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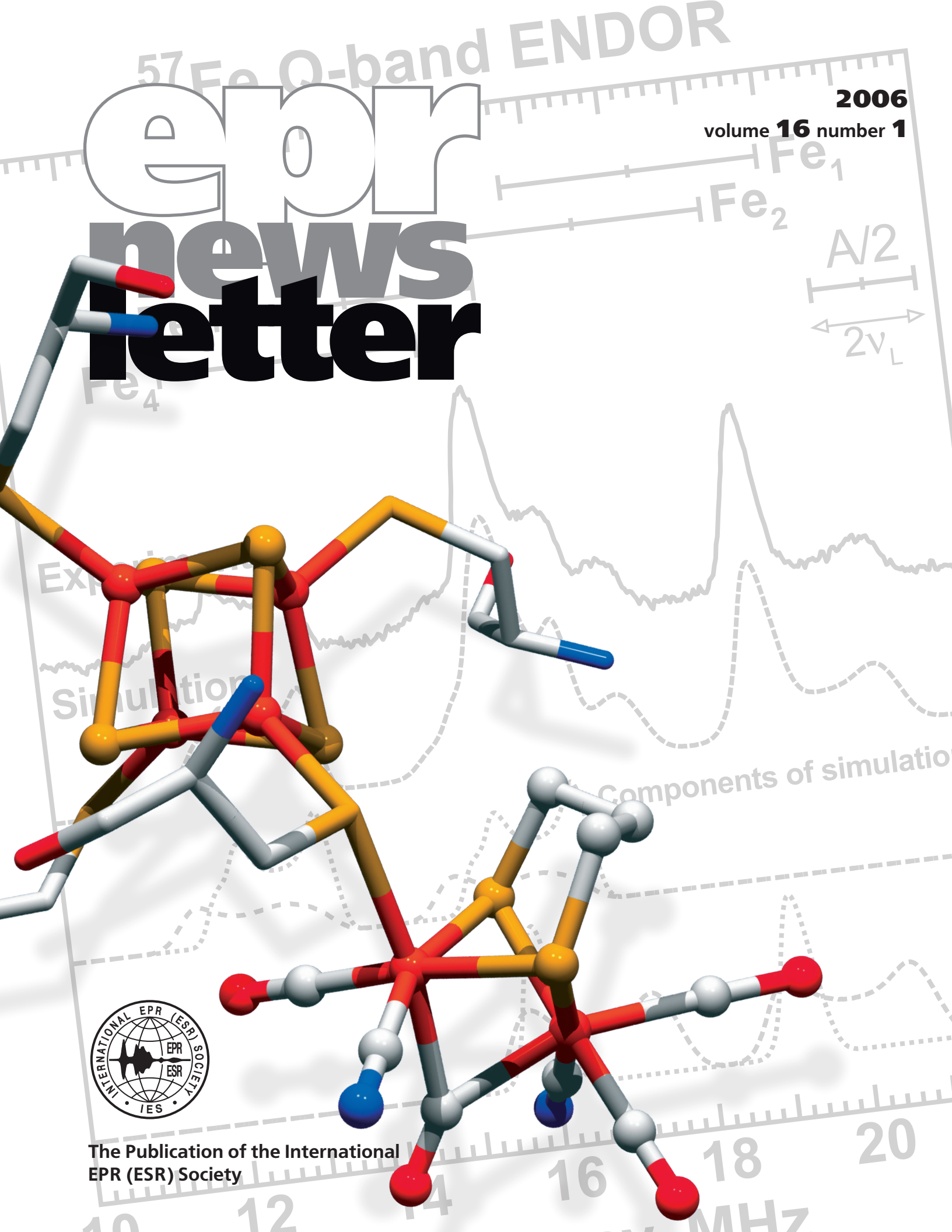

The Publication of the International EPR (ESR) Society

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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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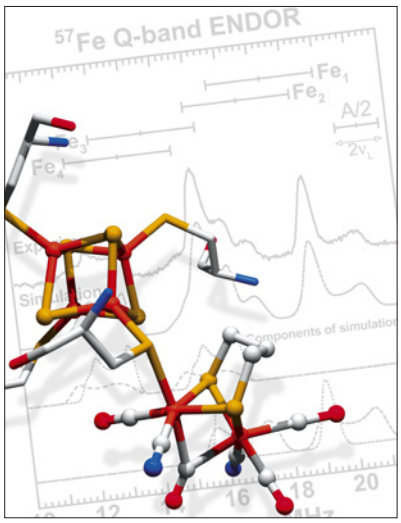


The cover picture illustrates some of the current research carried out in the group of Wolfgang Lubitz, recipient of the 2005 IES Gold Medal, on hydrogenase, the enzyme that reversibly converts protons to molecular hydrogen. The structure in the foreground shows the crystal structure of the oxidized active site of the Fe-only hydrogenase from *Desulfovibrio desulfuricans* (CO-inhibited state). In this structure (the so-called 'H-cluster') the orange spheres represent iron, yellow – sulfur, red – oxygen, white – carbon, and blue – nitrogen.

The experimental data in the background show the ^{57}Fe Davies ENDOR spectrum at Q-band (15 K) of the active site of this state, including the simulation. Four non-equivalent ^{57}Fe hyperfine couplings have been found and assigned to the iron atoms of the $[4Fe4S]_H$ subcluster. Further investigation of the ^{57}Fe-enriched H-cluster by various pulse Q-band techniques revealed the presence of six ^{57}Fe hyperfine interactions in total. This indicates that the electronic structure of the active site is characterized by an extended distribution of the unpaired spin density. (A. Silakov, E. Reijerse and W. Lubitz, to be published.)

epr newsletter

The Publication of the International EPR (ESR) Society

volume 16 number 1 2006

ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Editorial

Dear colleagues,

By now we all have learned with deepest regret about the sudden passing away of Arthur Schweiger. As his research created a sensation, his passing away was a great shock for the magnetic resonance community worldwide. When the creative development of a talented man comes abruptly to an end, his untimely demise sheds a special light on his whole life. His life becomes brighter and more tragic. It causes us to realize again and again how fragile and unpredictable life is. Instead of an article about Arthur's 60th birthday in 16/2 (he was born on June 13, 1946), we now have '*EPR newsletter* Anecdotes' and 'In Memoriam' columns dedicated to him that reveal the personality of this multitalented extraordinary man. We find an echo of his multilateral activities in the 'Computer Corner' column: he is a co-author of the article on SpecMan, a powerful control system for EPR spectrometers (p. 21).

I have another sad note to add. Shortly after Arthur's death, his previous mentor, Professor Hans H. Günthard, who was in his 90th year, passed away on February 2, 2006. He was the founder of the present Laboratory of Physical Chemistry of ETH Zurich. He initiated research in virtually all fields of molecular spectroscopy, beginning with infrared and microwave spectroscopy, later adding magnetic resonance and ultraviolet spectroscopy. It was Günthard who motivated Arthur to start his successful work in EPR, and they had a long lasting successful collaboration in this field of research. Much of Arthur's early work is influenced by the thoughts and the research style of Hans H. Günthard.

This issue starts my second term as the Editor of the *EPR newsletter*. In my first term I enjoyed collaboration with our team of Associate Editors, Graham Timmins, Takeji Takui and Thomas Prisner, and the Technical Editor Sergei Akhmin. Special thanks go to Stefan Stoll, our skilful and conscientious webmaster, who ensures functioning of the website at ETH Zurich. I am most appreciative of the high regard of our activity given in Wolfgang Lubitz's Letter of the President (p. 3). It gives us strength and inspiration for the future. Graham Timmins and Takeji Takui 'pass on their batons' to Candice Klug and Hitoshi Ohta, respectively (p. 6). Graham and Takeji san, I heartily thank you for your cooperation and hope that it will continue on an informal basis. Candice and Hitoshi san, welcome! I am glad that Thomas continues with his topical 'Pro&Contra' column. As I have already stated in my first editorial (13/1-2, p. 3), I wanted to add a human touch to science and to this end, a new column, 'Another Passion', was introduced. John Pilbrow's recent words: "In an age where most scientists spend a lot of time writing grant proposals and reports on progress in rather conservative and dull prose, your idea of the passions column takes us out of that dullness to the real world where people actually live" gives me hope you may enjoy this column as much as I do. John's contribution "The Interface between Science and Christianity – A Personal Journey" (p. 10) gives us a reason to look at ourselves and the world from the point of view of this interface and adds to the understanding of John's deep personality.

EPR newsletter and Arthur Schweiger are a special story. He highly anticipated the role of this publication in the life of the EPR community and he contributed a lot to its success. For six years he edited the 'EPR Specialist Vignettes' column, starting in 1994 with Motoji Ikeya's article "ESR Microscopy – Scanning ESR Imaging of Spin Density" (6/4, p. 12) and ending in 1999 with Gunnar Jeschke's article "Magic Angle Spinning in Pulse EPR" (10/4, p. 5). He kept this column running with experts reviewing the fields of EPR research that were not common knowledge to all of us. I was happy that in 2003 he agreed to edit the 'For Your Perusal' column. The way he did it was another manifestation of his spiritual wealth and intelligence. Arthur had a fine feeling for beauty in general and for the beauty of light and shadow in particular, so nicely illustrated by his photos published in the *EPR newsletter*. 'The Photo of the Issue' column revealed his great sense of humor as well.

It is with a heavy heart that I write this editorial. Even if our grateful memory will keep Arthur Schweiger alive for many years to come, we will terribly miss this man who enriched our lives with his presence. It was such a delight to have Arthur's input and comments on our issues of the *EPR newsletter*. Human beings are mortal but it never occurred to me that within my lifetime the flow of Arthur's brilliant ideas would ever come to an end. If he would have read this issue, would he have said: "well done!" as he usually did? I will never know…

Laila Mosina

Letter of the President

Dear Colleagues,

For the coming three years I have the pleasure to serve as President of the International EPR/ESR Society (IES). I would like to thank the former President, Yuri Tsvetkov, for his excellent work and commitment to our Society and for introducing me to the President's duties. I would also like to express my gratitude to the former Vice Presidents Ronald Mason, Takeji Takui and Marina Brustolon for their important work for the IES in the past years. During the period 2005–2008 the Vice Presidents will be Balaraman Kalyanaraman (Americas), Shozo Tero-Kubota (Asia-Pacific) and Carlo Corvaja (Europe), who assist and advise the President in all his decisions and activities.

As you know, the President is getting strong support from the Secretary of the Society, Shirley Fairhurst. Fortunately, Shirley agreed to continue her invaluable work for the next three years. Chris Felix, the Treasurer of the IES, will serve the Society also during the next period. It was due to his strenuous efforts that the finances of our Society are now looking very good.

The most important link within our Society, and with the international scientific community in general, is the *EPR newsletter*. Laila Mosina is the Chief Editor since 2003, and she will continue to edit and publish our *newsletter*, the Society's main source of information. For her excellent work in the past, for establishing a new cover and layout and for her tireless work to improve and extend the contents of the *EPR newsletter* I wish to sincerely thank Laila, her team of Associate Editors (Graham Timmins, Thomas Prisner and Takeji Takui) and the Technical Editor Sergei Akhmin.

The *newsletter* website was managed by Arthur Schweiger and his group at the ETH Zürich. As you all know, Arthur unexpectedly passed away on January 4, 2006. This was a shock for all of us and a great loss for our Society and for the field of EPR worldwide. With deep gratitude I thank Arthur for the great work he did for the *newsletter* website and as Secretary for the IES from 1993–1996.

The Executive of the IES will continue to work hard on the aims of our Society, in particular to stimulate the scientific development of EPR spectroscopy worldwide in all fields of natural science as well as to communicate information and news related to EPR not only among its members but throughout the scientific community. We will promote EPR in scientific journals, on conferences and workshops, in educational programs at schools, universities and companies and we will help to found new and preserve established EPR groups and centers throughout the world.

The number of applications of EPR has increased exponentially over the past decade. EPR has been recognized as the most versatile technique to study paramagnetic systems; it can furthermore be applied to diamagnetic systems by using spin labels and spin probes. For the structural and dynamic characterization of chemical and biological materials on length scales from 1 to 10 nm and time scales from picoseconds to microseconds EPR techniques are well suited and are often without competition. A particular advantage is the possibility to study liquid and solid samples, single crystals and even entire biological objects. Thus, a field of specific importance and increasing interest is EPR imaging in medical and materials science.

I am convinced that modern EPR has a great future in the sciences and it is therefore worthwhile to undertake any efforts for supporting EPR activities worldwide. I ask all members of the IES to help us in this endeavor.

Wolfgang Lubitz

Fellowship of the IES to...

Professor Harvey A. Buckmaster

FELLOW OF THE SOCIETY 2005

Professor Harvey Allen Buckmaster is a pioneer EPR spectroscopist. His PhD thesis at the University of British Columbia involved the first construction of both an EPR spectrometer in Canada in 1953 and a high-frequency magnetic field modulation version that achieved a significant improvement in spectrometer sensitivity by 1955. After an NRC Overseas Postdoctoral Fellowship in radio astronomy at Cambridge, he resumed his EPR research at the University of Alberta. In 1960, he moved to the University of Calgary, retiring as an emeritus professor of physics in 1993. He then moved to the University of Victoria as an Adjunct Professor to do EPR research for another six years.

His research involved the introduction of synchronous signal processing and noise suppression techniques to the design of EPR spectrometers and their incorporation into the design and construction of a broadband 1–2 GHz CW and pulse EPR spectrometer in 1992. He made early contributions to the tensor operator formulation of spin-Hamiltonians and the application of computers to fit EPR spectra to spin-Hamiltonians. His experimental EPR research included studies of S-state impurity ion host lattice effects, *in situ* combustion of coals, impurity ions in coals, radiation effects in biological tissue, and medical biophysics studies of hemoglobin and malignant hyperthermia. He has published over 180 scientific publications.

The International EPR Society honours Harvey Allen Buckmaster with the award of Fellow of the Society.

Fellowship of the IES to...

Professor Keith A. McLauchlan

FELLOW OF THE SOCIETY 2005

Keith McLauchlan (Emeritus Professor of Chemistry and Fellow of Hertford College, Oxford University) has long been recognised as one of the leading figures in EPR Spectroscopy. He graduated from Bristol University with BSc and PhD degrees, before undertaking research at NRCC, Ottawa (1959–60) and NPL, Teddington (1960–65). He then moved to the Chemistry Department in Oxford where he was Lecturer, Reader and Professor.

Keith has made a major contribution to the EPR study of short lived intermediate states in photochemical reactions and to the development of time-resolved EPR spectroscopy. His outstanding lecturing ability on EPR subjects is a delight for students and experts alike.

Keith has been honoured with many awards: Fellow of the Royal Society (1992), IES Silver Medal for Chemistry (1993), IES Gold Medal (2002), Bruker Prize (1997) and the Zavoisky Prize (2001). He was Chairman of the ESR Group of the Royal Society for Chemistry (1989–92), President of the IES (1993–96) and a member of Scientific Advisory Board of the Electro-Magnetic Field Biological Research Trust (1995–2001).

The title of Fellow of the Society is conferred on those who have made truly outstanding contributions in EPR theory and/or practice. Keith McLauchlan has made both and it is fitting that he should be honoured with a Fellowship of the International EPR (ESR) Society.

Professor Harold M. Swartz

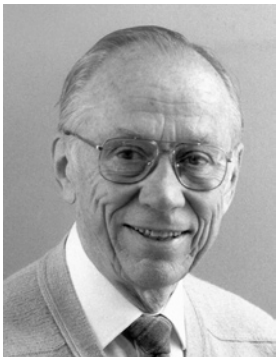
FELLOW OF THE SOCIETY 2005

Harold (Hal) Swartz (Professor of Radiology and Physiology at Dartmouth Medical School) is appointed a Fellow of the Society in recognition of his outstanding contributions to EPR studies of viable systems.

Hal obtained his first degree at the University of Chicago. He obtained his MD at the University of Illinois, his MSPH at the University of North Carolina (Chapel Hill) and his PhD from Georgetown University Medical School. He is Director EPR Center for Viable Biological Systems at Dartmouth Medical School.

During his distinguished career he has published over 400 papers and has held Professorial appointments at the Medical College of Wisconsin, University of Illinois and Dartmouth College. He is a Fellow of the International Society for Magnetic Resonance in Medicine and has received Silver Medals from the International EPR Society and from the Society for Magnetic Resonance in Medicine. Hal's interests include EPR oximetry and EPR of viable systems.

In 1989 he was instrumental in the founding of the International EPR Society and became its Founding President. The title of Fellow of the Society is conferred on those who have made truly outstanding contributions to the subject. In recognition of the special debt we owe him as Founding President he is also awarded the IES Founder's Gold Medal.



Professor George D. Watkins

FELLOW OF THE SOCIETY 2005

George Watkins (Emeritus Professor of Physics, Lehigh University) obtained his PhD in 1952 from Harvard University on NMR with R.V. Pound as his advisor. He began his career as scientist at the General Electric Research and Development Center, followed by a professorship at Lehigh University in Pennsylvania.

George Watkins is the true pioneer in the application of magnetic resonance in the investigation of atomic and electronic structure of centers in semiconductors. He has applied all the advanced probing techniques such as ENDOR, ODMR, uniaxial stress, polarized light to optimize the information obtained on defect properties. A particular impressive feature of his research is the combination of state-of-the-art experiments with theoretical analysis of defect structures. Highlights in the research are spectroscopic characterization of fundamental defects in silicon (vacancies, self-interstitials) with their high mobilities, the (Watkins) replacement mechanism creating interstitial impurities, the discussion of one-electron versus many-electron models, the negative-U properties of vacancy and interstitial boron, multistability of centers, incorporation of late transition metals in covalent semiconductors (Watkins vacancy model). Though most of the work ▶

The IES General Meeting

The 2006 IES General Meeting will be held during the 29th International EPR Symposium at the Beaver Run Resort & Conference Center in Breckenridge, Colorado from July 23–27, 2006.

Please send any items for inclusion on the Agenda to the IES Secretary (shirley.fairhurst@bbsrc.ac.uk) by 23 June 2006.

is on silicon, other excellent research has included diamond, II-VI and III-V compound semiconductors. He has authored over 240 articles in books and scientific journals.

George has received numerous honours, including election as a member of the US National Academy of Sciences in 1988 and the IES Silver Medal for Physics/Materials Science in 1999. The title of Fellow of the Society is conferred on those who have made truly outstanding contributions in EPR. It is fitting that George Watkins should be honoured with a Fellowship of the International EPR (ESR) Society.

John Pilbrow (left) and Wolfgang Lubitz (right)

Professor John R. Pilbrow

FELLOW OF THE SOCIETY 2006

John Pilbrow (Emeritus Professor of Physics, Monash University, Australia) obtained his BSc and MSc degrees at the University of Canterbury, New Zealand. He received his PhD from Oxford University (UK) in 1964.

Professor Pilbrow is a pioneer in the area of Electron Paramagnetic Resonance Spectroscopy and has contributed immensely to our understanding of the subject and its application to a myriad of areas in Physics, Chemistry and Materials Science. His research contributions cover over four decades of high quality research notably in the areas of transition metal multinuclear complexes, the understanding of systems with several unpaired electrons, pulsed EPR instrumentation, development of several simulation programs covering a variety of spin Hamiltonians, and various applications of EPR to high-T_c superconductors and materials engineering.

Apart from a prolific publication record with over 200 papers, John Pilbrow has written a classic book entitled "Transition Ion Electron Paramagnetic Resonance". It is both a reference and instructional compendium that deals exquisitely with the various spin Hamiltonian parameters for a variety of transition metal systems. It also includes many practical aspects of EPR instrumentation and biological applications.

Professor Pilbrow has won a number of academic awards and fellowships. He was President of the Australian Institute of Physics (1999–2000) and was the Royal Society of Chemistry ESR Group Bruker Lecture prize winner in 1998. He is a founding member of the Asia-Pacific EPR Society. John has served the International EPR/ESR Society as Secretary (1997–1999) and President (1999–2002). He was awarded the Society's Special Medal in 2003.

The title of Fellow of the Society is conferred on those who have made truly outstanding contributions to the subject. The Society takes pride in awarding the fellowship of the Society to John R. Pilbrow, in recognition of his outstanding contributions to EPR.

■

The award of John R. Pilbrow's Fellowship of the IES was made by Wolfgang Lubitz, the President of the IES, at a social occasion in John's honor on Monday February 20th, 2006 held at Monash University where most of his work has been done since 1965. John has been a faculty member since 1965, obtained his DSc there and finally received a personal chair. For almost a decade he served as the Head of the Physics Department and is now Professor emeritus at the University. During all the years he has been an inspiring teacher and a great researcher and colleague. His scientific record speaks for itself – with more than 200 very well cited papers and a famous book written by John on EPR of Transition Metal Ions. He educated many students in physics and many young scientists came out of his laboratory and several stayed in research either at a university or other institutions.

The Head of the School of Physics introduced the occasion; the Deputy Dean of Science, Monash University, was also present. Many of his former collaborators and colleagues were there for this celebration including Gordon Troup, Don Hutton, John Cushion, Keith Murray and others. And some of his former students and postdocs also came: Graeme Hanson from Brisbane, John Boas from Melbourne, and Simon Drew, his last PhD student, who is back at Monash now at the Medical School, to name a few. Before reading the official citation (see on the left), Wolfgang Lubitz thanked John Pilbrow personally for his engagement in the field of EPR spectroscopy both as a scientist – he is one of the fathers of modern EPR in Australia – and as member, former secretary and president of the International EPR/ESR Society.

New Associate Editors

Candice Klug

ASSOCIATE EDITOR AMERICAS

Candice Klug received her undergraduate degree in chemistry from the Massachusetts Institute of Technology in 1994 and her doctoral degree in biophysics from the Medical College of Wisconsin in 1999. Her dissertation work centered on the use of EPR spectroscopy in the study of a bacterial iron transporter. Candice went on to do her postdoctoral work at the Jules Stein Eye Institute at UCLA in the laboratory of Wayne Hubbell, where she continued to use EPR to study protein structure and dynamics. In 2001, she happily returned to her home state of Wisconsin where she was hired as an Assistant Professor of Biophysics at the Medical College of Wisconsin. Candice was recently promoted to Associate Professor and is currently the Director of the Training Program for the National Biomedical EPR Center in Milwaukee. Her research focuses on the structure and functional dynamics of membrane proteins and their binding partners using site-directed spin labeling EPR techniques. Additional research interests include the application of multiquantum EPR to the study of proteins. Candice is a member of the IES and the Biophysical Society.

Hitoshi Ohta

ASSOCIATE EDITOR ASIA-PACIFIC

Hitoshi Ohta received his MS Degree in Physics from the Science University of Tokyo, Tokyo, Japan in 1985. In 1989, he received his PhD in Physics from the Science University of Tokyo. In 1987 he became Assistant Professor and in 1994 Associate Professor of the Kobe University, Kobe, Japan. Since 2001, Dr. Ohta has been appointed full Professor and vice-Director of the Molecular Photoscience Research Center, Kobe University.

The research in his group is particularly dedicated to the development and application of high-frequency and high-field ESR methods from millimeter wave to terahertz region using the pulsed magnetic field up to 40 T. His research interests are centered on experimental condensed matter physics: high-field ESR measurements of magnetic systems, magneto-optical measurements of organic conductors, ESR measurements of magnetic semiconductors. Especially, the contribution of his group is substantial to the understanding of the quantum spin systems, which show novel quantum effects due to the large quantum fluctuation in low-dimensional magnetic systems.

Hitoshi Ohta has published more than 200 publications in scientific journals, and he has written three books. He was on the Editorial board of the *Indian Journal of Pure & Applied Physics* during 2002–2004. He is member of the Japanese Physical Society, the International EPR (ESR) Society, Asia-Pacific EPR/ESR Society (APES), the Society of Electron Spin Science and Technology, the Spectroscopical Society of Japan, the Japan Society of Infrared Science and Technology, the Japan Society of High Pressure Science and Technology. Since 2004, Hitoshi Ohta has served as President of APES.

★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★ IES BUSINESS ★

Are you interested to become a member of the International EPR (ESR) Society? Please find the registration/information form for new/continuing members of the IES and non-credit-card payment instructions for individual members on this Web site: www.epr-newsletter.ethz.ch/contact.html

QUIZ WINNERS

Our quiz of *EPR newsletter* 15/3

We are glad to announce the answer to the question what the photo of the issue shows: it is a satellite photo of the portion of the University of Denver campus starting just north of the Department of Chemistry and Biochemistry.

The winner is **Gareth R. Eaton** (Department of Chemistry and Biochemistry, University of Denver, Denver). He will get a lovely sample of a mineral from the Rocky Mountains.

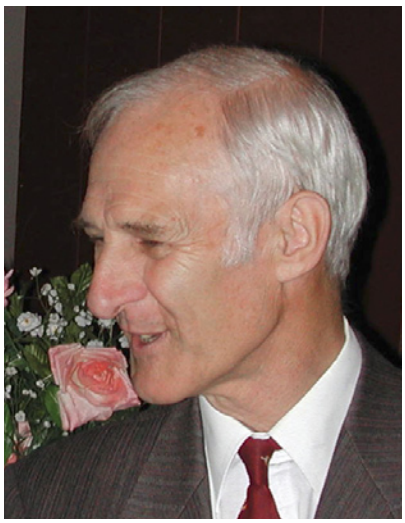
Our quiz of *EPR newsletter* 15/4

We are glad to announce the answer to the question who can see the flower as it is shown on the right (in the UV light): insects.

The winner is **Himansu Kumar Kundu** (Geochronology and Isotope Geology Division, Geological Survey of India, Calcutta). He will get a package of seeds of lovely fivefold-symmetry flowers.

The EPR community has available to it a list server. The address is epr-list@xenon.che.ilstu.edu. To subscribe to the list, send the words SUBSCRIBE epr-list to majordomo@xenon.che.ilstu.edu. That sends a message to Reef Morse who will then manually place you on the list. This honors only legitimate requests to join the list. Reef also moderates the list which keeps it spam-free.

70th Birthday of Keith A. McLauchlan*



Professor Keith McLauchlan, a pioneer of time-resolved EPR and one of the founding fathers of Spin Chemistry, celebrated his 70th birthday on 8 January 2006.

Keith obtained both his degrees in Chemistry from the University of Bristol. Although he describes his early undergraduate career as 'unspectacular', having been banned from practical work in both organic and inorganic laboratories after setting fire to one and being judged incompetent in the other, he still finished his degree course with the prize for the best examination results of his year. Research started with an undergraduate project, supervised by Bill (W. J.) Dunning, on crystal growth and nucleation and was followed by a PhD, also with Dunning, during which he built, from surplus military equipment, a mass spectrometer for the detection of gas-phase free radicals. After a one-year postdoctoral fellowship at the National Research Council in Ottawa studying gas-phase radiation chemistry, Keith returned to the UK in 1960 to the National Physical Laboratory in Teddington where he began work on NMR in the Basic Physics Division under the leadership of John Pople and David Whiffen. During an extraordinarily productive five years, he developed double resonance methods for the determination of the relative signs of coupling constants (with Ray Freeman), used three-bond spin-spin couplings to determine the conformations of carbohydrates (with Ray Abraham), did the first multiple quantum NMR experiments (with Whiffen) and the first NMR measurements on molecules oriented in electric fields. All this was at a time when the state-of-the-art in NMR was a magnet with no shim coils which had to be field-cycled – a lengthy and tedious procedure – to achieve sufficient field homogeneity to allow a spectrum to be recorded.

After moving to Oxford in 1965, as University Lecturer in Physical Chemistry and Fellow and Tutor in Chemistry at Hertford College, Keith initially extended his work on structure determination by orienting molecules in mixtures of nematic liquid crystalline solvents; little of this groundbreaking work was ever published. At the same time, he broadened his research interests into structural biology, performing ingenious deuterium NMR experiments on oriented collagen fibres in collaboration with Iain Campbell, and in 1969 together with Rex Richards, Bob (R. J. P.) Williams and other Oxford colleagues founded the Oxford Enzyme Group which pioneered the use of superconductors to generate highly stable and homogeneous magnetic fields for high resolution proton NMR. Keith and Rex drew up the specifications for a 270 MHz superconducting magnet which was built by Oxford Instruments in collaboration with Bruker. This technological advance led to an enormous number of biological and biochemical applications of NMR.

In the mid-1960s, mindful of an earlier suggestion from Rex Richards to move into a new research area, Keith changed from NMR to EPR. Following a discussion in an undergraduate tutorial about Norrish and Porter's Nobel Prize for the development of flash photolysis, he started thinking about EPR detection of photo-induced transient free radicals as a way of achieving higher spectral resolution than available from optical spectroscopy. After discussions with his Oxford colleague Peter Atkins, he constructed the world's first time-resolved EPR spectrometer, capable of identifying and characterizing free radicals with lifetimes down to a microsecond. It was based on a commercial machine from Decca Radar, with substantial modifications to extend the original bandwidth of a few kHz to 1 MHz. An extraordinary feature of all the initially recorded transient spectra was that they displayed inverted spectral intensities, with EPR lines appearing uniformly in emission rather than absorption. Naturally suspecting an experimental artifact, he spent several months verifying the authenticity of the phenomenon that became known as the Triplet Mechanism (TM) of CIDEP (Chemically Induced Dynamic Electron Polarization). Simultaneously and independently, Jeffrey Wan had made similar observations in Kingston, Ontario, and Smaller, Remko and Avery (Argonne National Laboratory) had rediscovered the other major source of CIDEP, the Radical Pair Mechanism (RPM), first seen by Dick Fessenden and Bob Schuler (Pittsburgh) in 1963. Meanwhile, Jo Bargon and Hans Fischer (Zürich) and, independently, Harold Ward and Ron Lawler in the USA had discovered the NMR analogue, CIDNP (Chemically Induced Dynamic Nuclear Polarization) as anomalous NMR intensities in the products of free radical reactions, which Rob Kaptein (Leiden) and Gerhard Closs (Chicago) independently explained in terms of the RPM. These discoveries, together with work in several laboratories on the effects of applied magnetic fields on radical pair reactions, marked the birth of Spin Chemistry, although it was not known as such until years later.

There followed in Keith's laboratory on the top floor of the Physical Chemistry Laboratory in Oxford, a large number of elegant investigations of transient free radicals, radical pairs and triplet states using the original time-resolved EPR instrument and its successor, a modified Bruker spectrometer. This work, which is recorded in more than 20 DPhil theses and many more Part II (undergraduate) dissertations, exploited the properties of both the TM and RPM varieties of CIDEP to probe the structures, dynamics, reactions, and spin relaxation of short-lived paramagnetic reaction intermediates. Almost 100 papers resulted, establishing time-domain EPR as a powerful and general physical method.

Never one to stay in the same research area for long, Keith soon started branching out, building a sophisticated pulsed RYDMR (Reaction Yield Detected Magnetic Resonance) spectrometer to complement his EPR studies of radical reactions. In the mid 1990s he became interested in the effects of weak applied magnetic fields on the rates and yields of chemical reactions under conditions where

* This piece is based on the foreword to a special issue of *Molecular Physics* published in Keith's honour and due to appear in May 2006.

the magnetic interaction energies are many orders of magnitude smaller than the thermal energy per molecule, $k_B T$. With Brian Brocklehurst, he was the first to discuss the so-called Low Field Effect, an aspect of the RPM that Brocklehurst had predicted as early as 1976, in relation to the putative health hazards of the electromagnetic fields (EMFs) emitted by electrical equipment, power transmission lines and mobile telephones. There followed stylish optically detected measurements of the influence of weak static magnetic fields with and without weak radiofrequency fields on solution-phase reactions employing fields only a few times stronger than the geomagnetic field. This work was funded, in part, by the EMF Biological Research Trust, a medical charity with the remit to support basic research on the biological effects of non-ionizing electromagnetic fields. Throughout this period, he enjoyed frequent invitations from around the world to speak on radio and television about the possible biological influence of extremely low frequency EMFs.

Keith was elected a Fellow of the Royal Society in 1992 and has won all four major international accolades for EPR spectroscopy, the Bruker Prize (1994), the Zavoisky Prize (2001) and the Gold Award (2002) and Fellowship (2005) of the International EPR Society (IES). He was also awarded the Society's Silver Award for Chemistry in 1994.

Keith's IES Fellowship was awarded in Oxford in September 2005 during the 9th Spin Chemistry Meeting (this newsletter, vol. 15, no. 4) at a half-day symposium in his honour. There was abundant evidence at this meeting that time-domain EPR, chemically induced magnetic polarization and magnetic field effects have become a mature, exciting and expanding area of research and that Keith has been one of its principal and most productive exponents.

Throughout his 37 years in Oxford, Keith gave tutorials on the whole of the Physical Chemistry course, lectured on most of it and supervised undergraduate practical work in the Physical Chemistry teaching laboratory. A naturally gifted teacher, he clearly enjoyed this aspect of the job and generations of undergraduates, Part II and DPhil students benefited from his insight and inspiration. I clearly remember my first encounter with Keith, in 1975. I was a second-year undergraduate struggling with the EPR spectrometer – another imposing Decca Radar instrument, full of prettily glowing valves – in the Physical Chemistry teaching laboratory. Despairing of ever obtaining a spectrum, I timidly approached the demonstrator for help. In the space of the next hour, with great patience and enthusiasm, Keith told me what EPR was all about (I had only a vague idea at the time), demonstrated how the spectrometer worked, produced a beautiful spectrum of the pyrazine radical anion, explained how to interpret its hyperfine couplings using Hückel theory and, thrillingly, described the time-resolved version of the experiment in his lab upstairs. When, a year later, I needed to select a supervisor for my final year research project, I found the choice particularly easy. In the 30 years since then, Keith has been an outstanding teacher, mentor, colleague and friend.

Since retiring in 2002, Keith has continued to be highly active, publishing in 2004 a well-received textbook, Molecular Physical Chemistry; a Concise Introduction, preparing a history of Hertford College scientists from the 16th to the 20th century, and working on a history of the College during his period as a Fellow. He spends two days a week in the lab, skis, plays golf, tends his large, attractive Oxford garden, learns Japanese and greatly enjoys family life with Joan (they met on their first day as undergraduates at Bristol and married five years later), their two children and four grandchildren. I wish him a long, happy and productive retirement.

Peter J. Hore

Another Passion

The Interface between Science & Christianity – A Personal Journey

John Pilbrow

It was during my undergraduate days in New Zealand back in 1959 that I attended a lecture by the noted Cambridge Paleontologist, Martin Rudwick, relating to the interface between science and Christian faith. I was not only impressed by his talk, but reassured that one could be both a practicing scientist at the forefront of one's field and also a Christian. The lecture was timely as I had just finished reading the excellent little book, *Science and Christian Belief* by Charles Coulson, perhaps better known to older members of IES as the author of the very fine monograph, *Valence*, published by OUP in 1938. Coulson's book reinforced my growing understanding of the unity of knowledge. I also came to see that as a Christian I should welcome the truth whenever and wherever it is found. During this time I realised that the bible is not a science textbook and that one should not look for modern scientific concepts there. It was these experiences that challenged me to find ways to harmonise my understanding of the world through both science and orthodox Christianity. It would have been unthinkable for me to try to put these two parts of my life in totally separate and watertight compartments.

I take the findings of modern science seriously and am convinced that biological evolution and big bang cosmology provide the best and most consistent scientific views of how our universe operates. Thus I do not support so-called 'creation science' or the arguments put forward in recent years by proponents of the 'intelligent design' movement. I am also suspicious of those who claim to have found God in one or other scientific discovery and I am reminded of a very insightful quotation from Coulson, "When we come to the scientifically unknown, our correct policy is not to rejoice because we have found God; it is to become better scientists."

On going to Oxford late in 1961 to do my doctorate in physics, I had no trouble in seeking out the Research Scientists' Christian Fellowship [RSCF*], which I already knew about, as one of my lab colleagues was a member. We met in the rooms of an Australian Chemist, John White, at the time a specialist in the Overhauser Effect. Other members included a young and senior academic, John Houghton [now Sir John], and winner of the 2006 Japan Prize for his work on atmospheric research and global warming. Although John White remained on the staff at Oxford until 1985, he served as Director of the Institute Laue-Langevin in Grenoble from 1977–80. He returned to Australia as Professor of Physical and Theoretical Chemistry at the Australian National University in 1985 and, from 1992 until recently, he has also been President of ISCAST, the Institute for the Study of Christianity in an Age of Science and Technology. I have just succeeded him as President.

It is noteworthy that when I started my research in Oxford there were five of us in the Bill Hayes lab, three of us Christians. One of the others became a Christian a few years later and remained so until he died from cancer 10 years ago. He was succeeded in the lab by another Christian. The discussions of those days as well as the more formal RSCF meetings both in Oxford and later in Melbourne presented a friendly environment where one could discuss some of the big questions and even ask 'dumb' questions without having one's head 'bitten off'! ISCAST continues to provide such an environment today.

Last July I presented a paper to the Conference on Science and Christianity held in Canberra on *The Impact of Einstein's Relativity on Christian Thought*. This may be found on the ISCAST website www.iscast.org.au. It is my hope to extend this paper for eventual publication in a major science-religion journal. What I found was that although many theologians acknowledge that Einstein has altered how we think about time, there was little evidence that this had really impacted on how they thought about Christian concepts such as eternity and resurrection. Those with a physics/cosmology background tended to be fairly cautious. Many of them referred to key insights regarding time and eternity in the writings of St Augustine of Hippo more than fifteen centuries ago which appear to have been way ahead of their time.

The keynote speaker at the conference was Professor George Ellis from South Africa, noted cosmologist and winner of the Templeton Prize for 'Progress in Religion' in 2004, and co-author with Stephen Hawking of *The Large Scale Structure of Space-Time* [1973]. He took us on a journey through hierarchies of knowledge with both bottom-up and top-down ways of looking at reality. In associated public lectures he addressed broader issues such as *The Moral Nature of the Universe*.

Christian theologians are careful not to tie their theological position too closely to current scientific paradigms for these might be ultimately modified in some way. Rather they seek the relationship much more in terms of the processes we use to think about our science and the religious and philosophical questions that science throws up. Nevertheless, many theologians nowadays are looking to see whether discoveries in modern science such as quantum indeterminacy and chaos theory might influence our understanding of divine action, though this seems rather speculative and somewhat controversial.

* In the UK the RSCF has been superseded by the organisation, Christians in Science, that publishes the Journal, Science and Christian Belief. In Australia the RSCF gave way to ISCAST [Institute for the Study of Christianity in an Age of Science and Technology].

In recent years I have been most strongly influenced by those Christian theologians who began their careers in science, in particular, John Polkinghorne FRS, formerly Professor of Mathematical Physics at Cambridge, who resigned his Chair in 1979 to pursue a new career in theology. He has written more than a dozen books ranging from theological to popular level texts, in one of which he sought to explain to his scientific colleagues why he had chosen to spend the rest of his career exploring the interface between Christianity and modern science. I think particularly of the lectures he has given at Monash University and elsewhere in Melbourne over the years, most of which I have had the privilege of chairing.

Others with a physics background include Ian Barbour, who pioneered the investigation of the science-religion dialogue back in the 1960's, and Robert John Russell, Founder and Director of the Center for Theology and the Natural Sciences in Berkeley, whose Physics PhD was in Paraelectric Resonance. Notable among writers in the science-religion dialogue are two former biochemists, Arthur Peacocke and Alister McGrath, the latter being Professor of Historical Theology at Oxford. These writers challenge the notion that 'religion is out-of-date' in this post-modern world. The fact that they recognise a major scientific revolution has taken place is a step forward. A representative bibliography may be found in my article *The Impact of Einstein's Relativity on Christian Thought* [see website www.iscast.org.au].

I readily acknowledge that Christian faith is not in the end logically provable but is adopted for reasons little to do with science. While there is a significant intellectual dimension to Christianity, which in its own way is very stimulating, I find it much harder to live consistently in the steps of the Carpenter of Nazareth! That is the challenge for me, at least.

I am convinced that science is not 'all there is' and that religious views, in particular, for me, Christianity, provide a complementary means of looking at ourselves and the world. It is important for us not to be mesmerised by what we have discovered through science, though of course modern civilisation depends so much upon it, but still to be able to appreciate a beautiful sunrise or sunset or a Bach Cantata or a Beethoven Symphony. Another essay would be needed to reflect on aesthetics, art, literature and so many things that don't fit neatly into our logical mindset.

My decision to retire a little early at the end of 2000 was to create more time for the pursuit of my interest in the science-religion area. I have sought to broaden my understanding of many of the current ethical and moral dilemmas raised by e.g. stem cell research and cloning, issues that challenge our understanding of what it means to be human. To that end back in 2002 I undertook two courses in Ethics. Freeing up time has made it possible to attend conferences in the science-religion area. Just last week my wife and I attended a two-day conference in Canberra *From Resurrection to Return: Perspectives from Theology and Science on Christian Eschatology*. One of the keynote speakers was Robert Russell from Berkeley, referred to earlier. The pull of the lab continues and I am still engaged in EPR experiments, mainly pulsed EPR, so balancing my time between these activities is not always easy.

I have always sought to find coherence between my faith position and my scientific understanding of the way things are. This is not always easy and there remain many 'untidy edges of my knowledge'. The journey I have been on all these years has been challenging and rewarding. I am passionate about science and passionate about finding appropriate ways to find coherence between my scientific understanding and Christian faith. That will remain for me an inescapable task into the future.

Melbourne, Australia, 4 April 2006

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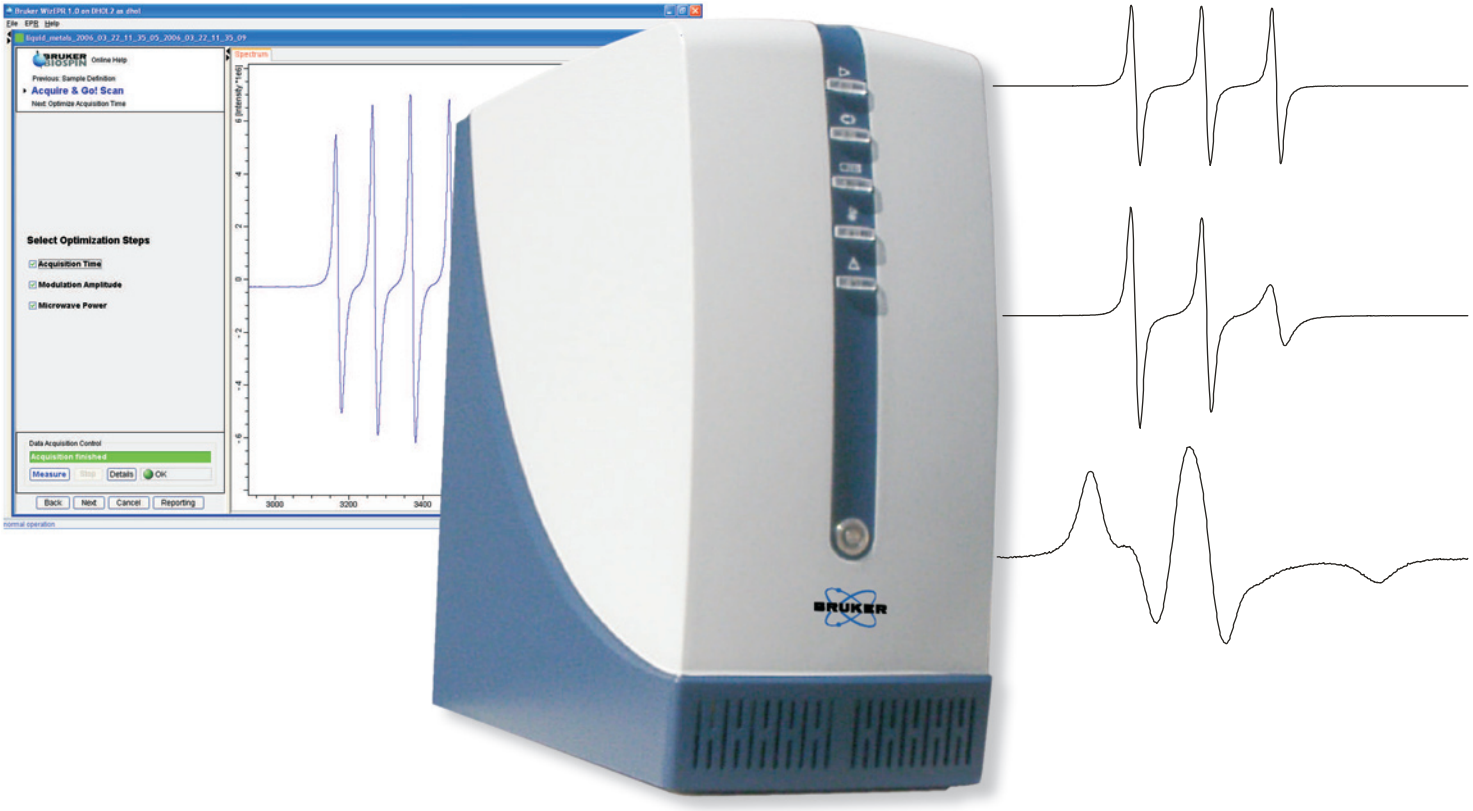

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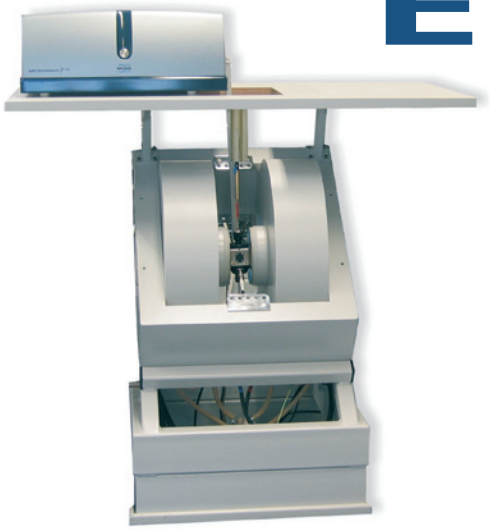

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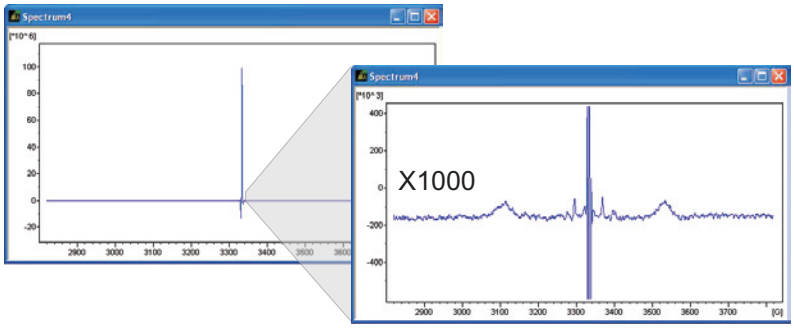

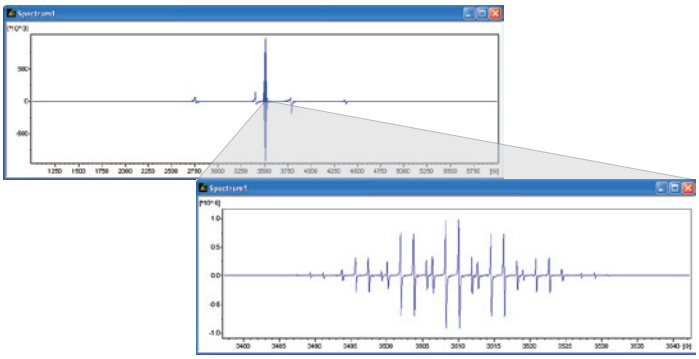

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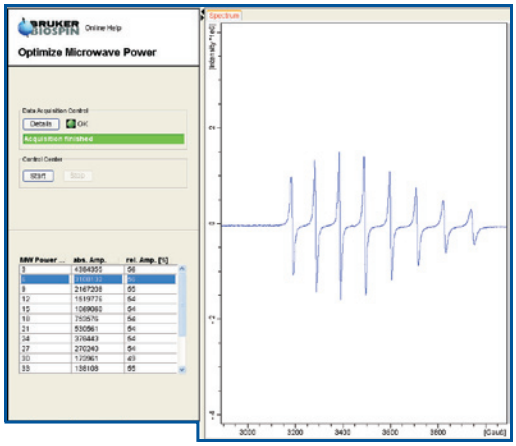

Arthur Schweiger & His Group

Remembering Arthur, the Compleat EPR Spectroscopist

Alex Angerhofer
University of Florida

Unfortunately, I was not granted to know Arthur Schweiger personally but for a few short years, starting with my sabbatical stay which he graciously supported in his lab in 2002. There was so much to learn from him, and so little time for it... as I have now realized.

When I made my way across the Swiss border on that sunny August day I mainly knew him from his published works, comprehensive and detailed accounts of everything EPR, some of which had been significant for my own research. However, the biggest impact of Arthur's magic wand I felt through his comprehensive reviews on the art of pulsed EPR, and most certainly through his book on the subject, a copy of which he graciously signed and gave to me when I joined his lab.

Yet, in looking back, remembering Arthur and pondering his legacy, my deepest impression is that of a great artist. He wasn't just content with publishing well-cited papers, giving eloquent talks, or inspire his students and co-workers with visions of what could be done in EPR and why it was important; all things he did time and again of course. No, he wanted to make EPR beautiful, and he succeeded in doing just that. In executing his craftsmanship Arthur wasn't satisfied with the analytical and descriptive powers of EPR or the technical advances he pioneered, but constantly tried to dig deeper into its foundations to come up with new facets of its inner beauty. This was most evident in the lively group meetings and discussions which, incidentally, were not always scientific ones. His slide shows from around the world, wherever his work took him, were beautiful cross-sections of life and demonstrated his skill in capturing the subliminal and recondite backdrop of a situation.

Memories of Arthur Schweiger

Jeff Harmer
Laboratory of Physical Chemistry, ETH Zurich

I first met Arthur in 1997 on Fraser Island in Australia at a magnetic resonance conference. This was his first trip to Australia, and my first magnetic resonance conference. He of course gave a humorous yet serious talk on EPR methodology, and this was my first introduction to the subject. Arthur often incorporated jokes into his talks to entertain the audience and to convey concepts. One of his favorite themes, usually at a conference dominated by NMR, was to compare the historical development of NMR and EPR using the cartoon characters Asterix (NMR) and Obelix (EPR). Asterix (NMR) is a very weak guy and represents the small g_n of magnetic nuclei, whereas Obelix (EPR) is a very tough strong guy good for representing the large gyromagnetic ratio of the electron. The extensive NMR 'magnetic menu' equated to the clever but weak Asterix eating from a large table full of food and wine, whereas before pulse EPR poor Obelix was eating only boring bread and water. With the development of pulse EPR (shown by Asterix and also now Obelix using very short hard strikes to win battles) of course the situation changed dramatically. These eye-catching demonstrations, and Arthur's talks in general, certainly made an impression on young people, and resulted in some of us (including myself) to become interested in the field. Arthur frequently used well-known themes to demonstrate the rapid advances that are presently being made in EPR spectroscopy.

To work in Arthur's group was an honor. His scientific style allowed people the freedom to develop their own ideas. If you asked Arthur what his role in the group was, then he usually replied, 'I am merely the group's Chauffeur'. He was a very modest man, and always provided useful and innovative ideas for all aspects of the research in his group. The group's main interests are the development of EPR methodology, the study of transition metal complexes in biology, chemistry, materials science, and catalysis, the development of resonators, spectrometers, and software. It is fair to say that Arthur's main scientific love was the dynamics of spins, which in the early days of his career he was fortunate enough to learn from the Nobel Prize winner Richard Ernst. The EPR community can be very grateful that Arthur was able to record this love for methodology in a clear and easily interpretable book, *Principles of Pulse Electron Paramagnetic Resonance*, by G. Jeschke and A. Schweiger. In our opinion this is one of the greatest legacies of his life working in EPR spectroscopy.

Apart from science, Arthur had many other interests. His love for classical music, fine restaurants and culinary delights was felt, and enjoyed, by everyone in his group. Photography was certainly his passion, and it does not go unnoticed that shortly before he passed away he put on display a large collection of his recent work (see www.fotocommunity.de/pc/pc/mypics/592001), in particular highlighting aspects of winter in Switzerland, and the ETH buildings and architecture. Unfortunately no one in his group had an opportunity to say a farewell to Arthur, we went away for the Christmas vacation, and we all came back, except Arthur. At the age

of only 59 he was suddenly taken away, and here it is appropriate to use an age old saying 'the best are always the first to go'. He will certainly be missed greatly by his coworkers and the EPR community as a whole. We wish his wife, Sylvia, and family, all the best for the future.

A Rare Party

Gunnar Jeschke
Max Planck Institute for Polymer Research, Mainz, Germany

When Arthur approached the age of 50, our whole group was guessing whether there would be some party. Arthur did not come forward with any suggestion. We could have expected that, as he was always very reluctant to take center stage. So, we started to nudge him, and as Arthur was always listening to his group, he finally conceded and gave a party in a chalet well hidden in a forest near Zurich. We decided to make him work during his own party. Some of us had still seen him measuring EPR spectra himself, but it hadn't happened for years. We decided that we would install a Varian E-3 table top spectrometer in the chalet. Jörg Forrer, our engineer, assured us that Arthur had once known how to operate it.

Carrying this spectrometer and loading it into a car turned out to be rather good exercise for us. The rear of the car nearly touched the road, but Michael Willer somehow managed to drive us to the chalet without ruining the exhaust pipe. After checking that the spectrometer would not blow the fuse, we hid it under a table cloth, well before Arthur arrived.

Arthur may have been surprised, shocked he was not. He gracefully received the sample, which we had unlabelled to make it more difficult, and nonchalantly measured its spectrum, not hesitating with any setting. "Oh, you gave me my beloved copper salicylate", he remarked. That in turn shocked us, as the sample was a single crystal in an arbitrary orientation. It meant that Arthur's mind kept a complete library of the ligand hyperfine patterns of all the complexes he ever measured. If he would now have told us the exact orientation of the magnetic field with respect to the crystal frame, we would have believed it.

The CW ENDOR group at ETH (1982), from left to right: Markus Rudin, Jörg Forrer, Giorgio Cirelli, Ernst Jörin, Cornelia Rey, Prof. Hans H. Günthard, Arthur Schweiger, Ferenc Rakoczi, Robert Wolf, and Antonio Russu.

"What's inside?"

Alessandro Ponti
Institute for Molecular Science and Technology, Milan, Italy

It was during my PhD that I decided to spend my Post-Doc period in Arthur's lab to learn about pulse EPR. Of course, I had been astonished by his papers on the subject – even if at that time I hardly understood half of what I read. Also, I had been deeply impressed by his benevolent and witty look as it appeared in the photo enclosed in his pulse ENDOR review (*Chem. Rev.* **91**, 1481 (1991)).

Soon after my arrival in Zurich, that photo turned out to be a faithful portrait of Arthur's character. He has always been a benevolent mentor to all of us youngsters. I once heard him asking a new PhD student: "Is your salary enough? I don't want that you drive a taxi at night to earn extra money…"

He loved to challenge us with puzzling questions and I have been thinking since then that he was most pleased when none of us had a ready answer. "What's inside?" he once asked me, pointing at a sealed but seemingly empty quartz tube he had on his desk. Taken off balance, I answered "Nothing." With a triumphant smile, he then said: "It's filled with a nice EPR sample, oxygen!" A few instants later, after noticing my disappointment for having been so dull, he added: "Don't worry, it was a difficult question…" I knew the question was not difficult, nevertheless I felt reassured. Such was Arthur's style: teach and motivate.

Challenges were preferentially thrown down (and taken up) during coffee breaks (10 am), after-lunch coffee (1 pm), and tea breaks (4 pm). Well, it seems we had a lot of breaks (and so it was!), but it was during those breaks that our research often made giant leaps thanks to the open discussions subsequent to the problems he cleverly set out for us. Arthur taught us a lot of science and, perhaps more important, a lot about

how research should be carried out. One morning I rushed into the room where everyone was sipping coffee and said: "I just had a wonderful idea, I only have to find an appropriate sample to perform the experiment." Smiling, he replied: "It will be a good idea when you'll find the appropriate sample." Such was Arthur's style: enthusiasm and wariness.

Anyway, Arthur was very challenging to himself, too. A week after some new hardware had been made ready, he was already discussing modifications with Jörg Forrer to perform new experiments. The just completed rearrangement of his huge literature collection had to be planned again because of a single paper that did not fit nicely in any of the classification entries. And the theories should be extended, and the experiments should be performed with another sample, and that new phenomenon could have a counterpart in pulse EPR…

Many more memories are in my pen, related both to his peculiar attitude towards science and research and to his keen interest to art and nature, but the little space left on the page is best filled by saying that Arthur Schweiger was not only a famous scientist with a leading role in pulse EPR spectroscopy: he also was a benevolent mentor and a great man, whom all of us will miss for many, many years to come.

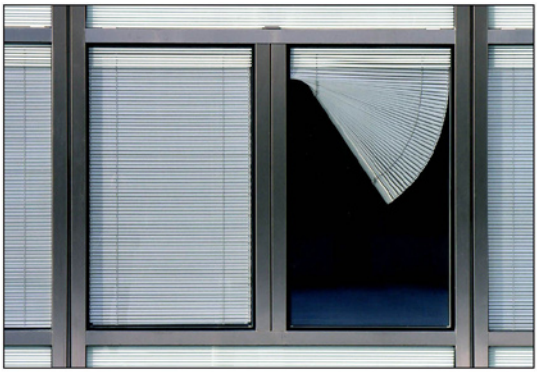

Photo taken by Arthur Schweiger. It shows the front of the ETH chemistry building, his working place. Arthur called this picture 'Nothing is perfect'.

Turicum Memories

Sabine Van Doorslaer
University of Antwerp, Belgium

How does one describe a person, his career and a years-long friendship in just a few lines, without doing injustice to the complexity and importance of that person's life? Surely, any anecdote told just means ignoring thousands of others. And yet, silence would do Arthur Schweiger even less justice.

So, what memories should I select? Should I tell you about how Arthur would inevitably have any new collaborator or even a long-term visitor climb the Mythen? For those unfamiliar with Switzerland, the Mythen is a mountain best compared to an enormous boulder suddenly rising from the earth. For a flatlander like me, the walk up the Mythen came close to a chase up a wall, but for Arthur, this walk combined many essential features of his being, such as his love for the mountains, for the mystic and for Switzerland.

Or, should I tell you how he would cheer up the coffee breaks with many anecdotes and jokes? How he had one day bought a levitron, and had practiced for hours at home to get it spinning with one swift turn of the hand, and how he then challenged us in the coffee break to repeat this? We failed of course, much to his amusement. I remember that many of us, including me, sneaked back to the coffee place afterwards, secretly trying to improve our levitron-skills in order to beat him in a next challenge. He even convinced Michael Willer, whose PhD defense was at that time coming up, that he might be asked to explain the working of the levitron. Michael spent a few days of frantic studying the subject. Of course, Arthur never mentioned the topic during the PhD exam. He pretended being surprised that Michael had believed him, although one could not miss the smile on his face.

Or should I tell you about Arthur's profound love for classical music and his regular visits to the opera, and how he even used a motive from Wagner's 'Tristan and Isolde' to explain an aspect of pulsed EPR? Or should I rather talk about his passion and talent for photography and his eye for detail and visual humor as can be seen from the accompanying photo?

Maybe, I should just tell you about the T-shirt we gave him for his 50th birthday. The front of the T-shirt depicted Abraracourcix[1] with his head replaced by Arthur's. At the back, all the members of the Turicum[2] group had signed in Asterix style: gunnix (Gunnar Jeschke), jörgix (Jörg Forrer), stefix (Stefan Stoll),… I kept the original figures of the T-shirt, because I had planned to make a sequel of it for his 60th birthday this year. The fact that I have preserved the pictures for almost 10 years now for the purpose of a birthday surprise, probably shows best how much I (and many of his former and current group members) valued Arthur as a mentor and friend.

[1] Abraracourcix (or Vitalstatistix in English) is the head of tribe in 'Asterix and Obelix', one of Arthur's favorite comics series.

[2] Turicum is Latin for Zurich, but the name refers of course also to Turi (Arthur)

André Rassat (1932–2005)

André Rassat, Emeritus Professor in the Ecole Normale Supérieure in Paris, passed away recently at 73 yrs. He had had an extremely fruitful carreer as a physical organic chemist and a guru of science.

His earliest contributions were in the field of the reduction of ketones by dissolving metals. He showed that, contrary to common wisdom and to Barton's generalizations, the stereochemical fate of these reactions cannot be understood simply on the basis of the relative stability of radicals or carbanions resulting from the addition of one, or of two electrons, on the carbonyl. The nature of the metal, and that of the proton donor, both import, pinacols can result, and even the least stable epimeric alcohol, e.g. isoborneol from camphor, can be formed.

In Grenoble where he was first appointed as a lecturer, he and Didier Gagnaire worked initially in the Nuclear Research Center (CENG), at that time the only location where the could obtain sufficient support for their work. André Rassat invested successfully a lot of effort into the synthesis and the study of remarkable stable radicals, the nitroxides. These led both to very interesting chemistry (during several years of intense research), and to the development of novel magnetometers serving in the guiding system of nuclear submarines.

André Rassat's next assignment was in the Université Joseph Fourier itself, where a new building was built for the organic chemists. André revealed himself as an astute and efficient leader, and managed to provide excellent facilities to all his colleagues, with a remarkable sense of collective priorities. He also started to display a keen interest in the more physical aspects of organic chemistry. However, this was revealed mostly once he was back at the Ecole Normale Supérieure in Paris as a Professor. He then began a series of studies on fullerenes, both from the theoretical and the experimental points of view, and became soon a major specialist in this field. He was remarkably at ease in the most abstruse domains of physics, including all the important aspects of geometry, of orbital symetry, etc. Quite recently, he has become fascinated by a novel way to describe the structure of benzene.

A clear illustration of how different he was from most chemists may be found in the remarkable title of one of his last publications (no. 320 approximately): "Any scalene triangle is the most chiral triangle". This is indeed in a chemical journal, *Helvetica Chimica Acta*...

André Rassat was brilliant, but did not strive to shine. He was an extremely likeable person, and it took knowing him well to discover how much ahead intellectually he was of most of us, his colleagues. He will be sorely missed.

Guy Ourisson
Université Louis Pasteur, Strasbourg

Arthur Schweiger (1946–2006)

Prof. Dr. Arthur Schweiger died unexpectedly on January 4, 2006 at the age of 59 after a short illness. We deeply mourn the passing of our friend and colleague.

Arthur Schweiger studied physics at ETH Zurich and received his PhD for his research performed at the Laboratory of Physical Chemistry at the ETH, where he worked until his very last days. After completing his 'habilitation' in 1982 he led a research group as a 'Privatdozent'. In 1995 he became an associated professor of physical chemistry, and in 1998 he was promoted to full professor. Since 2003 he has been a member of the steering board of the ETH faculty committee.

The research of Professor Schweiger focused on the development and application of new methods of pulsed electron paramagnetic resonance. He was an outstanding scientist and he played a leading role in his field. His work was honored with many prestigious awards.

Professor Schweiger was a gifted educator with an ability to explain complex phenomena in terms of simple intuitive pictures. He engaged in and initiated various teaching-related activities. In 2001 he co-authored a comprehensive textbook on electron paramagnetic resonance spectroscopy that has since become a widely consulted reference.

With the passing of Arthur Schweiger, the ETH Zurich and the international academic community lose a great personality. We will deeply miss him as a friend, colleague, scientist and instructor.

The Board of the Laboratory of Physical Chemistry, ETH Zurich

On behalf of the president, executive and members of the International EPR Society we wish to express our condolence over the sudden and unexpected passing away of Arthur Schweiger. With him the EPR community loses a great scientist whose impact on the development of modern EPR methodologies and applications can hardly be overestimated. For his contributions to pulse EPR he received the IES Gold Medal in 1998, the highest award of our society.

Arthur Schweiger was IES Secretary from 1993–1996 and has continued to serve the EPR community by hosting and maintaining the IES Newsletter website and contributing a regular column to the IES Newsletter. He was an outstanding leader in the field of EPR spectroscopy, a great colleague, an inspirational teacher and a close friend to many of us. He will be greatly missed.

Wolfgang Lubitz
President

Commemorative words

With Prof. Dr. Arthur Schweiger the EPR community has lost one of the most important researchers and leading scientists in the field of advanced methodology and applications of EPR spectroscopy. The EPR team at the Physics Institute of the University of Zurich deeply mourns his passing away.

He and his coworkers always kept doors open for our team members asking for technical help and advice. Quite recently we had ▶

together with Prof. A. Shengelaya a fine collaboration regarding high-temperature superconductivity and oxide switchable conductivity phenomena using his equipment. We all will retain him an honorary memory as an open-minded and stimulating personality.

K. Alex Müller
University of Zurich

An excellent co-operation partner

With Arthur Schweiger we have lost a good friend and collaborator of many years. The numerous milestones he set in pulse EPR technology and applications were always inspiring for us and have initiated many discussions about our development plans. From all his work it was clear that dealing with spins and their peculiarities was one of his greatest passions. His death has left a void in our lives and in the EPR community. He was an outstanding representative in the EPR field, and he still is one of the most well known EPR spectroscopists outside of the EPR community. His lab became a popular place for young post-docs to learn the secrets of pulse EPR and his book is the standard for everybody working in the field of EPR. In 2002 he became a member of the Bruker BioSpin Advisory Board and he presented his visions of the EPR future for several application fields. We are grateful for his unselfish support of science. We miss him very much and also his dry Swiss humour, cropping up frequently in the talks he gave in conferences around the world.

Dieter Schmalbein
Managing Director
Bruker BioSpin GmbH, Karlsruhe

A scientific gentleman

I first met Arthur Schweiger during the 3rd European B12 meeting held at the ETH in Zurich during March 1979 whereupon he invited me to come to speak to the weekly ETH EPR group seminar. We met many times at conferences, the last occasion in Banglalore, India, in November 2004! It often worked out that we ended up at the same table at conference Banquets. I particularly remember the Ampere Congress in Rome (1986) and the Ampere-ISMAR Conference in Berlin (1998) in the Zoo Gardens.

Arthur's research productivity really took off in the 1980's and, when he realised I was planning to write a book in EPR, he generously began sending reprints and preprints which proved to be of enormous help – a practice that continued until recently.

Arthur was widely recognised as one of the leaders in EPR, especially in bringing to our attention a range of clever pulsed techniques. At conferences where he was often a keynote or Plenary lecturer, he never sought to be in the highest place. Over the years I grew to respect Arthur enormously as a scientist and I was always impressed by his humility and modesty. Another side was shown more recently as he lightened up his presentations with delightful and imaginative images.

It is appropriate to record that Arthur pursued excellence in such a way that he never sought to be the 'Prima Donna'.

We shall all miss a good friend, a good and humble man, and the loss of his insightful contributions to our field of EPR Spectroscopy.

John Pilbrow
Monash University, Melbourne

We lost a friend and a colleague

Our friend and colleague Arthur Schweiger passed away. My family and I took this news as a bitter grief. It is difficult for me to believe that it is true. Just recently I visited his laboratory and gave a talk at the group seminar. Literally one day before his passing away, in Germany the School for young scientists took place and people from Arthur's group trained their young colleagues in the program to simulate EPR spectra Easy Spin. Arthur was very glad that all specialists in EPR could use the results obtained in his group. Of course, I always valued and respected Arthur very highly as a scientist who made an outstanding contribution to the development of EPR. But now I would like to speak of Arthur from another perspective. He was a remarkable man. Over the many years of our collaboration in the International EPR Society, in editing the journal *Applied Magnetic Resonance*, in the Zavoisky Award Committee and of our interactions at the scientific conferences, I made sure that Arthur was able to be his own man. He always formulated his point of view, his position, very accurately. It is not always that easy to be so independent. Arthur had courage to be such a man. He was never indifferent to what took place in the outside world, or in the EPR community. However, feeling is that he also remained easy-tempered and somewhat ironic. I was always comfortable in his company. We will miss Arthur Schweiger.

Kev Salikhov
Kazan Physical-Technical Institute,
Russian Academy of Sciences, Kazan

Arthur Schweiger in memoriam

It is sad to write about a friend and colleague who has deceased much too early, being thirteen years younger than the author. How much more sense would it make to exchange fates and to substitute myself for him! I have, so to say, completed my mission long ago, while he was still in the midst of his creative and active years. We, his scientific friends, were certain to have all reason to expect many more exciting innovations from him.

On January 4, 2006, his fruitful activities have come to an early close, and our hopes concentrate now on his students and former coworkers who will pursue his tradition of excellence. Indeed, he has planted numerous promising seeds that warrant a continuation of his lines of research and innovation, also after a premature death.

Arthur Schweiger was a great scientist in several dimensions. When I met him first, it must have been around 1975, towards the end of his graduate studies with Professor Hans Heinrich Günthard, he impressed me by his sheer size. Seldom, I met scientists looking literally down on me. But in addition, he also impressed me by his rock-solid knowledge. Asking him a question about electron paramagnetic resonance (EPR), I invariably received an answer that remained undisputed. Sometimes, he left on me even a paternal impression. Although he was still a student and me a 'Professor', I nevertheless got the feeling of being an ignorant novice standing in front of a master. Indeed, my knowledge on EPR at that time was quite limited, despite the close analogies between the resonances of nuclei and electrons. I certainly did not have any experience in microwave technology and its application to resonating, delocalized electrons. I preferred to think about well localized nuclei carrying a magnetic moment and an angular momentum; and radio frequencies were more familiar to me than microwaves that refrain from traveling through wires.

I had at that time several illuminating discussions with Arthur Schweiger. It was for me easier to talk to Arthur than to his boss; Arthur knew all the experimental details. In ▶

Arthur Schweiger, "my noble chauffeur" in October 1991 after the announcement of the Nobel Prize.

Arthur Schweiger, an attentive and critical listener in a seminar in 1984.

the mid eighties, I was working on chemically induced dynamic nuclear polarization (CIDNP) together with Stephan Schäublin and Alexander Wokaun. It was the first time in our group's work that electronic spins became truly relevant for intermediate radical pair states; and their recombination mechanisms were responsible for the observed absorptive and emissive resonance lines. Discussions with Arthur helped to clarify these concepts as well as our minds.

Our approaches were complementary. We in NMR saw indirectly the effects of the electron spins through CIDNP effects, while Arthur was at the same time heavily engaged in the development and application of ENDOR, observing indirectly the nuclear resonances via EPR. In particular, it was the time when he, together with Jörg Forrer, under the guidance of Hs. H. Günthard, developed an electron-nuclear-nuclear triple resonance spectrometer [1], after having earlier contributed to the construction of a computer-controlled ENDOR spectrometer [2]. Arthur worked from the beginning on instrumental and methodological design and applied the developed techniques fruitfully for exploring the electronic structure of transition metal complexes. It followed a very productive period of collaboration between Arthur Schweiger, Jörg Forrer, Markus Rudin, Ernst Jörin and others under the leadership of Hs. H. Günthard. It lasted until the retirement of Hs. H. Günthard in 1982, and 32 influential papers were published during a period of just ten years.

Surely, Günthard was seminal for initializing the research activities in EPR and ENDOR, but the true research leader was Arthur Schweiger who became a mature scientist already towards the end of his thesis in 1976. It is understandable that Günthard tried successfully to integrate Arthur Schweiger permanently, as an integral part, into his research enterprise. This may have been the reason why Arthur was not looking for a chance to perform postdoctoral work at a different institution, for example in the United States, as most of his colleagues did. The conditions for productive work at ETH Zürich, especially regarding instrumental and workshop-support, were just too good for him to consider any other laboratory in the world. On an intermediate time scale, his lack of foreign experience turned out to be a handicap for his promotion. But in the longer term, it proved to be beneficial for the continuity of his productivity.

After the retirement of Günthard in 1982, Arthur Schweiger was assigned to my magnetic resonance domain, following the institute's doctrine that only Professors should lead fully independent research groups, helping to concentrate the limited available means. It was a lucky coincidence that Arthur just became interested in time-domain experiments with pulsed EPR and ENDOR. This led to an ideal match of interests between the two research groups: my own developing two-dimensional NMR with all its variations, and Arthur's struggling with the more fractious microwave technology for implementing concepts from NMR's easy play ground.

Arthur realized from the beginning that by pure copying no generally applicable pulsed EPR technology would ever emerge, especially not in his main field of interest: the solid state and transition metal complexes. He started to invent novel schemes that could not be deduced from NMR methodology but were, from the beginning, fully adapted to the EPR environment. I had the pleasure to support him in his creative work, and we published together 18 publications between 1983 and 1992. For me, this collaboration was not only fun, but it also allowed me to broaden my own scope, and to experience the rich developing field of pulsed EPR.

After having won my 'little prize of Stockholm', we both thought it would be time to stop our publishing together in order to put into plain evidence his undisputed leadership. In the context of the Stockholm event, Arthur still served diligently as 'my noble chauffeur' (see photo). Looking at his list of publications, it becomes evident that the productivity got new impetus by his full independence, by his well deserved title of Professor in 1991, by his long overdue Associate Professorship in 1995 and Full Professorship in 1998: Year/number of papers:

1970/1, 74/1, 75/1, 76/2, 77/2, 78/1, 79/5, 80/5, 81/3, 82/6, 83/6, 84/3, 85/4, 86/2, 87/1, 88/5, 89/4, 90/6, 91/8, 92/4, 93/3, 94/5, 95/7, 96/7, 97/6, 98/9, 99/7, 2000/5, 01/14, 02/6, 03/17, 04/9, 05/13.

I will not try to summarize the wealth of ingenious techniques by which Arthur Schweiger has enriched pulse EPR. He has described, together with Gunnar Jeschke, his contributions much better than I ever ▶

could on this limited space in their famous book on *Principles of Pulse Electron Spin Resonance* [3].

I was very fortunate that I had the pleasure to collaborate with Arthur Schweiger on some of my best papers (e.g., refs. 4, 5). More over, he was an extremely pleasant and understanding colleague in the institute. We could occasionally disagree on science issues, but we never had the slightest personal dispute. Collaboration with him was always a pure joy.

Despite our acquaintance for thirty years and our quite close collaboration over a period of almost ten years, he was still capable, up to his last days, to surprise me by hidden skills in fields for which very few got to know him. For example, I did not have the slightest hint of his earlier activities in Dixieland music, playing the banjo, and I did not know about his skilful passion in photography. But quite obviously, these hidden passions gave him not only joie de vivre but also a fruitful basis for his unusual creativity.

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Richard R. Ernst
Laboratorium für Physikalische Chemie
ETH Zürich

Spectrometer Manager SpecMan

a powerful control system for EPR spectrometers

Boris Epel[1], Igor Gromov[2], Stefan Stoll[2], Arthur Schweiger[2†], Daniella Goldfarb[3], and Reef Morse[4]

[1] Max Planck Institute for Bioinorganic Chemistry, Mülheim an der Ruhr, Germany
[2] Laboratory for Physical Chemistry, ETH Zurich, Zurich, Switzerland
[3] Department of Chemical Physics, Weizmann Institute of Science, Rehovot, Israel
[4] Scientific Software Services, Plymouth, MI, USA

In modern commercial EPR spectrometers, the controlling software is tightly integrated with the hardware. This integration has many advantages for the vendors. For example, it secures the vendors complete control over the product for which they have ultimate responsibility. However, a growing number of EPR laboratories, especially those that develop instrumentation, employ homebuilt equipment for which no commercial software exists. These research groups have developed various programs to control their instrumentation. The programs roughly fall into two groups. The first group consists of dedicated software with a fixed structure tailored to a particular configuration of instruments. They are typically written in languages like C++, Basic or Pascal. The second group of programs is written using rapid application development platforms, e.g., LabView. There exist also freeware development environments for EPR instrumentation (e.g., fsc2 [1]). The applications of the second group are typically more flexible and expandable. However, for both groups, substantial changes to the software are necessary when performing experiments with changed instrumental setup or when migrating to different instruments.

SpecMan combines the advantages of both groups and provides increased flexibility and portability compared to either of the above groups. It is a stand-alone Microsoft Windows™ application, written in C++. Nevertheless, the combination of easily editable instrumental configuration files and a built-in scripting language for pulse sequences makes it truly flexible. SpecMan is designed to perform continuous-wave and arbitrary pulse EPR experiments, with the emphasis on the latter. The detailed structure of the program is described elsewhere [2]. A simple but powerful Pulse Programming Language PPL (inspired by the language developed by Jaap Shane et al. [3]) allows for an intuitive representation of virtually any pulse sequence. The innovative Graphical User Interface dramatically simplifies the control of an experiment. A robust kernel executes experiments at the highest speed. A large device driver library is provided, containing drivers for all devices commonly employed in pulse EPR spectrometers.

SpecMan is tailored to the needs of pulse EPR and has the number of unique features. These include random acquisition of parameters (instead of left-to-right sweeps), multiple signal detection during the pulse sequence, execution of several pulse sequences in one run and a number of data protection mechanisms. These features provide a powerful environment for a wide variety of the pulse EPR experiments.

Functionally, SpecMan has two components, a client where experimental parameters are set and data are displayed during acquisition, and a server that controls the hardware and collects data via the hardware interface (GPIB bus cards, pulse generators, A/D converters, etc.). These two components of SpecMan communicate via an internal messaging protocol based in TCP/IP. This way, the client and the server can interact in a seamless fashion even when running on separate machines. The development of SpecMan network capabilities is currently in progress.

One of the problems that have to be solved is the limited network channel bandwidth. In a typical pulsed EPR experiment, a huge amount of data is generated rapidly. When SpecMan operates on a single computer, the data can be directly written into the memory by the server and displayed simultaneously by the client. When SpecMan operates on two different computers, passing the entire data across a TCP/IP channel in real time is not possible. For example, an experiment with a repetition time of 1 ms, a time trace of 5000 points and two-channel acquisition with 8-bit resolution will generate 10 MB of data per second. This dataflow can block even the fastest network. Hence, during the experiment, the server sends only a subset of the data asynchronously to the client for display purpose. Assuming that the computer screen is roughly 1000 pixels wide, no more than 1000 data points have to be passed over the network to the client computer during the experiment. Once the experiment is completed, the full data set is sent to the client. In this way, SpecMan can both collect the data and inform the user of the progress of the experiment at the highest possible speed.

A number of research groups around the world already take advantage of using SpecMan as spectrometer control software. The new network capability will extend the applicability of the program e.g. to the case of performing experiments on dangerous samples or noisy environments.

At the beginning of this year we lost Prof. Arthur Schweiger, who played a key role in the development of SpecMan.

SpecMan is distributed through Scientific Software Services. Questions should be directed to Reef Morse at reef@scientific-software.com.

† Passed away on 4th January 2006

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2nd International Conference on Biodosimetry and 7th International Symposium on ESR Dosimetry and Applications

Uniformed Services University of the Health Sciences (USUHS), Bethesda, Maryland, USA
July 10–13, 2006
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(previously announced in *newsletter* 15/4)

Joint Conference of British NMR-DG, AMPERE and EENC **EUROMAR**

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July 16–21, 2006
www.euromar.org
(previously announced in *newsletter* 15/4)

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medusa.nmr.mpibpc.mpg.de/icmrbs

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(previously announced in *newsletter* 15/4)

6th European Federation of EPR Groups Meeting (EFEPR)

Madrid, Spain
September 5–8, 2006
efepr-2006.unicongress.com

The scientific program of this conference encompasses lectures and posters, including a prize-awarding ceremony to two 'silver medallists' of the International EPR (ESR) Society. Also, several Working Group sessions corresponding to the COST P15 Action "Advanced Paramagnetic Resonance Methods in Molecular Biophysics" will be held during this Meeting.

Plenary lecturers: Robert Bittl (Freie Universität Berlin, Germany), Daniella Goldfarb (Weizmann Institute of Science, Israel), Brian Hoffman (NorthWestern University, USA), Eric McInnes (University of Manchester, United Kingdom), Frank Neese (MPI für Bioanorganische Chemie, Germany), Sabine Van Doorslaer (University of Antwerp, Belgium)

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Asia-Pacific EPR/ESR Symposium **APES'06**

Novosibirsk, Russia
August 24–27, 2006
www.kinetics.nsc.ru/APES2006

This conference has become traditional and previously took place in 1997, 1999, 2001 and 2004. APES'06 aims at covering of all subareas of EPR/ESR. Contributions dealing with any aspects of recent developments and applications in the theory, applications, methodology, instrumentation and experimental techniques are invited (CW EPR/ESR, pulsed EPR, high-frequency and high-field EPR, ENDOR, time-resolved EPR, FMR, MRI, CIDEP, ODMR).

It is planned to publish a special issue of the journal *Applied Magnetic Resonance* with contributions to the APES'06 conference. Guest editors will be Professors Sergei A. Dzuba, Graeme R. Hanson, Kaushala P. Mishra and Hitoshi Ohta. The contributions should be original papers prepared according to Instructions to Authors to be found at www.springer.at/amr. The manuscripts should be submitted during the registration. They will undergo the standard refereeing procedure by two referees.

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Sendai-Berlin-Novosibirsk Joint Seminar on Advanced EPR 2006

Novosibirsk, Russia
28-31 August 2006,
www.kinetics.nsc.ru/sendai/sbn/index.htm

This seminar continues the tradition of the meetings of the researchers from the leading EPR scientific schools. The previous meetings were held in Berlin (2002) and in Sendai (2004). It aims at covering of all subareas of modern EPR. Contributions dealing with any aspects of recent developments ▶

and applications in the theory, applications, methodology, instrumentation and experimental techniques are invited (CW EPR/ESR, pulsed EPR, high frequency and high field EPR, ENDOR, ELDOR, time resolved EPR, FMR, MRI, CIDEP, ODMR).

International Organizing Committee:

Prof. Klaus Möbius (Berlin)
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For correspondence **please contact** the seminar secretary:

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Conference Reports

6th Biannual Conference of the Australian and New Zealand Society for Magnetic Resonance

Murramarang National Park
February 12–16, 2006

Magnetic resonance (MR) is the basis of a number of important analytical techniques, including nuclear magnetic resonance (NMR) spectroscopy, electron paramagnetic resonance (EPR) spectroscopy and MR imaging (MRI). Magnetic resonance presents the common physical phenomenon of all these techniques which have found wide spread applications for the analysis of chemical compounds in solution and in the solid state, including structural biology, metabolomics and materials science, as well as functional imaging of brain and studies of diffusion phenomena. 12 high-profile international speakers were invited and presented a series of outstanding lectures. With about 160 participants, there was plenty of opportunity to mix with the overseas speakers, greatly aided by the beautiful and relaxed environment of Murramarang Resort.

The conference was preceded by the user meetings of the two main manufacturers of NMR equipment, Bruker and Varian, which were attended by about half of the conference participants.

Of particular notice was the continued development of new, more powerful NMR techniques with implications in all areas of magnetic resonance and the high standard of the presentations by the Australian and New Zealand MR community. The overwhelming majority of the projects was concerned with biochemical applications in one way or another.

For the first time at an ANZMAG conference, introductory lectures were held in the early morning (8:00 to 8:45 am) prior to the regular presentations. These lectures were given every day except for the morning following the conference dinner and presented by the expert overseas speakers. They were aimed at students who were familiar with the foundations of magnetic resonance but were no experts in all areas of MR techniques. Despite long days and competition with breakfast, the introductory lectures were outstandingly well attended and their usefulness was quietly acknowledged also by senior members of the MR community.

The ANZMAG medal was presented to Professor Ray Norton of the Walter and Eliza Hall Institute of Medical Research in Melbourne. In his medal talk he pointed out the repeated situations of closure of his research institute on short notice, matched only by equal numbers of rescue positions found immediately afterwards. In spite of the vagaries of his carrier, he presented an impressive number of 3D structure determinations of biologically relevant proteins originating from his laboratory since the earliest days of structure determination by NMR spectroscopy.

The conference was sponsored by a record number of companies, including Bruker, Varian, Novachem, ASBMB, BOC, Linde, Sigma-Aldrich, Jeol, Camo AS, Magritek, Doty, Spectra Stable Isotopes, Spin Systems, Kluwer/Springer, Elsevier, Philips, and Schiller Australia. The sponsors made it possible to support the travel of graduate students from outside NSW/ACT, offer reduced registration fees for graduate students, provide drinks in the evenings and subsidize the conference dinner and bus transport from and to Sydney airport. As it has become a tradition at ANZMAG conferences, three oral and poster presentation prizes for students were sponsored by Spectra Stable Isotope. The selection committee was composed of five prominent overseas speakers from all areas of magnetic resonance who took care to quiz the students at their posters or following their oral presentations. The three hard-earned prizes went

Student prize selection committee (from left to right): Roland Henry (UCSF), Geoffrey Bodenhausen (EPF Lausanne and Ecole Normale Superieure Paris), Gerhard Wagner (Harvard), Wolfgang Lubitz (Max-Planck-Institute Mühlheim), Malcolm Levitt (University of Southamptom).

Chu Kong Liew, Joel Mackay and Ann Kwan engaged in critical discussions with one of the overseas speakers (David Neuhaus from the MRC in Cambridge).

to Kathryn Washburn (Victoria Institute of Wellington, NZ) for her talk on Multidimensional NMR inverse Laplace spectroscopy in porous media, Iain Murchland (Molecular and Biomedical Sciences, University of Adelaide) for his poster on Structure-based drug design to the liver oncoprotein Gankyrin and Tim Larkin (Biochemistry, University of Sydney) for his poster on NMR studies of diffusion in bicontinuous cubic phases.

At the ANZMAG General Meeting held at the conference, Queensland was agreed on as the venue for the next meeting in 2008.

Gottfried Otting
Conference Chair

50th Annual Meeting of Biophysical Society

Salt Lake City, Utah, USA
February 18–22, 2006

The 50th Annual Meeting of the Biophysical Society was held from February 18 till February 22, 2006 in Salt Lake City, UT. This was a milestone meeting for the society, and nearly 5000 biophysicists from across the world participated in the five-day meeting. There were more than 3000 symposium talks, workshops, and poster presentations describing a variety of research focusing on biophysical techniques. EPR spectroscopy applications were scattered throughout the meeting, with one poster section dedicated solely to the EPR technique. The majority of the more than 60 EPR applications presented at this meeting utilized site-directed spin labeling to study protein, peptide, DNA, and RNA structure and functional dynamics. Additional EPR research presentations included the study of metalloproteins and the use of double electron-electron resonance (DEER) to study long-range distances between two introduced spin label probes. The Biophysical Society's 51st Annual Meeting will be held March 3–7, 2007 in Baltimore, MD.

Candice Klug

New
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EPR at Work

A Special Thematic Issue of Concepts in Magnetic Resonance Available for Single-Copy Purchase!

Edited by James S. Hyde,
Sandra S. Eaton, and Gareth R. Eaton
(National Biomedical EPR Center, Department of Biophysics, Medical College of Wisconsin, Milwaukee, WI, and Department of Chemistry and Biochemistry, University of Denver, Denver, CO)

January 2006
Vol. 28A / No 1
Softcover
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The famous series *EPR at Work* began in 1957 with a description of the hyperfine structure of free radicals, illustrated with a spectrum of Fremy's salt. The early *EPR at Work* articles were written in parallel with longer, tutorial articles in the *Technical Information Bulletin*. After the *EPR at Work* series, there were a few similar reports with the title *EPR in the World of Biochemistry*. Varian produced these reports as a marketing tool, published as advertisements in major scientific journals, but they were solid scientific reports that in some cases served as 'preliminary communications' for later full articles. For scientists at the time, the *EPR at Work*, and the similar *NMR at Work*, series served to alert them to the wonderful things that could be done with the new magnetic resonance tools becoming commercially available. The *EPR at Work* series stimulated many scientists to include EPR as a tool in their research. Some of the spectroscopy reported remains educational and in some cases a benchmark of EPR. The editors have reproduced them in this volume with the hope that they will stimulate a new generation of scientists. The editors have added their perspective on these early reports with brief comments and modern references. It is immediately striking that the topics remain current: in fact, many remain challenges for further research.

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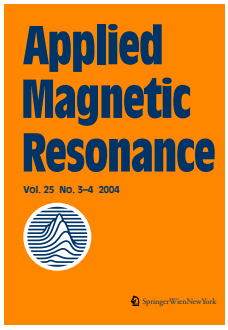

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Immediate openings (4) at Dartmouth Medical School in the Electron Paramagnetic Resonance (EPR) Center for the Study of Viable Systems for Research Assistant Professor (2) and Research Associate (2). For the Research Assistant Professor positions a PhD is required with expertise and experience in EPR instrumental development and/or microwave engineering. The selected individuals should be capable of independently carrying research developments that are consistent with the research directions of the EPR Center and eventually should be able to secure external funding for related research. For the Research Associate positions (requires MS or the equivalent in experience) the skills needed include expertise in at least one of the following: Tumor or Cell Biologist; EPR Instrumentalist; and microwave engineering skills. Submit complete curriculum vitae, statement of pertinent experience, and request three references be sent to: Harold M. Swartz, Dartmouth Medical School, 702 Vail, Hanover, NH 03755, fax: 603-650-1717, e-mail: harold.swartz@dartmouth.edu. *Dartmouth Medical School is an equal opportunity/affirmative employeer and encourages applications from women and members of minority groups.*

Postdoctoral Position in EPR Studies of Bio/Nano Systems

Applications are invited for a postdoctoral position in the Department of Physics at Boise State University to work in the area of electron paramagnetic resonance spectroscopy. The successful applicant will employ EPR in the studies of biomolecular and nanoscale systems in collaboration with researchers from biology, chemistry, materials science and engineering disciplines at Boise State University, and with scientists at national level EPR user facilities. Applicants must have a PhD in physics, chemistry, materials science, or a related field, and significant experience in the EPR samples preparation, data collection, analysis, and spectral simulations of solid and liquid samples. Experience with EPR studies of proteins and other biomolecular systems, spin labeled systems and/or bio/nano sensors will be a plus. Women and minorities are encouraged to apply.

To be considered, the following materials are required: (i) Vitae and list of publications, (ii) A summary of previous/current research in relation to the abovementioned areas (maximum of 2 pages), (iii) copies of two most important EPR-based publications, and (iv) a list of three references.

Applications may be submitted by e-mail: apunnoos@boisestate.edu, or mail to Dr. Alex Punnoose, Department of Physics, Boise State University, Boise, ID 83725-1570.

The appointment is for one to three years, depending on project funding and performance.

Postdoctoral Positions Available at Davis Heart and Lung Research Institute, The Ohio State University

A position is available for a scientist with experience in magnetic resonance instrumentation development and application. The candidate should have experience in EPR/MR hardware or software development and applications to chemical or biological systems. Salary commensurate with experience. Please reference PA06 in your application.

A position is available for a scientist with experience in cardiac NMR spectroscopy or imaging research to perform isolated heart and in vivo studies of alterations in myocardial energetics and metabolism in the postischemic heart. Salary commensurate with experience. Please reference PA07 in your application.

The Ohio State University is an equal opportunity/affirmative action employer. Qualified women, minorities, Vietnam era veterans and individuals with disabilities are encouraged to apply.

Send CV to:

Dr. Jay Zweier, 473 West 12th Avenue, Room 110, Columbus, Ohio 43210 or zweier-1@medctr.osu.edu.

EQUIPMENT

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Gareth R. Eaton geaton@du.edu

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4. Varian E-257 variable temperature controller with heater sensor and insert holder.

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- R.W. Martin, R.W. Zilm, **"Preparation of protein nanocrystals and their characterization by solid state NMR"**, Journal of Magnetic Resonance 165 (1), pp. 162-174
- C.R. Morcombe, K.W. Zilm, **"Chemical shift referencing in MAS solid state NMR"**, Journal of Magnetic Resonance 162 (2), pp. 479-486
- M. Ernst, **"Heteronuclear spin decoupling in solid-state NMR under magic-angle sample spinning"**, Journal of Magnetic Resonance 162 (1), pp. 1-34
- E. Kupče, R. Freeman, **"Fast multi-dimensional Hadamard spectroscopy"**, Journal of Magnetic Resonance 163 (1), pp. 56-63

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