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Office Bearers : 2006 - 2009

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EDITORIAL

It is our pleasure to welcome you to the concluding issue of Vol. 20 of the IRPS Bulletin.

Since our previous instalment, the Society has elected Office Bearers for 2007-2009 and we have seen, at long last, the 10th International Symposium on Radiation Physics (ISRP-10). Accordingly, the present issue highlights the results of the election, with a report from the Election Committee, and content from ISRP-10.

For the latter, we give thanks to several of our recently elected officers for contributions summarizing technical content from sessions they chaired. Their summaries are embedded in an overview of the entire conference, prepared by our new President, Dudley Creagh, who was also kind enough to provide the customary President's Report.

The issue closes with a Member's Report by Sameen Ahmed Khan regarding the 50th anniversary of UNSCEAR and several conference announcements.

Those of you who attended ISRP-10 will find plenty here to reminisce about, with the session summaries, the pictures and Malcolm Cooper's banquet speech reproduced in full.

Hopefully, those unable to attend will derive a sense of the excitement and scope of the event. To all, we extend our wishes for a peaceful and prosperous new year.

Ron Tosh

PRESIDENT'S REPORT

At ISRP-10, Coimbra, our society had a truly excellent symposium. Such success is, to a large extent, determined by the energy and drive of the local organizers, the quality of the invited speakers, the interest and diversity in the programme, and the friendships formed between participants through their discussions of the research described in the symposium programme.

Members of the Local Organizing Committee, especially Isabel Lopes and Margarida Costa are to be thanked for their contribution to the success of the symposium and its associated workshop through their attention to detail in the symposium organization. Jorge Fernandez and Isabel Lopes were the co-chairmen of the Scientific Programme Committee which set in place a richly diverse and interesting symposium programme.

As at ISRP-9 (Capetown), the symposium was preceded by a workshop, in this case on "The use of Monte Carlo Techniques for the Design and Analysis of Radiation Detectors". This was organized conjointly by Bill Dunn, Jorge Fernandez, and Isabel Lopes. This workshop was a resounding success, with almost three times more participants than were anticipated attending for the three days on which it ran.

The success of the format in which a workshop is held before the symposium has led us to continue with the format for ISRP-11 (Melbourne, 2009).

Our society has at its heart a desire to bring together people of all nationalities to discuss all aspects of radiation physics in an atmosphere of friendship and harmony. At ISRP-10, for example, 362 participants from 52 nations attended the symposium. The invited speakers, 18 in all, paid their own way to the workshop and symposium: we are very grateful to them for making the financial sacrifice to do this. Their generosity enabled us to give travel support to 19 scientists and students from developing countries. The encouragement of students and practicing scientists from developing nations in the study and practice of radiation physics is one of the key aims of this society.

With respect to the encouragement and development of students, at ISRP-9 it was decided that we would commemorate the name of one of the pioneers of this society, Didier Isabelle, by instituting a competition for research student speakers presenting their own research, and we proposed that such a competition would be a feature of our future symposia. The prize would take the form of an engraved glass plaque and a cash award. We were delighted when Didier's widow, Rosine, and his daughter Valerie, accepted the invitation to join us in Coimbra and present the award at the symposium banquet. The five students chosen to give presentations on the basis of the quality of their presented abstracts all gave excellent presentations on a very diverse range of topics.

The first winner of the award was Danielle Stewart (University of Warwick) for her research on "The COBRA Double-Beta decay experiment".

Didier Isabelle would have been delighted to know that "his" award is associated with those in whose hands the future of our Society rests - young radiation scientists learning to do first class research.

Further details of the workshop and symposium will be given elsewhere in this Bulletin.

I want here to acknowledge the efforts of all the members of the Council for the work they have done to further the aims of the society. I hope that in the coming years we can work towards increasing our membership to include more countries in the developing world, as well as serving better our existing members. In particular I would like to thank our immediate past President, Richard Pratt for his dedication to the society. He was its Secretary for most of the years for which it has existed.

I would like to wish all members a happy, successful, and peaceful 2007.

Dudley Creagh

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I.S.R.P. 10 REPORTS

Dudley Creagh, University of Canberra, Australia

with reports on individual events by

John Hubbell, Walter Gilboy, Dan Jones,
Chris Chantler, Ladislav Musilek,
Malcolm Cooper, Larry Hudson

Group Photo

The Tenth Symposium of the International Radiation Physics Society was held in Coimbra, Portugal, from 17th to 22nd September 2006. It was preceded by a Workshop on "The Use of Monte Carlo Techniques for the Design and Analysis of Radiation Detectors" (15 to 17 September 2006).

The International Radiation Physics Society has as its aims the bringing together of people of all nationalities to discuss all aspects of radiation physics in an atmosphere of friendship and harmony; the education of scientists in developing countries in radiation physics; the encouragement of students in the study of radiation physics; assistance to researchers and practitioners in developing countries in their development as users of radiation physics.

At ISRP-10 362 participants from 52 nations attended the symposium. The front page shows a photograph of the conference delegates on the steps of the Palace at the University of Coimbra. The invited speakers, 18 in all, paid their own way to the workshop and symposium. And the IRPS is very grateful to them for making the financial sacrifice to do this. Their generosity enabled us to give travel support to 19 students from developing countries.

As is our custom, the programme for the symposium was organized in seven distinct sections : fundamental processes (interactions) in radiation physics; radiation sources and detectors; radiation physics in materials science; radiation physics in medicine and biology; radiation physics in art and cultural heritage; new technologies and industrial applications; modeling and simulation of radiation transport. There were no parallel sessions. Plenary sessions were given by invited speakers, and other oral presentations were selected by virtue of the perceived scientific interest of their submitted abstracts. A session was set aside for presentations by students of their own research. All other presentations were given as posters.

Professor Richard Pratt (University of Pittsburgh, USA) presented a summary of his work over four decades on ***"new developments in the theory of photon and electron interactions with atoms".*** His talk was to be the first Ananda Mohan Ghose Memorial Lecture, instituted by the IRPS.

From David Bradley, University of Surrey, U.K.

Professor Ananda Mohan Ghose

27 December 1926 to 23 May 2004

The person sitting in the front row is Prof. P.K. Iyengar (the first President of IRPS, also Director of Bhabba Atomic Research Centre, (BARC), at the time this picture was taken he later went on to become Chairman of the Indian Atomic Energy Commission. Seated behind him is Richard Pratt and to the left of Richard ***(looking at the picture)*** is Prof. Ghose.On the right-hand side of the picture and looking directly at the camera is Prof. Didier Isabelle

Professor Pratt commenced by reviewing the basic theory underlying photon and electron initiated atomic processes, and then discussed modifications which have to be made to the conventional "free atom" scattering processes to take into account scattering events of orders higher than dipole. These modifications must be made to take into account multiple ionization, and the effects of environments such as plasmas, lattices and clusters, and intense laser fields. Photon initiated processes considered were: the photoeffect, elastic and inelastic scattering. Electron initiated processes include bremsstrahlung, elastic and inelastic scattering.

For the photoeffect relativistic and higher multipole treatments are necessary additions to the basic theory, as are consideration of correlation effects. For photon scattering at low energies deviations from the independent particle and impulse approximation treatments become significant. As well, the change of polarization following a bremsstrahlung scattering process by free atoms is not well understood. As Professor Pratt commented, there is much more to be done both in the development of theory and in the construction of experiments to bring theory and experiment into some sort of accord.

Prior to his lecture Professor Pratt had received the JARI Award. This award, made by Elsevier Science BV, is made for outstanding career-long contributions in the field of radiation physics. ***Fig. 1*** shows Professor Pratt receiving the medal from the representative of Elsevier, Francissen Didell. Professor Pratt was the President of the IRPS from 2003 to 2006.

Submitted by John Hubbell, NIST, U.S.A.

Professor Pratt's lecture was followed by two well-received invited talks on two uniquely useful radiation sources which have become available in the past decade or two, and their high-precision capabilities and applications, presented by **Paul Indelicato**, University of Pierre and Marie Curie, Paris, and by **Joshua Silver**, University of Oxford, UK.

In Paul's talk, entitled "Highly charged ions x-rays from electron-cyclotron resonance ion sources," he first recounted how we had for many years depended on fluorescence and x-ray tube x rays for studying a variety of physical effects including relativistic correlations and quantum electrodynamics (QED) effects to better test our understanding of the physical cosmos in which we are all embedded. However, the necessary high precision for testing the effects of high fields in QED, and for some other studies, had not been available, for x-ray standards compilations and for other objectives. With the development and introduction of the Electron Cyclotron Resonance Ion Trap (ECRIT), a higher precision and well-characterized x-ray source is now available for these new and interesting studies, such as differentiating between lithium-like and helium-like K-alpha transitions in ions. Preliminary measurements demonstrate the potential of the ECRIT for studies of highly charged ions, providing a newly-opened testing ground for relativistic many-body theory and QED, superior to that of even the most accurate x-ray measurements on neutral atoms in solid targets.

In Josh's talk, entitled "The electron beam ion trap (EBIT): principles and applications," he first listed some of the sources of highly-charged ions, in addition to the EBIT, including astronomical objects, accelerator-based ion sources, and the ECRIT Paul had just described in his talk above. The Oxford EBIT, which has been up and running in the Clarendon Laboratory since 1993, has been a real workhorse, and Josh provided us with an extensive listing of many of the high-precision x-ray and UV spectroscopy measurements it has made possible. Some of these involved 2s Lamb shifts for highly stripped medium-Z hydrogen-like ions, and also looking for Lyman-alpha emission enhancements. Josh also mentioned observation of laser resonance in ions trapped in an EBIT. However, two-orders-of-magnitude improvements in accuracy are required for the latter to become a critical test of QED theory. The two talks together provided an excellent status report on these state-of-the-art spectroscopy facilities and their capabilities.

Professor Ferenc Salvat (University of Barcelona, Spain) discussed Monte-Carlo algorithms for the simulation of electron and positron transport in matter. These algorithms are usually described in terms of sets of differential scattering cross-sections for the various interaction mechanisms, used in conjunction with sampling and tracking algorithms to follow the time evolution of the electrons (or positrons) through the material. He reviewed the interaction models used in Monte-Carlo computer codes, and developed from that a comparison of different schemes used in formulating the codes. Below 100keV it is feasible to follow the history of the charged particle. Above 100 keV other strategies have to be invoked, and Professor Salvat discussed these in some detail.

At energies above 1.022 MeV pair production becomes a dominant contributor to the scattering of photons by matter. **Dr Iwan Kawrakow** (Ionizing Radiation Standards, Ottawa, Canada) presented an evaluation of the Overbo, Mork, and Olsen [1] expression for pair production in the nuclear field for photon energies up to 85 MeV. These showed a small but noticeable difference from the earlier calculations of Bethe and Maximon for high-Z elements.

Submitted by Walter Gilboy, University of Surrey, U.K.

In the first of the plenary lectures on instrumentation **Professor Carel van Eijk** (Delft University of Technology, The Netherlands) gave an impressive and beautifully illustrated account of recent developments in inorganic scintillators for gamma-ray and neutron detection.

After briefly recounting the history of scintillators from the end of the 19th century up to the invention of the photomultiplier and the introduction of NaI(Tl) in the post World War II era, he went on to chart the increasing flood of new, improved, inorganic scintillators over the past 30 years, culminating in the impressive performance of cerium-activated materials. He indicated how the Ce^{3+} ion with its 5d-4f luminescent transition fits into the crystal lattice of materials like $LaCl_3$, $LaBr_3$ and LaI_3 to yield high detection-efficiency scintillators, achieving time and energy resolutions down to 300 ps and 3% (for 511 and 662 keV), respectively. He rounded off his talk by describing the performance of more complex materials like Rb_2LiYBr_6:Ce and Cs_2LiYCl_6:Ce, which can be used for thermal-neutron detection via their Li-6 content.

Professor Zhong He (***University of Michigan, USA)*** described the development of semiconductor detectors and their energy resolution. In particular he discussed HPGe detectors (which require cooling to LN2 temperatures), and CdZnTe, HgI_2, and TlBr (which do not). The development of arrayed systems with a detector volume of 100 cm^3 for the angular resolution of gamma-rays was described. This would enable angular resolutions of around 3^0. The system would be able to undertake photon spectroscopy with excellent energy resolution, detect thermal and fast neutrons from fission events, and operate at room temperature. Such a device could be used as a hand-held device, for surveys of sites, or as a fixed detector in a wide range of experimental equipment.

Experiments and theoretical investigations of biological systems using X-ray Absorption Spectroscopy (XAS) and phase contrast imaging were described by **Professor Ziyu Wu** (***Beijing Synchrotron Radiation Facility, China***). Professor Wu outlined the theory underlying XAS and XAFS before discussing studies of metalloproteins, in particular Kti11p, which is the only metalloprotein with a zinc-finger domain. This was studied in both the EXAFS and the XANES regions. He then discussed a diffraction enhanced imaging computed tomography system developed for the study of inner microstructures such as are found in the cochlea of a guinea pig's ear.

Dr M. Folkard ***(Gray Cancer Institute, Northwood, UK)*** described the use of microbeams for the investigation of the bystander effect in cells and tissues. Despite the widespread use of ionizing radiation in industrial settings, the risks to human health associated with occupational environmental radiation are not well understood. Similar uncertainties surround the use of ionizing radiation in medical treatments. It is essential to have an understanding of the mechanisms underlying cell death and cell mutation. Damage to DNA in cells can be direct through the breaking of bonds; however, there is strong evidence that non-targeted cells also can be damaged by biochemical signals transmitted by irradiated neighbours. Cellular microbeam techniques have been developed to discriminate between direct and bystander damage, and through this an understanding has been achieved of the mechanisms by which cell damage occurs. These, in turn, provide clues about the fundamental processes of individual cell dynamics which lead to the macroscopic concept of dosimetry in radiotherapy and diagnostic radiology

Submitted by Dan Jones, iThemba, South Africa

The session on applications (mainly medical) of radiation physics was most interesting and informative. The first speaker was **Dr. Gudrun Alm Carlsson** of Linköping University, Sweden. Her presentation was entitled "Dosimetry in Radiation Therapy and Diagnostic Radiology." The second speaker was **Dr. Andrea Denker** of the Hahn-Meitner Institute (HMI) in Berlin, Germany. She spoke on "Ion Accelerator Applications in Medicine and Cultural Heritage."

Dr. Carlsson stressed the fact that ionizing radiation is damaging to human tissue and has physical, chemical and biological effects. It is of fundamental importance that the amount of radiation (dose) be quantified so that the effects can be predicted. In radiation therapy the dose which can be delivered to the tumor is limited by normal tissue tolerance. Ionization chambers and calorimeters are the instruments used to measure dose. Because of their simplicity and ease of use ionization chambers are most commonly used in the clinic. Conversion of the charge measured to absorbed dose requires knowledge of several physical factors such as absorption coefficients, stopping powers and W values. Dr. Carlsson pointed out the increasing use of Monte Carlo simulations to calculate these factors. She also stressed the additional dosimetry problems associated with the emerging technologies of ion-beam therapy, in which the quantification of beam quality is also a fundamental issue in determining the dose to be delivered to a patient. In this context she discussed micro- and nanodosimetry measurements.

Dr. Carlsson pointed out that the patient dose in diagnostic imaging procedures is relatively easy to measure, but that image quality is difficult to quantify. She showed examples of Monte Carlo simulations of images of a voxel phantom, which were superior to measured images. She concluded her address by emphasizing the need for improved cross section data for Monte Carlo simulations of detector response and for optimizing image quality.

Dr. Denker's presentation mainly concerned two of the major activities at HMI's laboratory for Ion Beam Applications, viz. proton therapy of eye tumors and analysis of historical objects using proton beams. Medical applications of ion accelerators include hadron therapy and radionuclide production. The 68 MeV beam from the HMI cyclotron has a range of about 30 mm in tissue, which is ideal for treating eye tumors. Other techniques which are used include enucleation (removal of eye), tumor resection, laser coagulation, irradiation with radioactive plaques (mainly for small tumors) and x-radiation. With the latter technique there is a significant risk of damaging the optic nerve. She outlined the beam modification methods, treatment planning procedures (using CT and MR images) as well as the patient positioning and immobilization techniques. Accuracy of dose delivery is of crucial importance to avoid damage of critical radiosensitive structures such as the optic nerve. The first patient was treated in 1998 and to date more than 750 patients have been treated at HMI, of which 85% of cases were choroidal melanomas. Recently tumor control in excess of 99% has been achieved.

Nondestructive techniques are required for analyzing historical objects since it is usually not possible to take samples. Proton induced x-ray emission (PIXE) spectroscopy is a commonly used method with proton beam energies of 2 MeV - 4 MeV. At HMI higher energy beams (up to 70 MeV) are also used as elemental depth profiling of bulky objects is possible. Dr. Denker illustrated the utility of the PIXE technique by describing the analysis of old medals and coins and the authentication of the age of oil paintings and Chinese porcelain. She concluded her talk by stressing the value of ion-beam accelerators in medical and analytical applications.

Professor Malcolm Cooper ***(University of Warwick, UK)*** described recent experiments being undertaken at the ESRF using Compton scattering as a research tool for the study of electron density distributions in solids, focussing in particular upon the study of the behaviour of unpaired spin electrons in ferromagnets. These experiments are only possible with circularly polarized radiation produced by synchrotron sources. He discussed current work on hexaborides and 4f rare-earth systems. The origin of the magnetism can be understood from the Compton data, aiding the development of suitable working materials.

Other invited papers included: quantitative imaging of meteorite using fluorescence tomography,
Professor Alexandre Simionovici ***(ENS Lyon, France)***; X-ray waveguiding in nanochannels, **Dr S. Dabagov** ***(Frascatti, Italy)***; and the dating of wine, **Dr. Philippe Hubert** ***(CEN Bordeaux-Gradignan)***.

Professor Yasuhiko Fujii ***(JAEA, Japan)*** presented a description of certain Japanese large facilities, and followed that with an introduction to the current world-leading facilities and instruments such as SPring-8 (synchrotron, 8GeV) and JRR-3 (reactor-based neutron, 20MW), both of which are in full operation, and JSNS (accelerator-based neutron, 1MW) which is under construction. He presented examples of the use of these facilities from materials science, nanoscience, and life science.

Dr Peter Fink ***(Argonne National Laboratory, USA)*** presented a paper on the closing of the (nuclear) fuel cycle, in which he indicated future technical challenges and necessary developments. He identified three technologies which are crucial to the fuel cycle, ***viz***.: separation technologies for extraction of transuranic elements from fuel rods; advanced reactors to destroy these elements via fission; advanced reactor fuel and separation technologies to enable the fission process to continue until the transuranic elements are destroyed. He discussed the status of each of these technologies.

In keeping with our aim to foster and highlight the research of students, five students were chosen to give presentations on the basis of the quality of their presented abstracts. All gave excellent presentations. The winner was given a trophy, the Didier Isabelle Award, and a prize of $US 500. The award was won by **Danielle Stewart** ***(University of Warwick)*** for her research on ***"The COBRA Double-Beta decay experiment" (Fig.2).*** The content of the student presentations is summarized below.

Submitted by Chris Chantler, University of Melbourne, Australia.

This session was composed of contributed talks, particularly by doctoral students and young researchers. There were 5 talks in different fields and by groups spread over the world, from Italy, Israel, UK to Belgium and Australia. All of the talks illuminated practical and important areas of physics.

Each talk used and highlighted a different detector type: from fast infrared detectors; advances in gaseous imaging (THGEM-based) detectors; neutrino detectors for COBRA; dosimetry modelling and detectors; and the modelling of diffractive X-ray scattering. Several of the talks linked up to the workshop strength and the area of Monte Carlo transport codes of different types.

Danielle Stewart, from Warwick, gave an interesting talk on Cadmium-Zinc-Telluride detectors for COBRA, for which she was awarded the student prize for the conference. The target background levels of 5 x 10^{-4} counts/ keV/ kg/ yr require not only sending everyone (and the experiment) into a dark hole underground, but also must avoid trace contamination of radioactivity from uranium by developing the surface paint of the detectors.

Joel O'Dwyer, from Wollongong, Australia, explained how his group has modified current (EGS) Monte Carlo codes to make a first-order correction for Bragg peaks, especially for powdered crystals for on-line analysis of industrial mineral slurries.

And Vincent Nuttens, from Namur, Belgium, modeled radioactive nanoclusters to establish dosimetric regimes for binding these to the surface of cancerous tumours and delivering lethal doses to these while minimising effects on surrounding tissue.

All talks were well presented and a pleasure to listen to.

And the following is a summary of a second session consisting of contributed talks:

Submitted byLadislav Musilek, Czech Technical University, Czech Republic

The contributed talks session was something new for ISRP. Up to ISRP-9, only invited papers had been presented orally, and all contributed papers were displayed as posters. Let me share with you my observations as chairman of one of the contributed talks sessions.

Six papers were scheduled, and five of them were presented in the session (the sixth author was not able to attend the symposium) :

Claus E. Andersen et al. ***(Riso National Laboratory, Denmark):***
Medical proton dosimetry using radioluminescence from aluminium oxide crystals attached to optical fibre cables.
This paper described a dosimetric system for verifying the dose in cancer radiation therapy, where a radioluminescence signal from a small carbon-doped aluminium oxide crystal provides real time information on the dose rate, and an OSL signal gives the integrated dose after treatment.

Regina C. Barroso et al. ***(Universidade do Estado do Rio de Janeiro, Brasil):***
X-ray scattering signatures from lyophylized human tissues.
The authors described the use of diffraction patterns of coherently scattered X-rays for differentiating between various lyophilized tissues (human breast, uterus and kidneys). The results presented differences potentially useful for distinguishing between normal and malignant tissues.

Mary P.W. Chin et al. ***(Velindre Cancer Center, U.K.):***
Investigation of Monte Carlo transport for medical positron emission tomography (PET).
Various Monte Carlo codes were compared from the point of view of their reliability for PET, and the possibilities of neglecting various physical effects were discussed.

Ikuo Kano et al. ***(University of Kyoto, Japan):***
Comparison of current and energy measurement methods of X-rays in contrast media detection.
The comparison referred to in the title of the paper was aimed at reducing the dose in X-ray transmission measurements. The energy measurement method showed better contrast at all tube voltages.

J.A. Thornby et al. ***(presented by Yorck Ramachers, Warwick University, U.K.):***
A novel atto-Coulomb charge spectrometer and applications.
An experimental concept for charged particle spectrometry was presented, based on replacing the energy observable with voltage measurements utilizing an inverse Kelvin-probe technique.

The first four papers were on symposium topic D "Radiation physics in medicine and biology," while the last one was on topic B "Radiation sources and detectors." It is not necessary to discuss here the quality of the papers and presentations; all of them provided interesting and valuable results. However, the main impression from the session was of thematic heterogeneity; even the four papers on medicine and biology were, as seen from the outline above, on very different topics.

The range of research done by participants in ISRP is very broad and disparate, and many high-quality but narrowly-based research projects are of major interest only to a limited number of participants. The poster format is suitable for bringing a researcher's work to the attention of fellow specialists and, at the same time, providing a quick overview for researchers in less closely related fields. Oral sessions, in which an invited speaker gives an expert overview of a larger field, give a focus to ISRP, aiming to attract the interest of and bring together all ISRP participant

As noted above, the JARI Medal was awarded to Professor Richard Pratt. The citation speech, delivered by Malcolm Cooper, follows :

Submitted by Malcolm Cooper, University of Warwick, U.K.

It is an honour and a pleasure to deliver this citation. In a sense what I am about to say is rather unnecessary! Richard Pratt's eminence in the field of the photon-atom interaction, which is in the mainstream of radiation physics if ever anything was, is well known and appreciated by this knowledgeable international audience.

Perhaps I may be permitted to emphasise a few salient points. Since obtaining his PhD almost 50 years ago Richard has been a leading player, indeed for our community the leading player in the area of photon-atom interactions. The methods that he and his many co-workers have developed for the photon-electron interaction are not just milestones to look back on: they by-and-large remain as the standards of the day, and they have influenced the work of very many of us. A photon is a truly wonderful thing with electrical and magnetic properties that lead to a myriad of complex interactions with the charge and spin of electrons in atoms. Predicting those interactions accurately is not just an intellectual pastime: the results matter to everyone from the plasma physicist working on fusion power, the astrophysicist trying to understand black holes, to the patient undergoing radiation therapy.

By the early 1970s Richard Pratt's standing was such that he, together with HK Tseng, produced a review of the ***Atomic Photoeffect***, which continues to clock up citations at a very steady rate. It is only one of Richard's many heavily cited papers that come from his highly productive period of what most of us might perhaps call "middle career," but what I am sure Richard refers to as his early career since he may not have accepted that he is yet as far as "the middle."

The Web of Science would only tell me about the period after 1970, since when Richard has published about 240 papers. But his activity before that was very considerable and I think that publishing first class science is an addiction to which he has never ever sought a cure. Certainly, since his inappropriately named "retirement" in 1999 his research activity has hardly dropped down one gear. He has published well over 30 papers since 2000 and, indeed, one of his most recent papers is a review of the work that HK Tseng did back in the 1970s with him in using the relativistic s-matrix approach in the independent particle approximation to calculate the cross section for pair production near threshold.

Never could the world "international" be more appropriately applied to a physicist. There are rather few areas of this planet that Richard has not visited in the name of research collaborations: it is exhausting just to listen to his travel itineraries: he and Ann must have accumulated more frequent flyer miles than the rest of us put together, but I am quite sure that they will only be used in the cause of science, with perhaps a hike or a new production of an opera thrown in for good measure. It is, I am sure, a delight for him that some of his collaborators are here to share in this celebration.

I could not finish this eulogy without referring to Richard's role in the advancement of radiation physics internationally though our society, IRPS. Richard first figured in the second symposium in 1982 in Penang, prior to any declaration of the existence of a Society as such – that came in 1985 in Ferrara, Italy. From that time he has been an ever present activist, archivist and secretary, contributing to all aspects of the society's existence and of course now, quite rightly, serving as its President.

However, it is for his invaluable contributions, past present and certainly also future, to the theory of the photon-atom interaction which is core to radiation physics, that Richard is now to receive the Medal of the Journal of Applied Radiation and Isotopes.

Another prize, JARI Enterprise Award, was awarded to **Dr Chris Chantler** ***(University of Melbourne, Australia)***. ***(Fig.3)*** shows Chris talking with Richard Pratt and David Bradley prior to the presentation. This prize recognizes an early to pre-mid career scientist working in the field of radiation sciences who has made significant and/or innovative scientific/technical contributions. The award consists of prize money of US $1,500 and a certificate

Submitted by Larry Hudson, NIST, U.S.A.

Chris Chantler is an Associate Professor and Reader at the School of Physics, University of Melbourne. He obtained his D. Phil. from Oxford in 1990, is the Regional Vice-President of IRPS (Oceania), and Associate Editor of AOS News; he was Scientific Program Chair of X-ray and Inner-Shell Processes 2005 and has co-chaired several AOS meetings. He is the chair of the next ISRP meeting in Melbourne in 2009. He has been a Member of the OSA and the American Institute of Physics since 1993; and a Member of the Australian Institute of Physics since 1992.

Chris Chantler has developed computation of X-ray atomic form factor theory, and his theory is the current NIST reference database on the subject. The Web database receives 10000 - 20000 hits per month as one of the major references for atomic form factors and attenuation coefficients.

He has also produced the first absolute polarization studies performed on an EBIT, amongst the first investigations of Radiative Electron Capture to test QED, and worked on laser resonance spectroscopic tests of QED. He has developed the X-ray Extended Range Technique with Associate Professor Zwi Barnea and students, which has given a new accuracy to atomic and solid state photoabsorption measurements. He has built and directed the X-ray facility at the University of Melbourne over the last 12 years since returning to Australia from the USA.

He has 89 papers published or submitted in refereed journals and over 218 papers and conference presentations, with over 118 citations on an individual publication.

All was not serious business : the conference excursions to the remains of a Roman settlement at Conimbriga, and as well, to the ruined, walled city of Montemor-o-Velho ***(Fig. 4)*** showed us interesting aspects of Portuguese history and culture. And the elegant conference dinner at the Palacio de S. Marcos gave all a taste of good Portuguese cuisine. Prior to the dinner we were entertained by a fado singer ***(Fig. 5)***. (Fado is a song form unique to Portugal).

The conference proceedings are to be published in a forthcoming edition of Nuclear Instruments A.

Dudley Creagh

Fig. 1

The Elsevier representative, Francissen Diddell, presents Professor Richard Pratt, with the JARI Medal.

Fig. 2

Professor Malcolm Cooper and Rosine Isabelle (the widow of Didier Isabelle after whom the award is named) present the Didier Isabelle Award to Danielle Stewart.

Fig 3

Professor Richard Pratt and Dr David Bradley talking with Dr Chris Chantler ***(right)*** prior to the presentation to him of the JARI Enterprise Award

Fig 4. Some council members and their wives on the excursion to Montemor-o-velho

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Fig 5. Delegates watching the fado singer at the conference dinner

.. AND ..

Conference delegates on the steps of the Palace at the University of Coimbra

Photographs : Dudley Creagh

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MEMBER'S REPORT

Fifty Years of UNSCEAR the UN Scientific Committee on the Effects of Atomic Radiation

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UNSCEAR, the UN Scientific Committee on the Effects of Atomic Radiation, turned fifty this year. In the decade following the atomic bombings of Hiroshima and Nagasaki there had been about one hundred atmospheric nuclear weapons tests raising serious concerns of damage from the resulting radiation. In 1954, India called for an immediate end to all nuclear explosions. In response the USA proposed a resolution asking the United Nations to establish a committee to study the effects of radiation on human health. Subsequently on 3 December 1955 the General Assembly unanimously approved resolution 913 (X), which established the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). The first session was held from 14 to 23 March 1956 in New York. The original Committee was composed of senior scientists from 15 designated UN Member States, namely Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, Egypt, France, India, Japan, Mexico, Sweden, UK, USA and the USSR. It is to be noted that China is not in this list, which joined much later in 1986. The then UN Secretary General Dag Hammarskjöld appointed Dr Ray Appleyard of Canada as Secretary of the Committee. UNSCEAR's ancestry was two senior international scientific bodies:

- The International Commission on Radiological Protection (ICRP)
- The International Commission on Radiological Units and Measurements (ICRU)

These commissions had been created a quarter of a century earlier during the second Congress of Radiology in Stockholm. However, both the ICRP and the ICRU were and are non-governmental academia, which do not act in the name of and on behalf of governments. The nuclear testing prompted the authoritative international analysis and scientific assessment of the global effects caused by the radiation resulting from the weapons programmes. In a farsighted decision of the UN General Assembly, UNSCEAR was established.

The UNSCEAR submitted two reports to the General Assembly in 1958 and 1962. These reports contained comprehensive evaluations of the state of knowledge about the levels of ionizing radiation to which human beings were exposed and of the possible effects of such exposures. Those reports laid the scientific grounds on which the Partial Test Ban Treaty on the prohibition of nuclear weapon testing in the atmosphere was negotiated and signed in 1963. This was a major success of the UNSCEAR. Over the decades that followed this important first achievement, UNSCEAR became the official international authority on the levels and effects of ionizing radiation, used for peaceful as well as military purposes and derived from natural as well as man-made sources.

The Committee has systematically reviewed and evaluated global and regional levels and trends of medical exposure, as well as exposure of the public and workers. These reviews continue to influence the national and international programmes. The Committee has regularly evaluated the evidence for radiation-induced health effects. UNSCEAR turned out to be a key instrument in the process through which international radiation protection standards was developed. UNSCEAR's reports are impartial, dispassionate and scientific, and have prompted significant worldwide reductions in radiation exposure. Since its inception, UNSCEAR has issued only fifteen major publications, but these authoritative reports are principal sources of information. These reports (most recent dated 2001) are freely available at the UNSCEAR website. More than fifty national organizations and several international organizations provide considerable contributions in kind. The Secretariat in Vienna organizes and services the annual sessions and manages the preparation of documents for the Committee's scrutiny.

In 1973 the General Assembly invited five UN Member States to participate in the Committee, namely Germany, Indonesia, Peru, Poland and Sudan. China was invited in 1986. In 1974, the UNSCEAR Secretariat moved from New York to Vienna and was functionally linked to the United Nations Environment Programme (UNEP). Now there are twenty-one States, which appoint scientists to UNSCEAR. These are Argentina, Australia, Belgium, Brazil, Canada, China, Egypt, France, Germany, India, Indonesia, Japan, Mexico, Peru, Poland, Russia, Slovakia, Sudan, Sweden, United Kingdom and United States of America.

For the past fifty years, the UN Scientific Committee on the Effects of Atomic Radiation has fulfilled effectively the important mandate entrusted to it by the General Assembly. With important decisions concerning new medical uses of radiation, environmental restoration, waste disposal and the nuclear power option, the role of the UNSCEAR in providing authoritative scientific information continues to be central and will be crucial in the future. UNSCEAR's work will also be essential in meeting the environmental challenges associated with nuclear power.

Further Reading:

- David Fischer, History of the International Atomic Energy Agency, The First Forty Years, (IAEA 1997).
- Website of the UNSCEAR the UN Scientific Committee on the Effects of Atomic Radiation http://www.unscear.org/

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ELECTION COMMITTEE REPORT

Paul Bergstrom, N.I.S.T., USA

During the meeting of the membership of the society, on the last day of ISRP-10, the officers of the society for the next three years were announced.

The society will be led by **Dudley C Creagh** of Australia
who replaces Richard Pratt of the USA as President.

Richard Pratt will continue to contribute to the society
as chair of the Advisory Board.

David Bradley, from the UK, will retain the Secretarial pen.

Joining his countryman, **Malcolm J. Cooper** takes over as
Treasurer of the society from Ante Ljubicic of Croatia.

The Vice Presidential ranks saw some turnover with
Jorge Fernandez of Italy taking over the Western Europe
posting from Mic Farquharson of the UK.

Mic Farquharson will retain his office as Membership Registrar of the society.

We also have **William Dunn** taking over the USA posting
from John Hubbell, and **Chris Chantler** taking over in Australasia
from Dudley Creagh.

The other VP postings were filled by the incumbents:

Anselmo Paschoa for South and Central America
Suprakash Roy for South East Asia
Luo Zhengming for North East Asia
Dan Jones for Africa and the Middle East
Andrei Korol for the former Soviet Union
Ladislav Musilek for Eastern Europe

There was also quite a bit of turnover in the ranks of the
Executive Council with
Odair Goncalves of Brazil,
Fiona McNeill of Canada,
Marcelo Rubio of Argentina,
Ziyu Wu of the Peoples Republic of China
being elected to six year terms.

Isabel Lopes of Portugal and **Francesc Salvat** of Spain
were elected to fill three year vacancies.

Remaining on the Council until 2009 are
Paul Bergstrom of the USA and **Kuhlwandt Singh Thind** of India.

Leaving the council and returning to the general membership are
Leif Gerward, Raoul Mainardi, Joanne O'Meara, Don McLean and Takashi Nakamura.

We salute them and
John Hubbell
for their long service to the society.

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