen
2004 No Award
2005 No Award
2006 No Award
2007 Thomas Prisner
2008 No Award
2009 No Award
2010 Naresh Dalal
2011 No Award
NEXT: 2013

Silver Medal: Instrumentation

2000 Sankaran Subramanian
2001 Tadeusz Walczak
2002 George Rinard & Richard Quine
2003 No Award
2004 No Award
2005 Jos Disselhorst
2006 No Award
2007 No Award
2008 Hitoshi Ohta
2009 No Award
2010 No Award
2011 Awarded to Graham Smith and Keith Earle

• IES Award 2011

Silver Medal (Instrumentation)

Dr. Graham Smith
University of St Andrews, Scotland
in recognition of his outstanding contributions to the development of high-field EPR spectrometers employing quasi-optical microwave technology.

Dr. Keith Alton Earle
University at Albany, USA
in recognition of his exceptional work in the design and implementation of quasi-optical techniques for the instrumentation needs of High Field High Frequency EPR.

Young Investigator Award

1994 Devkumar Mustafi
1995 R. David Britt
1996 Gunnar Jeschke
1997 Robert Bittl
1998 Alex Smirnov
1999 Ilya A. Shkrob
2000 Bernard Gallez & Karsten Mäder
2001 Mark Newton
2002 Marina Bennati
2003 Stephan Zech
2004 No Award
2005 Eric McInnes
2006 No Award
2007 Leonid Kulik
2008 No Award
2009 Stefan Stoll
2010 No Award
2011 Awarded to: Enrica Bordignon and Alexey Silakov

• Young Investigator

Dr. Enrica Bordignon
ETH-Hönggerberg
in recognition of her contribution in an outstanding way to the recognition of EPR spectroscopy as a valuable tool for characterization of the structural dynamics of membrane proteins and protein complexes that is the basis of their function.

• John Weil Young Investigator

Dr. Alexey E. Silakov
Max-Planck-Institut für Bioanorganische Chemie
in recognition of your spirit of leadership and accomplishment in EPR that goes beyond mastery and proficiency and for your contributions to the EPR field including

ground-breaking studies of EPR in bioinorganic catalysis, especially work on [FeFe] hydrogenases.

The selection of Fellows of the Society was initiated in 1995 for honoring distinguished senior scientists nearing the end of their careers for their extensive contributions to EPR. They include:

1995 Anatole Abragam*, Brebis Bleaney*, Clyde Hutchison*, Aleksandr Prokhorov*, Samuel Weissman*

1996 George Feher, Erwin Hahn, Joan van der Waals

1998 George Fraenkel*, Karl Hausser*, Yuri Molin, Charles Poole, Charles Slichter, John Weil*, David Whiffen*

1999 Melvin Klein*, Martyn Symons*, Hans C. Wolf

2000 Anders Ehrenberg, Noboru Hirota, August H. Maki*, Bruce R. McGarvey, Tengiz Sanadze

2001 James R. Bolton

2002 James S. Hyde

2003 Daniel Kivelson*, Harry Kurreck

2004 None

2005 Harvey Buckmaster, Keith McLauchlan, Harold M. Swartz, George Watkins

2006 John Pilbrow

2007 Leslie (Les) Sutcliffe

2008 Sandra Eaton, Gareth Eaton

2009 None

2010 James Norris, Yuri Tsvetkov

2011 Awarded to: Klaus Möbius, Lowell Kispert, Michael Baker

- Fellows of IES Award 2011

Professor Dr. Klaus Möbius

Emeritus, Free University Berlin, Germany

in recognition of his major contributions to the development of advanced multi-frequency EPR spectroscopy, in particular to electron-nuclear double resonance, optically detected magnetic resonance and pulse electron-electron double resonance.

Professor Lowell D. Kispert

Emeritus, The University of Alabama, USA

in recognition of his contributions to the early development of electron-nuclear double resonance and electron-electron double resonance; the dynamics of radicals in solids; to the dynamics of conduction of organic conductors; and to the free radical oxidative chemistry of carotenoids, including their quantum chemistry.

Professor John Michael Baker

Emeritus, Oxford Physics, Claredon Laboratory, UK

in recognition of his foundational contributions in the early days of EPR, particularly his pioneering work on rare earth ions in crystals and paramagnetic defects in diamond, determining nuclear spins and nuclear moments, pair interactions among rare earth ions and the subtleties of their hyperfine structures.

I want to thank all the members of the Gold and Silver Medal Committee for Instrumentation for their excellent work for the Society.

Enrica Bordighon, Jack Freed and Alexey Silakov. Taken by Wolfgang Lubitz.

Upcoming 2011 EPR Conferences

7–10 September. 3rd International Meeting on Dynamic Nuclear Polarization. EPFL, Lausanne Switzerland. http://sdnpi.epfl.ch/

11–15 September. 7th Alpine Conference on Solid-State NMR. Chamonix, France. http://www.alpine-conference.org/

26–29 September. SPIN-2011: An International Conference Devoted to Synthesis, Properties and Implications of Nitroxides. Marseilles, France. http://spin2011.org/SPIN/welcome.html

2–7 October. FACSS 2011: 38th Annual Conference of the Federation of Analytical Chemistry and Spectroscopy Societies. Reno, Nevada, USA. http://facss.org/facss/index.php

12 October. EPR Spectroscopy in Pharmaceutical R&D. AstraZeneca, Macclesfield, UK

1–6 November. International conference on Spin Physics, Spin Chemistry, and Spin Technology. Kazan, Russia. http://www.kazan_spin2011.kfti.knc.ru/

4–6 November. SEMRC 2011: 40th Southeastern Magnetic Resonance Conference. Atlanta, Georgia, USA. http://chemistry.gsu.edu/SEMRC/

14–17 November. 2011 Eastern Analytical Symposium and Exposition. Somerset, New Jersey, USA. www.eas.org

1–20 November. 2nd ISESS-SEST 2011: A Joint Conference of the 2nd International Symposium on Electron Spin Science & the 50th Annual Meeting of the Society of Electron Spin Science and Technology. Matsushima, Sendai, Japan. http://res.tagen.tohoku.ac.jp/SEST2011/

For 2012... EPR Conferences

1–5 July, 2012. EUROMAR 2012. Dublin, Ireland. http://www.euromar.org/

22–26 July, 2012. 54th Annual Rocky Mountain Conference on Analytical Chemistry at the Snowmass, Colorado, USA. http://www.rockychem.com/ssnmr/

19–24 August, 2012. ICMRBS 2012: XXVth International Conference on Magnetic Resonance in Biological Systems. Lyons, France. Contact: icmrbs2012@pasteur.fr

9–12 September, 2012. MRPM11: Magnetic Resonance in Porous Media. Gildford, Surrey,

* deceased

UK. http://www.surrey.ac.uk/physics/news/events/2012/conference_mrpm11.htm

October, 2012. APES 2012: Asia-Pacific ESR/EPR Society Meeting. Beijing, China. http://www.apeprs.org/

December, 2012. EFEPR Summer School in December. Weizmann Institute of Science, Rehovot, Israel. http://www.physics.ua.ac.be/EFEPR/index.php

4. Secretary Report

- IES Awards 2012:

Nominations are invited for the following awards:

– Silver Medal for Biology/Medicine & Chemistry
– Young Investigator Awards (Regular & Weil)
– Fellows of the Society

Please visit http://ieprs.org for full constitution and by-laws.

Send nominations to the IES President.

Closing date: 15th November 2011

- IES Activities

The Secretary is responsible for day-to-day operations of the Society, and ensures efficient functioning of the Society, e.g.:

– Sending out invoices to the sponsors;
– Informing members of the various items of interest to them, e.g. announcements of conferences and workshops;
– Organization of awards given by the IES: certificates and citations;
– Overlooking financial status and membership of the Society;
– Website (revamping);
– Answering any enquiries;
– Election Notice;
– Organizing AGM;
– Liaisons with the President, Treasurer, Editor of the EPR newsletter, and the members of the IES Executive.

Proposed amendments to the constitution:

a) Annual Young Investigator Award: There shall be given young investigator's award each year, with the regular and John-Weil ones alternating from year-to-year.

b) Modify terms for Fellowship Award: A fellowship shall be awarded at the normal end of a member's career. The fellows will not be eligible for nomination to silver or gold medals.

c) Terms and Election of New Executives: The term of the executive shall commence at the beginning of a calendar year, with the nominations deadline for awards being January 15 of the year of award.

I sincerely thank Shirley Fairhurst, my predecessor, for her enthusiastic cooperation on all matters of secretarial advice, whenever required by me.

IES Web Site (www.ieprs.org): It has been recently revamped.

5. Treasurer's Report

2010 Financial Report ($) (self-audited)

Balance January 1, 2010	9,487.94
Income:	
Membership	5,244.26
Sponsors	8,360.00
Total Income	13,604.26
Expenses:	
Bank & credit card fees	1,189.89
Web design & fees	91.25
Newsletter	8,950.00
Awards + meetings	1,259.06
State of Illinois	10.00
Total Expences	11,500.20
Balance December 31, 2010	11,592.00

2011 (January-June) Financial Report ($)

Balance January 1, 2011	11,592.00
Income:	
Membership	993.28
Sponsors	2,626.00
Total Income	3,619.28
Expenses:	
Bank & credit card fees	457.58
Newsletter	2,475.00
State of Illinois	10.00
Web support	95.75
Total Expences	3,038.33
Balance June 30, 2011	12,172.95
Obligations outstanding	8,000.00

Comment from the Treasurer:

We balanced the budget in 2010. In 2010 we have lost sponsorship from Elsevier. We more than ever need support of the members and our sponsors.

Complementary 41
Membership: paid for 2011 or 2010
Full members 154
Emeritus 15
Students 25
Postdoctoral members 25
Membership:
If you are interested in joining the IES

Membership fees are:	
Full	$30
Emeritus/retired	$10
Postdoctoral (3 years max)	$10
Student	$5
Fellows (Complementary)	

Membership forms are included in the handouts or join via the web site:

www.ieprs.org.

6. Newspaper Editor's Report

Since the previous Annual Meeting of the IES in 2010 in San Juan (Puerto Rico) we published three single issues, 20/1, 20/4 and 21/1, and a double issue 20/2-3. We hope all of you had a look at 20/1, 20/2-3, 20/4 and 21/1 on the newsletter website and got copies of 20/1, 20/2-3 and 20/4 as well. A preview of the latest issue 21/2 was presented.

On behalf of the Editorial Board, I thank most heartily all contributors to the EPR newsletter with special thanks going to the CEOs of the IES and editors of the columns in the EPR newsletter: John Pilbrow, Candice Klug, Thomas Prisner, Stefan Stoll, Keith Earle and David Budil, and also to Yevhen Polyhach, our web-master, and Sergei Akhmin, our Technical Editor.

I gratefully acknowledge collaboration with Associate Editors Candice Klug, Hitoshi Ohta and Thomas Prisner.

7. Thanks

The IES thanks the following Corporate Sponsors for their contributions in 2010–2011

Bruker BioSpin
JEOL Japan & USA
Research Specialties
Scientific Software Services
Wilmad-LabGlass
L&M EPR Supplies
Molecular Specialties
GMW
Resonance Instruments
Norell

Special thanks to

ETH Zurich for hosting the Newsletter website and the Zavoisky Physical-Technical Institute, Kazan for supporting the Newsletter

All paid up members

Newsletter Editor: Laila Mosina

Technical Editor: Sergei Akhmin

Associate Editors: Thomas Prisner, Candice Klug and Hitoshi Ohta

8. Other Business

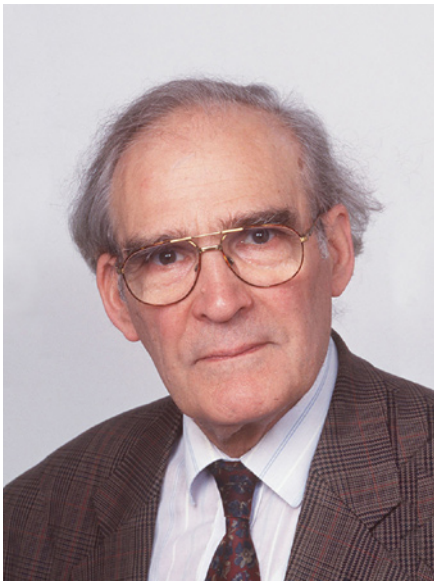
Wolfgang Trommer expressed thanks to the current Executive for their service to the EPR community.

The meeting was adjourned at 14:15.

FELLOW OF THE SOCIETY 2011

Professor **Lowell Kispert** is appointed a Fellow of the Society in recognition of his significant contributions to the field of electron paragmagnetic resonance for nearly four decades.

Emeritus Professor Lowell Kispert has been a strong contributor to the field of EPR over his career, in training EPR spectroscopists such as Raman Kalyanaraman and Joy Joseph, in helping establish the Southeast Magnetic Resonance Conference, and in contributions to EPR spectroscopy. His early work in ENDOR and ELDOR and his book with Larry Kevan on those topics helped many researchers and students get started in ENDOR and really brought together the experimental aspects of those spectroscopies in a way that neatly complemented Freed's theoretical underpinnings. Lowell made an excellent contribution to: the dynamics of radicals in solids in a series of papers on methyl group tunnelling and rotation, and dynamics of radicals in irradiated single crystals of carboxylic acids; to dynamics of conduction of organic conductors; and more recently to the free radical oxidative chemistry of carotenoids. He has also been a champion of the use of molecular orbital and quantum chemical calculation of hyperfine couplings in analysis of EPR and ENDOR spectra and recently achieved nearly quantitative agreement between calculated and experimental results that allowed the discovery of the deprotonation of cation radicals to form neutral carotenoid radicals.



FELLOW OF THE SOCIETY 2011

Professor **John Michael Baker** is appointed a Fellow of the Society in recognition of his significant contributions to the field of EPR over nearly six decades.

Emeritus Professor Michael Baker who began work in EPR in 1951 as a doctoral student of the late Professor Brebis Bleaney in the Clarendon Laboratory in Oxford, is author or coauthor of some 150 refereed publications, many of which were foundational in the early days of EPR and results of which found their way into the text by Abragam and Bleaney. His work is characterized by two major themes. Firstly, he focused particularly, but not exclusively on rare earth ions in a variety of crystals and secondly on paramagnetic defects in diamond. His early pioneering work involved determination of nuclear spins and nuclear moments, investigations of pair interactions among rare earth ions, the subtleties of hyperfine structure and showing that rare earth ions had weak covalent interactions with surrounding ligand ions, surprising since 4f electrons are largely shielded by outer electrons. The first ENDOR in the UK was carried out by Baker and his student, F.I.B. Williams, in 1961 on Eu^{3+} [$4f^7$] in CaF_2.

Later, R. Davies developed "Davies ENDOR" while working in the Baker group. His work on diamond was definitive in elucidating the structures of intrinsic and impurity related defects, the control of which is essential for exploitation of synthetic diamond in optical and electronic applications.

FELLOW OF THE SOCIETY 2011

Professor **Klaus Möbius** is appointed a Fellow of the Society in recognition of his significant contributions to the field of EPR and related spectroscopies for nearly five decades.

The outstanding achievements of Klaus Möbius have been honoured by numerous awards and recognitions. Klaus Möbius has continuously made major contributions to the development of advanced multi-frequency EPR spectroscopy, in particular to ENDOR, ODMR and PELDOR. His laboratory was among the few dedicated places in the international EPR community where high-power continuous wave and pulse ENDOR and electron-nuclear-nuclear TRIPLE resonance was perfected for new high-resolution applications on large biologically relevant systems, in liquid solution, powders and single crystals; examples are his time-resolved EPR and ENDOR experiments on short-lived transient electron-transfer intermediates in photosynthetic reaction centres and their biomimetic donor-acceptor model systems. In recent years he and his group has focused on pulse high-field/high-frequency EPR, ENDOR and PELDOR spectroscopy to unravel electronic and spatial structures and conformational dynamics of organic cofactors in membrane proteins during light-induced transfer reactions, including paramagnetic redox cofactor ions, excited-state cofactors and specifically spin labelled protein sites. His scientific and human relations with collaboration partners have bridged political barrier all over the world. Many of his former students and postdocs have become academic teachers and professors.

THE IES GOLD MEDAL 2011

Ronald P. Mason graduated with a Bachelor of Arts in Chemistry from the University of California at Riverside (UCR) in 1966. During his senior year, he had a brief conversation with Professor August Maki, a new faculty member at UCR concerning the choice of going to the University of Wisconsin at Madison for graduate school and serving as a Physical Chemistry Teaching Assistant or Cal Tech and working as a Freshman Chemistry Teaching Assistant. A letter offering the Physical Chemistry Laboratory Teaching Assistant position came from Dr. John Harriman, who had been Professor Maki's former student while he was an Assistant Professor at Harvard. The idea of teaching in a physical chemistry laboratory appealed to Ron. Like all new physical chemistry faculty, Dr. Harriman contributed a new experiment to Madison's well known Physical Chemistry Laboratory. This experiment used an ESR spectrometer that functioned at 120 MHz. In this manner, Ron began his career in ESR spectrometry. His thesis work was single-crystal ESR of the nitrobenzene anion radical in benzoate crystals. Other than being a good graduate student, his most distinctive accomplishment was passing the qualifying exams in all four areas of chemistry, which only five of 100 incoming graduate students did.

After receiving his Ph.D. at Madison, Ron spent two years as an NIH Postdoctoral Fellow at Cornell University with Professor Jack Freed. The postdoctoral fellowship was awarded for a proposal to do an analog of the nuclear Overhauser experiment where the two electrons of a nitroxide biradical would be isotopically labeled with N-15 and N-14. Although there was no biological or medical content in this proposal, the criteria for NIH funding were quite different then. While at Cornell University, Ron authored three papers including his one and only pure theory paper. In 1973, he moved on to the VA hospital associated with the University of Minnesota in Minneapolis. There he worked for Dr. Jordan Holtzman, who was Chief of the Clinical Pharmacology Laboratory and had a new E-104 spectrometer. Dr. Holtzman had worked at NIH and was well known in the area of drug metabolism. This position was a great opportunity, for Ron soon discovered that free radical intermediates were present in many pathways of drug metabolism and were, in fact, responsible for some of the drugs' side effects.

After a series of papers on the free radical metabolites formed by enzyme activities referred to as nitroreductase and azoreductase, in 1978 Ron moved to the National Institute of Environmental Health Sciences (NIEHS), one of the National Institutes of Health, as a Research Scientist in the Laboratory of Molecular Biophysics. The work group he headed became the Free Radical Metabolite Group, and he assembled a team of postdocs and technicians to explore free radicals in a variety of biological contexts. He has been instrumental in the development of spin trapping and, particularly, the development of in vivo methods for detecting radical formation in a wide range of pathological conditions and toxicology. In particular, he has pioneered the use of spin traps in vivo and methods for ascertaining true radical formation as opposed to artifactual reactions.

Ron is the author of nearly 400 scientific papers, and previous awards include the Southern Chemist Award from the American Chemical Society (1994), the Silver Award for Biology and Medicine from the International EPR/ESR Society (1996), the Scientist of the Year Award from NIEHS (2006), the Lifetime Achievement Award from the Society for Free Radical Biology and Medicine (2007), the Mentor of the Year Award from NIEHS (2008), and the Bruker Award from the Royal Chemical Society (2010).

THE IES SILVER MEDAL 2011
Instrumentation

Graham Smith:
The HIPER project

I am sometimes asked by my University or Department to give a seminar on "top tips for writing Fellowship proposals", (which are currently the main route into academia in the UK system for young postdocs). Whilst, acknowledging a large part of any successful application nearly always has an element of luck, the importance of "having a good and timely idea that can open up new fields and is suitably ambitious" is nearly always stressed. In practice,"timely" often means realising the impact and significance of some other technological or methodological breakthrough in another field, and seeing how that can be adapted to a slightly different problem using one's own skill set.

In my case back in 2002/2003 it was easy to be inspired by the high-field pulse EPR work from the Moscow, Berlin, Leiden and Cornell groups. The importance and potential of site-directed spin labelling in conjunction with 4-pulse DEER/PELDOR at X-band was just emerging, and at one level, it was not difficult to make a case that the UK should really make a start in investing in modern pulse EPR instrumentation.

Thus in 2003, as a young lecturer, I was not only lucky enough to lead a consortia that was funded under the UK's Basic Technology Program, (which gave major funding to around five projects a year) but was also lucky enough to have the top rated proposal out of 140 applications, across all scientific disciplines for that call. And I remain extremely grateful to those people that gave me that opportunity. Our project was called HIPER (High power Pulsed EPR). The grant not only

funded a major instrumentation program, but also funded commercial pulse EPR instrumentation and initiated the UK's first PELDOR program with major partners in local life science departments and elsewhere.

A key technical aim of the HIPER project was to show that very high power (kW), high bandwidth, high sensitivity, pulse EPR measurements were practical at 94 GHz and could be scaled to higher frequencies, and that FID detection could be viable for many more EPR systems, by demonstrating measurements with 1 ns deadtime. This latter aim was particularly ambitious requiring something like 15 orders of magnitude reduction in unwanted signal relative to conventional systems, and I can recall several instrumentation experts commenting at the time that this was essentially impossible!

However, at that point I had been involved in mm-wave technology development for almost 20 years, and high-field EPR for almost 10 years and was confident that a different set of methodologies, technologies and components became viable at W-band and this would open up new possibilities.

Indeed, the technology challenge was certainly not simply a matter of adding a commercial high-power amplifier at the front end of a spectrometer. Many of the other mm-wave components envisaged simply did not exist at the time or did not come close to having the required specification or power handling capability.

Thus the first year of the project simply focussed on the development and demonstration of a number of key pieces of core mm-wave and electronics technology, which by themselves were all significant design projects. Major advances were made in the performance of isolators, loads, optics, switches, feedhorns, pulse formers, induction mode detection and in several areas of fast electronics. In many cases not only was state-of-the-art performance achieved for individual components, but was achieved by many orders of magnitude – which in turn has impacted on our other mm-wave related programs.

The spectrometer itself has a rather striking look, and the feature that nearly everyone remembers is the large number of "witch's hats" pointing in bizarre directions. These are actually extremely high performance state-of-the-art loads designed to eliminate any reflections within the associated mm-wave optics (and are important for very low deadtime and ultra-wideband operation).

In terms of performance, I like to believe the system has set major new performance standards for pulse EPR in terms of concentration sensitivity, time resolution, and bandwidth whilst offering excellent orientation selectivity for PELDOR measurements. It removes the myth that you always need a cavity for high sensitivity, makes sensitive ultra-wideband measurements practical and firmly establishes a practical design methodology for scaling to higher frequencies. The underlying electronics is very stable and 16 different phase states at 94 GHz are currently available for implementation of composite pulses or phase cycling methodologies.

I have to admit that the original goal of 1 ns deadtime and general FID detection has not yet been fully achieved, although it is now at a level where I think most technical experts would concede that this goal is not completely unrealistic. Certainly at low powers (50 mW) on favourable samples it is possible to effectively achieve zero deadtime, and measure how the signal evolves within the pulse itself (without any phase cycling). Perhaps 12 of the required 15 orders of magnitude in signal reduction have been demonstrated, and as a side benefit the whole system offers a very stable and flat wideband frequency response, which makes quantitative orientation-selective PELDOR measurements practical and possible on relatively short time-scales.

I feel hugely honoured by the award of the IES Silver Medal for instrumentation and I was certainly happy to accept the award in Frankfurt on behalf of all the outstanding postdocs who worked on the instrumentation, namely, Paul Cruickshank, David Bolton, Robert Hunter and Duncan Robertson. Those that work in similar fields will know all about the countless hours required in this type of project for design, manufacture and testing of components, subsystems and software along with everything that goes with the full system evaluation and optimisation and project management. I would also acknowledge major contributions from all the other project partners, and in particular Richard Wylde from Thomas Keating Ltd., David Keeble and David Norman from Dundee and Olav Schiemann and Hassane El Mkami from St Andrews.

It is sometimes stated that there was little real change in instrumental sensitivity for the first 50 years of cw EPR. However, I am extremely confident the next 50 years will see huge advances in sensitivity at all frequencies for both conventional cw and pulse EPR, driven both by new technology advances and major application drivers related to DNP, PELDOR and ENDOR for biological, chemical and solid-state applications. In my view EPR, more than ever, offers new opportunities for aspiring young scientists to make their mark.

THE IES SILVER MEDAL 2011
Instrumentation

Keith Alton Earle:
Quasioptical EPR/ESR: Perspectives and Outlook

I am grateful to the International EPR/ESR Society for its recognition of my contributions to instrumentation development for EPR/ESR spectroscopy. My introduction to Quasioptics and its application to high field/high frequency EPR/ESR came when I joined the Freed group to work on the 250 GHz/8.9 T spectrometer that was under development at that time [1]. That spectrometer was a transmission mode spectrometer and is the high frequency analogue of early microwave spectrometers that also operated in transmission mode. This is an instance of a design aphorism I encountered early in my work in this field: "For every microwave component there is a strict quasioptical synonym." I cannot recall exactly where I first encountered this succinct observation, nor the original wording. I suspect it was in one of the review articles of Derek Martin, whose elegant work on the development and application of the so-called Martin-Puplett interferometer was an inspiration to me. Much of my design work could be summarized as a practical application of Derek Martin's design motto and constantly asking the question, "What if..."

Coming from a background in Physics, I was used to thinking about coaxial cable and twisted pair as transmission lines, but that background wasn't particularly helpful when dealing with physical structures that extended over tens of wavelengths where diffraction

effects rule the show. At this point, it might be appropriate to comment on why quasioptical techniques are useful at high frequencies as opposed to the waveguide techniques that are more commonly employed at lower frequencies. As one pushes waveguide to ever higher frequencies, particularly fundamental mode waveguide, the losses per meter increase dramatically. It is possible to accommodate the increased loss in waveguide by overmoding, but unless care is taken to avoid mode conversion losses the expected performance level can be degraded. The Freed group approach was to take an alternative technology, based on free space propagation techniques, which has intrinsically low loss per meter and uses reflecting or transmitting elements specifically designed to control diffractive beam growth. This leads to structures that are not as compact as waveguide based structures, but whose insertion loss can be extremely small in favorable cases. I am most familiar with the western technical literature on this subject, but I do want to draw attention to the work of the Leningrad school, particularly Anan'ev and coworkers [2], whose work on the beam divergence problem informed my thinking considerably.

Given that diffraction is important at these wavelengths and that typically several refocusing elements are needed for reasonable aperture sizes it might appear that there is a daunting number of Fresnel diffraction integrals that need to be evaluated to predict and achieve a given performance level. It is fortunate that there is a useful approximation regime for large aperture sizes and paraxial beams that lead to algebraic design equations that are comparable to the well-known laws of geometrical optics. This is a considerable simplification. During that time, I had the good luck to be able to interact on a regular basis with Paul Goldsmith, a radio astronomer formerly at Cornell University, with considerable expertise in quasioptical techniques who was kind enough to keep me supplied with a constant stream of reprints and was always available for conversations about quasioptical techniques. I was happy to be able to partially return the favor during the preparation of Paul's important book on quasioptical design techniques [3].

After the publication of the Freed group's first article on the 250 GHz spectrometer1, I made the acquaintance of Graham Smith whose work at St. Andrews introduced me to the advantages of corrugated waveguide over the system of lenses that we had been using up to that time. Corrugated waveguide is a kind of overmoded waveguide with radial grooves in the wall of the guiding structure that suppress wall currents and symmetrize the E and H planes of the guided beam. This symmetrized beam couples extremely efficiently to a free-space quasioptical mode [4], and the guiding structure can have remarkably low insertion losses. It is important to note at this point that the number of lenses that are required to propagate a Gaussian beam over a given distance is in inverse proportion to the aperture area. Given that the refocusing effect of the lens depends on a discontinuity in the index of refraction, each lens will reflect a portion of the incident beam. This can be overcome by shaping the surface of the lens with grooves that present an averaged index of refraction to the incident beam and serves the same purpose as an anti-reflective lens coating. Nevertheless, the grooves lead to stigmatic beam propagation, which can degrade the performance in critical applications. For this reason, corrugated waveguide is the preferred propagation method when the available aperture diameter is constrained. Graham and I have communicated many times over the years, and I value his insightful comments and knowledge of quasioptical techniques.

Due to the interest of many in the ESR community, the Freed group tackled the challenge of investigating aqueous samples at high fields and frequencies. The principal difficulty attendant on such studies is that water is highly absorbing at millimeter wave frequencies and can degrade the unloaded 'Q' factor of the resonant structure catastrophically. At this critical juncture, the Freed group had a very talented post-doc, Jeff Barnes, who was able to successfully address this issue. Some of his work is summarized in our 1999 review article [4]. Jeff's accomplishments drove home the need for continually adjustable coupling and the ability to move the sample within the resonant structure as an independent control parameter.

We were able to take advantage of these insights in our design for a high power pulse/CW spectrometer operating at 95 GHz [5]. The ability to control sample position and coupling independently of the resonant structure dimensions was crucial for achieving our design goals. I would comment that although there is no hard boundary below which quasioptical techniques could not be applied, nevertheless 95 GHz probably represents a lower practical bound for applications in EPR/ESR. After our initial successes with this spectrometer, we have been refining our abilities to perform pulsed ELDOR and are upgrading the necessary hardware and software for performing DEER (or PELDOR) at 95 GHz. The ELDOR capability on aqueous samples should prove to be highly informative for a variety of systems of biological interest.

The range of applications of quasioptical techniques to high field ESR, at least within the purview of the ACERT center, indicates that the approach is viable and productive [6]. Of particular importance, in my view, is the continuing improvement in the achievable signal to noise ratio across the millimeter wave band, particularly for aqueous samples, which has greatly facilitated the implementation of multifrequency studies of labeled proteins and other biopolymers [7]. The author list on the T4 lysozyme work [7] is illustrative of the collaborative nature of much contemporary work in high field ESR, which is a positive trend in my view. It is also important to note that there is a healthy cross-fertilization of developments in instrumentation on the one hand, and theoretical tools and models for analyzing complex dynamics on the other. I would like to acknowledge my debt to Jack Freed, for providing the environment at ACERT in which both fields of endeavor overlap and in such fruitful ways. I predict that multifrequency studies in both pulse and CW modes will be of continuing importance for many years.

As far as instrumentation is concerned, I expect that hybrid resonant structures, partaking of characteristics of fundamental mode cavities and open resonators, will allow further improvements in achievable signal to noise ratio, available B_1 for pulse experiments, and complementary spectroscopic probes, such as light excitation and linear electric field effects. Some of these developments will be aided by the increasing availability of design software specifically tailored to the needs of near millimeter band spectroscopy. MODAL [8], developed by the millimeter wave group at the University of Maynooth is an example of such a package. I am currently exploring such developments both at ACERT and my own laboratory at the University at Albany (SUNY).

As this is something of the recounting of a personal journey, I have focused attention on developments and events with which I have had direct contact. This is not to slight contributions from others in the field, from whose publications and interactions I have greatly benefitted. Indeed, one of the great strengths of the high field ESR/EPR community is its collegiality. However, in a short ▶

piece such as this one, it is simply impossible to be comprehensive when summarizing over twenty years of work.

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IES YOUNG INVESTIGATOR AWARD 2011

Enrica Bordignon:

I am very honored to have received the IES Young Investigator Award 2011 at the EUROMAR in Frankfurt last August. I wish this medal will accompany my career towards more exciting discoveries in the EPR world.

I work in the group of Prof. Jeschke at ETH, in Switzerland, since 2008. There I enjoy the fruitful company of a group of people "crazy for science" and the scientific interaction with Gunnar Jeschke, the pioneer of DEER (or PELDOR) applied to membrane proteins. He was the one widening the EPR and my own perspective towards an understanding of conformational changes in large macromolecular complexes during their functioning. My research at ETH deals with several classes of ABC transporters and proteins involved in the programmed suicide of the cell called apoptosis.

In the transporters field I contributed to the understanding of the coupling between maltose uptake and periplasmic rearrangement of the type I maltose importer, and I discovered the molecular origin of the distinct mechanism of import of the type II importers. Moreover my work on the human transporter TAP elucidated a remarkable coevolution in terms of antigen recognition of TAP and MHC class I molecules, two key machineries in antigen processing in the adaptive immune system.

In the apoptosis field I used site directed spin labeling EPR to follow the conformational changes of an apoptotic protein from the soluble inactive to the oligomeric pore-forming membrane-bound state that is responsible for cell death in humans, providing new details of the membrane embedded structure.

I first "met" a membrane protein at University of Padua, in Italy where I did my PhD under the supervision of Prof. Giorgio Giacometti. My doctoral work was devoted to the study of bacterial antenna complexes and the plant photosystem I using ODMR at zero magnetic fields. In 2003 I went to Berlin (a city I fell in love with) for a research period in the group of Prof. Lubitz, where I performed optical measurements and theoretical analysis of the excitonic-coupled network in photosystem I with Dr. Eberhard Schlodder. Thinking about my future I decided to move from the cofactors to the membrane protein itself. It was time for me to switch ON a magnetic field, at last. Thus, I applied for a post doc position in the group of Prof. Heinz-Jürgen Steinhoff in Osnabrück, Germany, to work with site directed spin labeling EPR applied to proteins "in action".

The Steinhoff's years were a real source of inspiration: science dedication and scientific excitement accompanied each new extracted piece of information on sensory rhodopsin II, a membrane proteins which trigger the photophobic response of archaea bacteria towards sources of harmful light. After light excitation, the protein transfers information for more than 20 nm down to the cytoplasmic tip through the HAMP domain. By detecting transient changes in dynamics, water accessibility and distances during the protein cycle, we could decipher the first steps of the mechanism of signal transduction. We suggested the interplay between a compact and a more dynamic structure of the HAMP domain being the language of signal transduction. Analysis of the gxx heterogeneity in high field cw spectra of spin labeled proteins was also another important subject of research during my post doc, which led to the discovery of three spectral components correlated with the presence of different degree of hydrogen bonding to the nitroxides.

I believe that the unique possibility to study dynamics of a protein at room temperatures and to obtain intra- or inter- protein distances at low temperatures provides more structural snapshots of a membrane protein during "action" than X-ray could possibly do. Extraction of interspin distances in membrane proteins is still often difficult due to limitations imposed by fast relaxation and by the amount of protein available. Now at ETH I have been working on the development of a high power Q-band spectrometer, which enables a high data throughput, thus a faster and more accurate study of membrane proteins down to a few micromolar concentration.

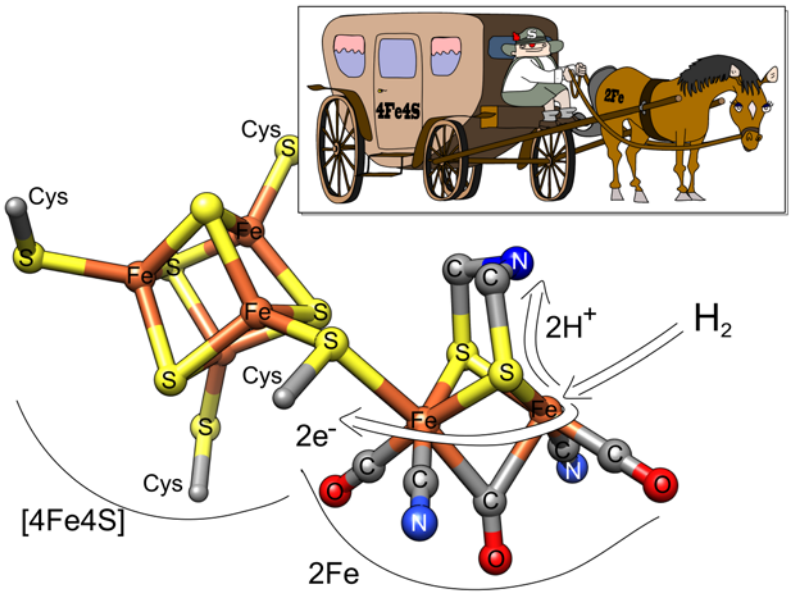
In the future, overcoming invasive spin labeling, inventing new labeling strategies and optimizing sensitivity will help EPR to expand its horizon. Promising ideas to apply the technique directly at the cell membranes will hopefully bring EPR beyond the limits of today. I hope to contribute to these milestones with my work.

IES YOUNG INVESTIGATOR
JOHN WEIL AWARD 2011

Alexei Silakov:
I am honored to receive the very first John Weil Young Investigator Award and would like to thank the committee for selecting me. My scientific carrier started in Kazan (Russia), where I graduated from the Kazan State University in 2003 with a Master degree in Physics. Under the supervision of Dr. Rafail Mansurovich Rakhmatullin I studied the clustering of Yb^{3+} ions in doped germanate glasses (GeO_2) using pulsed EPR. After my graduation, I accepted a position as doctoral student at the Max-Planck-Institute for Bioinorganic Chemistry (Muelheim an der Ruhr, Germany) in the group of Prof. W. Lubitz and Dr. E. Reijerse to perform EPR investigations on [FeFe] hydrogenases. After the completion of my doctoral studies, I stayed in the Max-Planck Institute as a postdoctoral researcher to continue the ongoing projects. Although my interests widened considerably, the main subject of these studies remained the active site of [FeFe] hydrogenase.

Why do I find [FeFe] hydrogenases so fascinating? They contain complex metalloclusters that perform the reversible reduction of protons to dihydrogen. Considering that H_2 is one of the best candidates as an alternative energy carrier, understanding the catalytic mechanism of hydrogenases is essential for designing artificial catalytic systems.

The main breakthrough was achieved just a few years before I started my doctoral work when the first X-ray crystallographic structures of [FeFe] hydrogenases was resolved. The active site turned out to consist of a ferredoxin-like [4Fe4S] "cubane" connected via a S-Cys bridge to a CN/CO ligated di-iron subcluster with irons in a low spin state. One of my main tasks at that time was the characterization of the accessible oxidation states of the 2Fe subcluster. My studies were focused on two states: the catalytically active oxidized state (Hox) and its inhibited variant having a CO bound to the open coordination site (Hox-CO). Studies of the ^{57}Fe hyperfine interaction by ENDOR and HYSCORE proved to be very informative. In both cases, we identified in total six ^{57}Fe HF couplings and concluded that the formal oxidation states of irons are Fep(I)-Fed(II) for the mixed-valent state. The detection of six ^{57}Fe HF interactions is indicative of a strong spin exchange interaction between the [4Fe4S] and 2Fe subclusters (estimated to be up to 100 cm^{-1}).



Another central question concerned the identity of the central atom in the di-thiol bridge of the binuclear subcluster. The X-ray crystallographic data could not distinguish between C, O, or N. Mechanistically, an amine in the bridge would make perfect sense, since it could act as a proton donor/acceptor in the catalytic cycle. Our X- and Q-band HYSCORE spectra of the H-cluster in the Hox state, revealed complex patterns that were unambiguously attributed to signals from three ^{14}N nuclei. One of the resolved signals had a distinctive quadrupole coupling that could only be reproduced by considering an amine in the dithiolate bridge. Based on DFT calculations, no other nitrogen around the H-cluster could possibly give such a quadrupole coupling. Therefore, we conclusively showed that the central atom in the dithiol bridge is indeed a nitrogen.

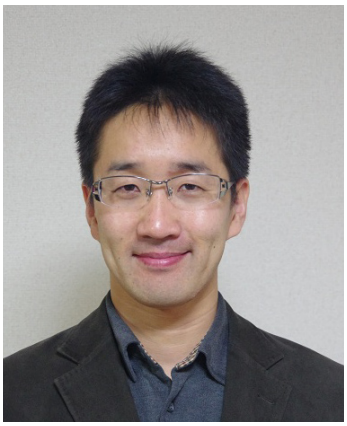
In the recent years, the field of artificial H_2 catalysts boosted considerably. Unfortunately, none of the di-iron model compounds proposed so-far show considerable catalytic activity.

A di-iron model, closely resembling the H-cluster in the Hox-CO state was studied by pulse EPR methods and we could show that the spin density is almost completely delocalized over both iron atoms. This is surprising, since in the native H-cluster of the Hox-CO state, the spin density is more localized on the proximal iron. Considering the rather similar coordination of irons in these cases, the difference in their electron spin distribution can only be attributed to the absence of the [4Fe4S] moiety in the model complexes. It is quite apparent from this study that the electronic connection between the [4Fe4S] and [2Fe] subcuster lies well beyond the Heisenberg exchange spin-spin interaction. In fact, it is no wonder for us anymore why the di-iron model compounds mimicking the active site are poor catalysts; the crucial partner strongly modulating the electronic properties, i.e., the [4Fe4S]subcluster, is missing.

To conclude, I would like to say that all my work would not be possible without the help of many people. I am very grateful to Dr. R. M. Rakhmatullin who introduced me to the field of EPR, Prof. W. Lubitz and Dr. E. Reijerse for suggesting to work on this interesting topic and all their support and Prof. K. Möbius for his advice and help. I would also like to thank my friends and colleagues B. Epel, J. Niklas, M. Antonkine, T. Petrenko and M. E. Pandelia who supported me all these years.

Ravil Muratov, First Deputy Prime-Minister of the Republic of Tatarstan (left) presents the Zavoisky Award 2011 diploma to **Seigo Yamauchi** (center) at the International conference "Spin Physics, Spin Chemistry and Spin Technology", Kazan, November 1st, 2011. Kev Salikhov, Chairman of the Zavoisky Award Committee (right), holds in his hands the Zavoisky Award 2011 medal.

For details, see the forthcoming newsletter.



SEST YOUNG INVESTIGATOR AWARD 2011

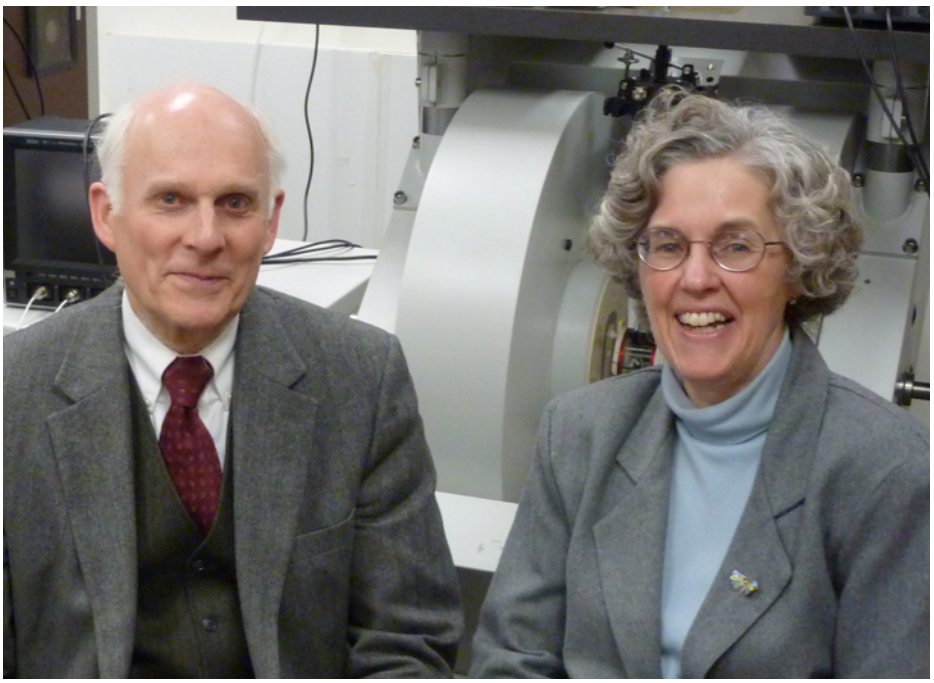
Hisaaki Tanaka:

I was honored to receive the SEST Young Investigator Award for "Electron spin resonance study of elementary excitations in quasi-one-dimensional metal complexes and conducting polymers". This study was conducted with many collaborators. I especially thank Prof. S. Kuroda at Nagoya University, and the graduate students in the laboratory for their invaluable contributions.

Elementary excitations such as solitons and polarons have been attracting much interest as the typical spin and charge carriers in quasi-one-dimensional (Q1D) metal complexes or in conducting polymers. I have been engaged in the ESR study of these excitations in Q1D systems starting with halogen-bridged metal complexes. I successfully observed thermally and optically excited spin solitons generated in the iodine-bridged diplatinum complexes, which had been predicted theoretically, for the first time. As for the conducting polymers, ESR detection of polarons is an essential issue to obtain the microscopic information of charge carriers in the polymer electronic devices. Especially, field-induced ESR (FI-ESR) technique, developed by our group, provides valuable information in the field-effect transistor (FET) such as electronic state of injected polarons or the local molecular orientation at the polymer/insulator interface. I applied this method to the operating polymer transistors and demonstrated a clear change of charge carrier concentration induced by applying drain voltage, which quantitatively agreed with the standard FET theory using gradual channel approximation.

Now I extend the target material to the small molecules containing fused thiophene rings such as C8-BTBT, which exhibits high mobility. In the C8-BTBT transistors, motional narrowing of the FI-ESR signal is clearly observed even at 4 K due to high carrier mobility. Such mobile carriers arise from the highly-ordered crystalline grains at the interface as directly determined from the anisotropy of the FI-ESR signal. These recent results demonstrate that the FI-ESR technique is a promising microscopic tool to clarify the device physics of organic transistors consisting of wide variety of organic molecules.

65th birthday of Sandra Eaton and 70th birthday of Gareth Eaton



We would like to offer special birthday wishes to Sandra and Gareth Eaton. This is a particularly fortuitous opportunity to recognize their contribution to our understanding of EPR and of the many systems probed by EPR. We also recognize their contribution to the universe of engineers, physicists, chemists, biologists, physicians and imaging scientists to enhance discussion of our work.

After completing his undergraduate degree, Gareth joined the Navy and was assigned to the nuclear submarine division where he worked fairly directly under Admiral Hyman Rickover. He returned to graduate school at MIT where he met Sandra. They since moved to the University of Denver where their research has brought very important recognition to the university. They have been internationally recognized as joint awardees of the Bruker prize. Sandy and Gareth are both Fellows of the International EPR Society. This has, in turn, been recognized in their positions at the university. Sandra is presently Chairman of the Department of Chemistry and Biochemistry. Gareth has been Dean of the Physical Sciences and Vice-Provost of the university.

The connection that they made at MIT was among the strongest among current researchers. Although one might find some indication of a division of labor in their work, they work so closely and review each other so fastidiously that the individual contribution is indistinguishable. Gareth has tended to assume the more visible aspects of their professional career, such as the duties at the International EPR Symposium, where he presented pre-conference lectures and chaired symposia. Sandra, meanwhile, worked tirelessly behind the scenes dealing with the more organizational aspects of the meeting. Nonetheless, their description must be symmetrized.

Their work has contributed to many aspects of the field. A major contribution that may generalize the application of EPR has been the development of the technique of spectroscopic or spectral-spatial imaging of spin systems which relax too rapidly to obtain a free induction decay. This is accomplished using projection acquisition and tomographic reconstruction. Their early recognition of spectral-spatial images established them with early workers who developed the groundwork for the development of the field of EPR imaging. The development of pulsed imaging techniques was suggested by their work with X-band echo detection imaging. The Eatons have also developed considerable instrumentation for low frequency animal imaging and continue to do so.

They have explored important aspects of distance measurements and have been active in the exploration of these measurements to characterize the environment of stable radicals, particularly nitroxides at low frequencies. Their studies have suggested a general model ▶

of EPR relaxation in protein structures. They have published extensively on mode coupling to the environment to explain the spectral modifications from spin labels dissolved in solvents ranging from pure water to organic solvents and glasses.

They have published extensive analyses of the sensitivity of a wide variety of different EPR spectrometer configurations under a range of spectroscopic conditions and configurations. Their measurements and explanation of the spectrometer operation has led to the optimization of spectrometer sensitivity. Their work in this area has required painstaking care in making sure that what is published is correct. It reflects a commitment to a lifestyle that is devoted to analytical and physical chemistry to an extent that few of us can match.

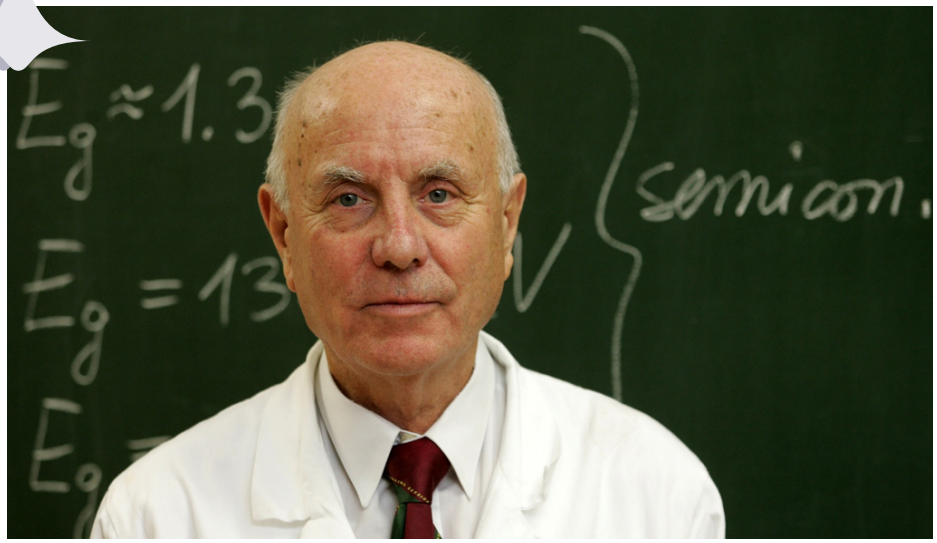
Their work has produced a number of novel instrumental and technical inventions. We mention only a few examples: they have published novel designs of bimodal resonators designed with high isolation and unusually high sensitivity, developed spin echo standards, pioneered fast-sweep spectral imaging and many other developments.

In the process of this work, they have gathered a core of co-workers including Richard Quine and George Rinard who have contributed their engineering expertise to the effort of the laboratory. These colleagues have worked with Sandra and Gareth for nearly four decades to produce a tremendous body of high quality research, which has benefitted many other researchers in EPR. It is a mark of the environment that the Eatons provide that this group has remained together for this length of time, enjoying the brisk, collegial argument that has resulted in the laboratory productivity. Post doctoral research associates, graduate students and other research colleagues too numerous to individually mention have learned in the Eaton laboratory.

As important as the products of the laboratory have been, an equally important contribution that Sandy and Gareth have given us has been the International EPR Symposium, which they organized for over 30 years as part of the Rocky Mountain Conference of Analytical Chemistry. This Symposium is unique in its nature in that it gathers researchers from the span of science covered by EPR techniques from physics to medicine. The conference is carried out in the relaxed environment of Denver and other parts of Colorado. It is organized to enhance opportunities for scientists to interact by giving us all an opportunity to present our work and to network with other scientists. The conference has been an on-going force for the entire EPR community. For years, Gareth's steady hand and immediate concern assured the smooth running of the presentation sessions. He literally ran through the presentation room to deliver a microphone to a participant with a question. Sandra sits with Gareth, having provided the background organization for the rooms, the coordination with the NMR and other analytic chemistry groups involved in the Rocky Mountain Conference.

Other reasons to celebrate your birthdays exceed the limits of brevity so that we confine ourselves to the above and a wish you both "happy Birthday" and many more. And we hope and trust that you contributions to science will continue to be productive for many years to come.

Howard Halpern
Bruce Robinson
Colin Mailer
Michael Bowman
Arthur Heiss



Robert Blinc (1933–2011)

Robert Blinc was born in Ljubljana, Slovenia on October 31, 1933. He graduated at the Faculty of Natural Sciences, University of Ljubljana in 1958 and received a PhD from the same university a year later. During his post-doc study in the laboratory of prof. John S. Waugh at the Massachusetts Institute of Technology, Cambridge, MA, U. S. A., he learned about NMR. After he returned to Ljubljana he established a NMR laboratory at the "Jozef Stefan" Institute. Professor Robert Blinc was leading the Condensed Matter Physics Deparment at the "Jozef Stefan" Institute for years and he was one of the founders of uses of nuclear magnetic resonance for investigations of phase transitions and liquid crystals. He established NMR, EPR and NQR spectroscopy in Slovenia. One of his great achievements is the tunneling model of the hydrogen bonded ferroelectrics, known also as the Blinc–de Gennes pseudospin model. Prof. Blinc introduced the "soft mode" theory of phase transitions in the nematic and ferroelectric liquid crystals. Together with Pincus he experimentally confirmed the existence of order parameter fluctuations in nematic liquid crystals by measuring the frequency dependence of the nuclear spin-lattice relaxation. Prof. Blinc applied NMR for the study of incommensurate systems. He experimentally determined the soliton density and proved the existence of phason and amplitudon excitations. Using NMR he determined the Edwards–Anderson order parameter in deuteron glasses and the distribution of local polarization. In ferroelectric relaxors Prof. Blinc and his coworkers developed the random bond-random field model and showed that the Edwards–Anderson order parameter exists also in relaxors. In his research Prof. Blinc did not use only NMR but also several less standard techniques like EPR, NQR and double resonance. His research was not only devoted to "pure science" but he also investigated the possibility of practical applications of NMR. This resulted in the application of NMR in plant breeding and cement research. He also applied NQR in the study and identification of the pharmaceutical substances and in the detection of explosives and illicit substances.

Robert Blinc became a professor of physics at the University of Ljubljana in 1970. He was the teacher of numerous generations of students and the supervisor of a large number of diploma, MSc and PhD students. He was also a visiting professor at several universities worldwide.

Prof. Robert Blinc was a member of the Slovenian Academy of Sciences and Arts and served as its vice president from 1980 to 1999. He was also a member of the European Academy of Sciences and Arts and several other academies of sciences.

Prof. Robert Blinc was a great scientist, great teacher and also a great organizer. He was the president of Groupement AMPERE for two mandates during 1990–1996. He organized several scientific meetings. Among them the AMPERE NMR Summer School in Baško Polje is the best known.

The scientific work of Prof. Robert Blinc is published in a large number of highly cited papers. In addition, he published a synthesis of his research in several books. The book "Soft Modes in Ferroelectrics and Antiferroelectrics", North-Holland, Amsterdam (1974), written together with Prof. Boštjan Žekš, was later transtated to Russian and Chinese. Prof Blinc is the coauthor of the books "The physics of ferroelectric and antiferroelectric liquid crystals", World Scientific, Singapore (2000) and "Incommensurate Phases in Dielectrics", World Scientific, Singapore (1986). In autumn 2011, just few months ago, he published his last book entitled "Advanced Ferroelectricity", Oxford Univerity Press (2011) covering the development of the ferroelectric materials in the last twenty years.

Professor Robert Blinc was a prominent scientist and he left a large impact on the NMR community.

Janez Seliger

Nikolai I. Silkin (1945–2011)

Professor Nikolai I. Silkin, member of the IES, graduated from the Physics Faculty, Kazan State University in 1969 and received his Ph.D. and Dr. Sci. degrees there in 1975 and 2009, respectively. From 1980 to 1981 he studied as a post-doc in the laboratory of Professor Robert Blinc at the "Jozef Stefan" Institute in Ljubljana, Slovenia. In the 1980s and 1990s he collaborated with the University of Giessen, Germany.

The properties of post-transition ions were the main field of his interest in the beginning of his scientific career. Nikolai Silkin used the high sensitivity of the EPR spectra of Tl^{2+} in different media to the structure of the nearest environment in the studies of the phase transitions in ferroelectric KH_2PO_4 and the K_2SO_4 crystal with the incommensurate phase. At the end of 1980s and beginning of 1990s he studied fluoride crystals, doped with transition metal ions that were promising as active media of tunable near-infrared solid-state lasers. As a result, effective laser generators on fluorides with chromium ion admixtures were created.

At the end of 1990s and beginning of 2000s he studied the optical spectra of admixture post-transition ions in the fluoride crystals with the perovskite structure. Interestingly, it was shown that the Tl^{+} and Pb^{2+} ions were localized in the positions with the 12-fold anion surrounding of the cubic symmetry and that the characteristics of the luminescence spectra change dramatically with small changes of the electron-phonon interaction.

Nikolai Silkin initiated and participated actively in the studies of the effect of the low-intensity He-Ne laser radiation on the nervous tissue, in particular its stimulating effect on the regeneration of the chemoreceptor structures and the peripheral nerve. He stimulated the study of the molecular and cellular mechanisms of neuroregeneration by means of magnetic resonance and laser spectroscopy. Interesting EPR data was obtained on the role of NO, L-arginine and Cu(II) in the processes of degeneration and regeneration of the peripheral nerve and spinal marrow. Starting from 2006, Professor Silkin served as a crystallization center for a large team of researchers aimed at studying the molecular organization of the organomineral matrix in the vessel wall during atherosclerosis by means of advanced physical methods. A new type of paramagnetic centers, organomineral radicals, was observed in the high-frequency EPR spectra of a gamma-irradiated atherosclerotic plaque. It was established that the spectral and relaxation characteristics of these radicals depend on the calcification degree of the atherosclerotic plaque and can be used for diagnostics.

Nikolai Silkin was a brilliant lecturer and adored by his students. His wide range of interests included music, painting, sculpture and literature. He wrote poetry. He was the driving force in the implementation of the idea about the Zavoisky museum at the Kazan State University: he inspired, directed and supported his brother Igor Silkin, curator and director of the museum. Nikolai Silkin was personally acquainted with Evgeny Konstantinovich Zavoisky. Nataliya Zavoiskaya, daughter of Evgeny Zavoisky, remembered that Nikolai Silkin appeared in their house in 1970, when he was still a post-graduate at the Kazan State University. The academician and the post-graduate were on the same wavelength. They were drawn together by their love of painting. Later Nikolai and Nataliya Zavoiskaya wrote an essay about the artistic likings of Evgeny Konstantinovich.

Nikolai was richly endowed with a magic talent of being a true and reliable friend. He helped people a lot and did it with pleasure. His untimely death leaves the feeling of void and forsakenness.

Yurii Chelyshev Sergei Orlinskii
Georgy Mamin Kev Salikhov
Laila Mosina Roman Yusupov

Prof. S. M. Ryabchenko (Kiev, Ukraine) reports his latest results.

International Conference "Resonances in Condensed Matter" devoted to the centenary of Professor Semen A. Altshuler
Kazan, Russia, June 21–25, 2011

The Conference was organized by the Kazan (Volga Region) Federal University (KFU) and was devoted to the centenary of Professor Semen A. Altshuler (1911–1983), Corresponding member of the Academy of Sciences of the USSR, who was well-known by his pioneering work in EPR (together with E. K. Zavoisky), the prediction of the neutron magnetic moment (with I. E. Tamm) and acoustic magnetic resonance. Scientists from many countries came to Kazan to discuss the most significant results obtained with the use of magnetic resonance and magnetic relaxation measurements and theoretical models in condensed matter physics and modern applications of magnetic resonance techniques and methods.

The main topics of the conference were electron paramagnetic resonance, nuclear magnetic resonance, acoustic magnetic resonance, ferromagnetic resonance and antiferromagnetic resonance in condensed matter; enhanced nuclear magnetic resonance in Van-Vleck paramagnets; magnetic relaxation; optical spectroscopy of paramagnetic crystals; magnetic resonance in high magnetic fields; magnetic resonance in medicine, informational and nano-technologies.

23 plenary talks, 32 oral talks, 69 poster presentations and 9 talks at the Altshuler Memorial session were presented at the conference. In addition to scientists from Russia (Moscow, St. Petersburg, Yekaterinburg, Chernogolovka, Troitzk, Ufa, Nizhniy Novgorod, Kaliningrad, Kazan), scientists from Germany, France, Poland, Switzerland, Japan, Italy, Israel, Croatia, Syria, Ukraine and Moldova took part in the work of the conference. The Altshuler Memorial session was opened by the Chairman of the Conference Professor I. R. Gafurov, Rector of KFU, Z. R. Valeeva, Vice-Premier of the Republic of Tatarstan, A. N. Gilmutdinov, Minister of Education and Science of the Republic of Tatarstan. A comprehensive talk about S. A. Altshuler was given by the Chairman of the Organizing Committee Professor B. I. Kochelaev, one of his first post-graduate students. The talks in memory of S. A. Altshuler were delivered by his pupils and co-workers: Professors A. A. Manenkov (Institute of General Physics, Russian Academy of Sciences, Moscow), V. A. Golenischev-Kutuzov (Kazan State Power Engineering University), Yu. E. Pol'skii (Kazan State Technical University), I. N. Pen'kov (KFU), A. A. Kaplyanskii (Ioffe Physical-Technical Institute, Russian Academy of Sciences, St. Petersburg).

More than a half of the talks at the conference were devoted to the magnetic and optical resonance methods of materials studies. Along with traditional applications of these methods (spectroscopy of crystals and organic compounds, including impurity centers in crystals), many talks were devoted to the results of the studies of nano-objects (nanomagnets, nanostructures, nanoparticles, nanoclusters, nanotubes) by spectroscopic methods, including high-frequency EPR (90 GHz and higher). Applications of magnetic resonance in medicine, informational and nanotechnologies were reported as well.

A memorable event at the conference was the performance of the opera-fado "Evgenii Zavoisky or Epochs' Paradoxical Resonance (EPR-2)" written by Professor N. I. Silkin.

The XIV International Young Scientists' School "Actual Problems of Magnetic Resonance and its Applications" (rector – Professor M. S. Tagirov, vice-rector – Professor V. A. Zhikharev) took place during the conference.

All information about the Conference and Young Scientists' School can be viewed on the websites http://alt100.ksu.ru and http://mrschool.ksu.ru.

Murat S. Tagirov,
Chairman of the local organizing committee
Alexander V. Dooglav,
Scientific Secretary

* * *

The International Conference "Resonances in Condensed Matter" became a great event in the life of the magnetic resonance community reflecting both the key role of Semen A. Altshuler in modern solid state physics and his great personality. I was impressed by the scientific program of the conference and the wide variety of the problems discussed there.

In one of the evenings the scientific session, unexpectedly, for its participants, was continued at a merry and unusual theatrical production – opera-fado "Evgeny Zavoisky or Epochs' Paradoxical Resonance EPR-2" composed by Nikolai I. Silkin, Professor of the Kazan Federal University.

The first-night of the show became the integral part of the conference not accidentally, since Evgeny K. Zavoisky and Semen A. Altshuler were long-term collaborators and friends. The author has devoted the opera also to the memory of two other outstanding scientists of the university – Boris M. Kozyrev and Boris L. Laptev.

The history was revived and present day Kazan University, founded in 1804, flashed by on the stage in the best traditions of a burlesque show, a parody show, KVN[1], or a simply friendly student party (video www.youtube.com/watch?v=6YvISYmblmE&feature=youtu.be). The author Nikolai I. Silkin, the stage manager-director Eduard G. Treskin, the People's Artist Vladimir Ya. Akimov, musicians,

[1] http://en.wikipedia.org/wiki/KVN

DRAWN BY SOFYA SILKINA

and performers, everybody, who participated in the creation of the show, have formed a remarkable team of high-rank scientists and highly professional people of art. Undoubtedly, the composition of Nikolai Silkin will enter the annals of the worldwide university epos and will remain there forever.

Not easy even for a scientist, but all the more so for an unsophisticated spectator, the opera's title became comprehensible very soon. The performance on the stage, due to the paradoxical resonance caused by the electromagnetic fluctuations in the cortex predicted by E. K. Zavoisky, affected the spectators and generated their return reaction, mainly, in the manner of laughter through (or not through) tears.

The sufferings of young Vanka Zhukov[2] (a famous personage of Anton P. Chekhov's short stories), the fate of which was discussed by the Emperor Alexander I[3] and the members of the High Council of the Kazan University Nikolai Lobachevsky[4], Aleksandr Butlerov[5], Vasily Engelhardt[6], Vladimir Bekhterev[7], Jan Niecisław Baudouin de Courtenay[8] and, certainly, Evgeny Zavoisky, could not leave indifferent neither students-freshmen nor graduate students nor gray-haired mentors, personally acquainted with the greats, to whom the opera was dedicated. The distinguished scientists, who were transferred to the times of their reckless and to some extent dissident student years by this Kazan fado, which in a mysterious manner flew here from Portugal, have taken the opera particularly passionately.

The spirit of the free thought, rebellious intellect, riot against the dominance of stupid bureaucracy and political conformism were like balsam spilt from the scene directly into the souls of grateful spectators, and they joyfully accepted the invitation to actively participate in performing opera arias and student songs of all times and folk.

Therefore, the audience enthusiastically joined all the participants of the show in singing: "Vivat Academia, Vivat professores! Vivat membrum quodlibet, Vivat membra quaelibet! Semper sint in flore!"

Boris Tsukerblat
Ben Gurion University of the Negev,
Beer-Sheva, Israel

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[2] http://www.ibiblio.org/eldritch/ac/vanka.html
[3] http://en.wikipedia.org/wiki/Alexander_I_of_Russia
[4] http://en.wikipedia.org/wiki/Nikolai_Ivanovich_Lobachevsky
[5] http://en.wikipedia.org/wiki/Aleksandr_Mikhailovich_Butlerov
[6] http://en.wikipedia.org/wiki/Vasily_Engelhardt
[7] http://en.wikipedia.org/wiki/Vladimir_Bekhterev
[8] http://en.wikipedia.org/wiki/Jan_Niecis%C5%82aw_Baudouin_de_Courtenay

EQUIPMENT

Design and construction of EPR electronics

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EPR Field Service Engineer

Location
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Division
EPR

Job Description
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Excellent communication skills with the ability to communicate complex technical issues in an easy to understand manner are essential.

Strong organization and prioritizing skills, ability to work independently yet has a team focus, responsive and reliable are all key strengths of the ideal candidate.

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Ability and willingness to travel as travel is required along with a valid driver's license and passport.

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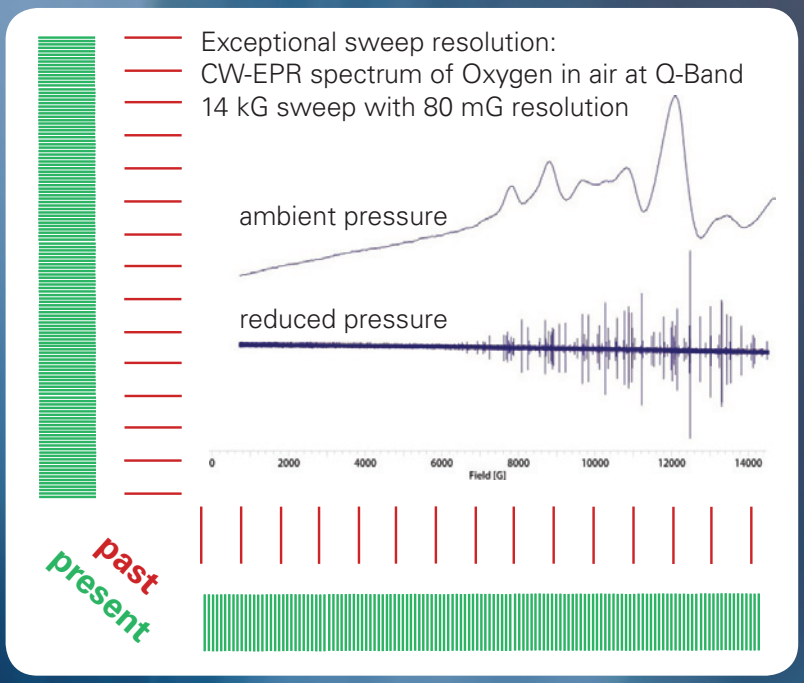

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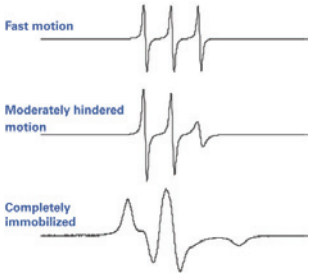
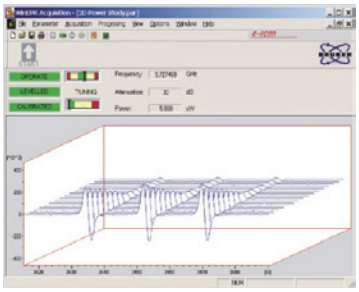
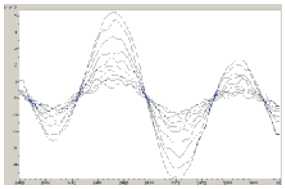


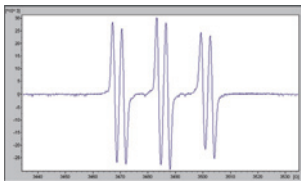
2D acquisition capability: microwave power saturation study



DPPH-Assay: Antioxidant activity



Spin-trapping of ROS



Application Areas:

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