ARCHIVE EDITION OF

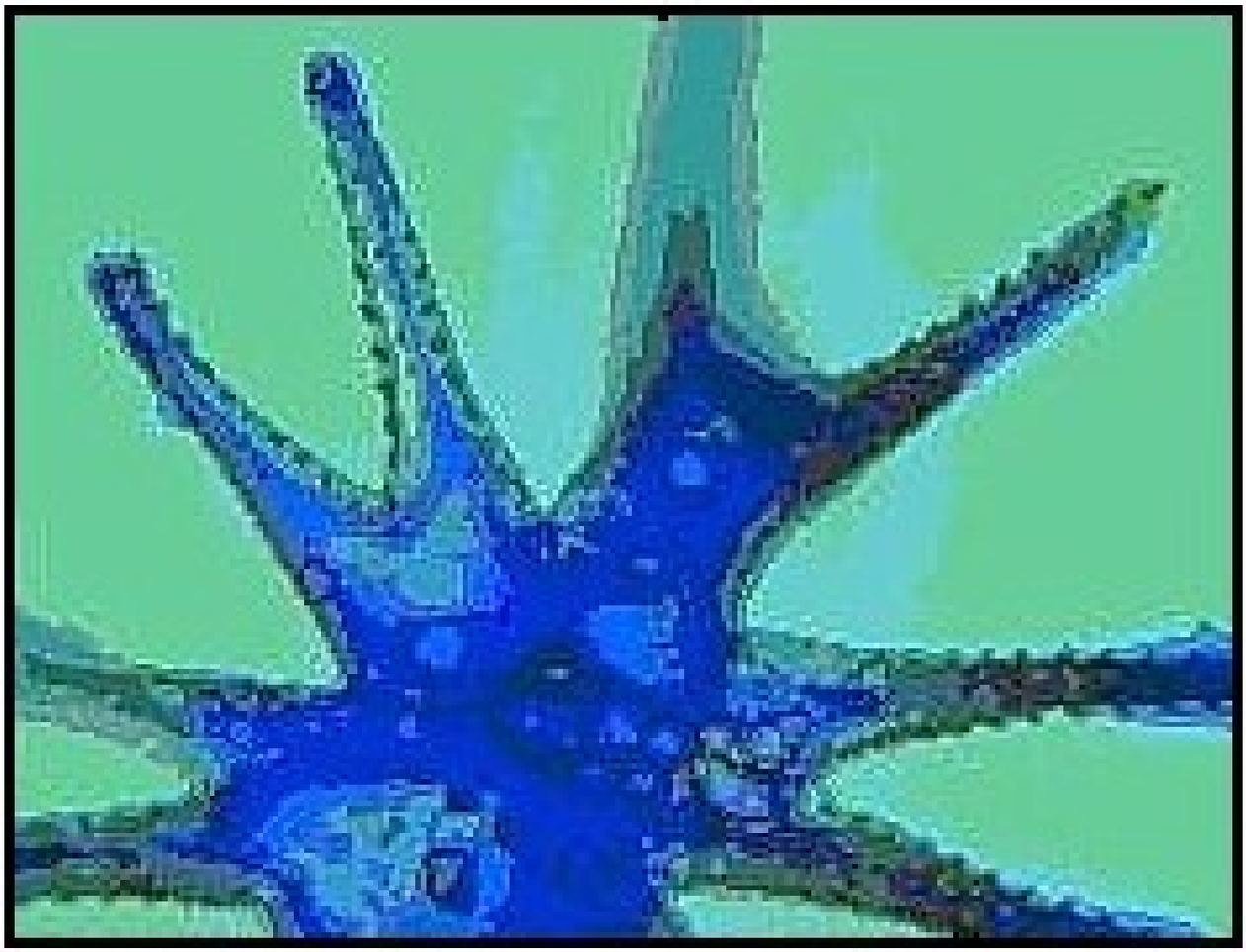
IRPS BULLETIN

Volume 22 No 1 April, 2008

Office Bearers : 2006 - 2009

Return to Archive Home Page

COVER OF VOLUME 22 NO 1, April 2008



Micro-organism Response to Environmental Change

Image of ***Micrasterias hardyi*** prior to an experiment to test the uptake of nutrients by this cell. Tests are in vitro and real time.

Image by Dr Mark Tobin
Beamline Scientist, Infrared Beamline, Australian Synchrotron

Home Page | Next

EDITORIAL

Greetings from the editors of IRPS! While assembling this first issue of volume 22 of the Bulletin, we are reminded that submissions from our very diverse and capable readership – conference reports, student papers, regional news, opinion pieces, book reviews or thumbnail reviews of articles in current literature, historical surveys, tutorials, research reports, cartoons … are encouraged, as they make us all a little more aware of how our subject evolves across cultures and geography, adapts to the vagaries of funding, couples effectively into allied fields, and does all this because of the dedication of people at various stages of career or education.

This issue brings a pair of reports from opposite sides of the equator that contrast sharply in their assessments of the outlook for research funding in their respective corners of the world, although, as both pieces suggest, the impact of such decisions can extend beyond geographical borders: Malcolm Cooper's submission identifies international projects that are jeopardized by funding cuts in the UK, while Marcelo Rubio's piece on the embrace of science and technology by the new government of Argentina suggests that the IRPS itself could be instrumental in identifying opportunities for cooperative research activities that cross international borders.

We are also pleased to present a summary by Neal J. Carron about his new book on radiation physics, ***An Introduction to the Passage of Energetic Particles Through Matter*** (Taylor and Francis, 2007). He reminds us that this is not a review, but could be considered as an invitation for potential reviewers to step forward and, perhaps, submit an item for the Bulletin.

A request for nominations for the ICRU Gray Medal, due by June 1, 2008, follows the book summary, and the issue concludes with several conference announcements, including a detailed spread about the upcoming Radiation Physics and Protection Conference in Cairo, Egypt, scheduled for the end of this year, as well as a first announcement of ISRP-11, which is to be held in Melbourne, Australia in September 2009.

We will greet you next
in the new year of possibilities,

Larry Hudson, Ron Tosh

PRESIDENT'S REPORT

In this issue of the Bulletin Malcolm Cooper reports on changes in funding for science in the recent science budget brought in by the government in the United Kingdom. The decrease in funding to the Sciences and Technical Facilities Council budget is significant. Overall, however, there has been an increase in the science budget with significant funding going to the Medical Research Council.

The STFC is responsible, in part, for the further development of synchrotron radiation sources, neutron scattering facilities, large accelerators such as supercolliders, radio- and optical- telescopes, and so on. The first two items on this list could be considered as systems for developing new science and technology; the latter two as systems for acquiring knowledge fundamental to our understanding of the structure of matter and the universe.

I often wonder how decisions by government come to be made. Sometimes they seem to fly in the face of reason. I must declare my bias: I have designed equipment for synchrotrons and been a user of synchrotron and neutron radiation for two decades. The range of experiments which I have seen undertaken is very diverse: studies of corrosion at surfaces, the ordering of lipids on surfaces, the tensile properties of elastomers, the composition of pigments in paints, the degradation of inks on parchment…. the list goes on. None of these experiments could have been undertaken without access to a synchrotron. No two experiments used the same experimental technique. And the most recent beamline I designed (which is an infrared beamline using both the edge and bending magnet radiation emitted as the particle beam passes through a bending magnet) has a FTIR microscope which uses one source, and a high resolution spectrometer which uses the other.

The FTIR microscope beamtime has been taken up, in the main, by experiments involving in-vitro cell biology, and the effects of disease on cells. Research proposals in the medical and biological fields are much more numerous than from other fields and the beamline is 200% oversubscribed.

The story I have just told you is by no means unique. When the neutron facility at the Institute Laue Langevin (Grenoble) first started, the major part of the activity was by physicists and chemists. Within a very few years experiments related to biology and bio-medicine were a major part of the activity of the ILL.

Much of the research undertaken at major national facilities such as synchrotron and neutron scattering facilities is of a biological, biomedical, or medical nature. Yet the funding to produce the equipment to undertake new research and to prosecute current research has been curtailed.

I wonder whether the funding bodies are aware of this fact; perhaps not. All I know is that the capability of anti-cancer drugs to destroy cancer, developed using the protein crystallography beamlines at a synchrotron, is being tested at my IR beamline at a synchrotron.

We cannot change what has happened to the STFC in the United Kingdom. But we must realize that what has happened in the UK could happen to scientists anywhere.

It is necessary therefore that as scientists we develop a better capability to talk about our work and its relevance with ordinary people through the media. And we must become better at informing governments and funding agencies about our work and how it relates to more seemingly pressing scientific needs.

Dudley Creagh

Summary of N.J. Carron's Book

N.J. Carron

University of Tennessee, Medical Centre, Box 93 Knoxville, Tennessee, USA

Email : ncarron@alum.mit.edu

Before John Hubbell's unfortunate death, he helped guide me through some of the intricacies involved in producing a book of interest to radiation physics workers and educators. He suggested that the IRPS Bulletin may be a good forum to bring it to the attention of an appropriate audience. So, at the risk of appearing uncharacteristically self-promoting, I here do just that.

The book is

An Introduction to the Passage of Energetic Particles Through Matter by N. J. Carron. (Taylor & Francis, 2007). 360+ pages. ISBN-10: 0750309350. ISBN-13: 978-0750309356.

It is a condensation of 30 years experience in applied radiation physics.

It discusses the basic interaction physics of photons, electrons, protons, alpha particles and heavy ions, and neutrons with matter. Modern data on cross sections, stopping powers, ranges, etc., and reduced quantities of interest (electron mean-forward range, neutral particle kerma, dose parameters, NIEL, etc) are presented in useful graphical form. A full discussion serves as an introduction to the huge ENDF data library.

The discussion of neutron interactions is quite limited, of course, due to their immense variety and isotope dependence. Neutron cross section graphs in common isotopes of interest and a few elements in their natural isotopic composition are presented.

It comes with a CD-ROM, attached to the back cover, which contains numerical data in parallel columns in ASCII text files, carefully constructed and interpolated from ENDF (or EPDL and EEDL), and from NIST tables. These contain:

- Photon cross sections (Photoelectric, Rayleigh, Compton, pair production, and total) in barn/atom and cm2/gm, and fluence to kerma conversion functions in all elements at "all" energies

- Electron cross sections (elastic small angle, elastic large angle, elastic total, Bremsstrahlung, Excitation, Ionization); collisional, radiative, and total stopping powers; radiative yields; and CSDA ranges, in all elements at all energies

- Neutron fluence-to-kerma (ionizing and non-ionizing) conversions in Silicon

- A few other parameters of interest.

In addition, we make a useful observation. Normally one graphs a photon cross section ***vs.*** photon energy in an element, say, Pb. Another graph applies for Si, and another for Ge, etc. Likewise, one constructs a graph of a particle range ***vs.*** energy ***E*** in Ge, another in Si, etc. More generally, over all elements ***Z***, each parameter (a cross section, an electron mean stopping power, a charged particle range, etc.) is a function of projectile energy ***E*** in each element. So over all elemental targets, any such parameter is a function of ***Z*** and ***E***, $s = s(Z, E)$. As such it forms a surface over the ***Z***, ***E*** plane.

That surface can be represented by a contour plot in the ***Z***, ***E*** plane, just as elevation is represented by contours on a topographic map. Then, on a single graph, one sees the photon cross section in all elements over all energies of interest; or the electron CSDA range in all elements over all energies; etc. One readily sees dips, valleys, rapid variations, etc. over the span of ***Z***, ***E*** values.

While apparently novel, these contour graphs are of more than academic interest. They are actually useful. When graphed carefully on large paper, some can be read to better than a few percent, adequate for estimating needed quantities. Local colleagues and I use them routinely for just that. They are great time savers.

The CD contains seventeen color, high resolution pdf files of these graphs, intended to be printed on 11" x 17" paper. In that form they are really quite striking.

Four graphs of photons:

- Total cross section (barn/atom; cm^2/g);
- Mean free path against total scattering (g/cm^2)
- Fluence-kerma conversion factor (rad per photon/cm^2)

Seven of electrons:

- Collisional mean stopping power (MeV-cm^2/g) from NIST; from EEDL.
- Total mean (collisional + radiative) stopping power (MeV-cm^2/g).
- Full range (CSDA) against total mean stopping power (g/cm^2)
- Mean forward range against stopping power and multiple scattering (g/cm^2)
- Mean forward range to rms scattering angle 1 radian (g/cm^2)
- Mean forward range to rms scattering angle 20 degrees (g/cm^2)

Three each of protons and alpha particles:

- Total stopping power (MeV-cm^2/g)
- Full range (CSDA) against total stopping power (g/cm^2)
- Mean forward range against stopping power and multiple scattering (g/cm^2).

Since one cannot include the large paper graphs in the book, electronic versions are on the CD. However, the author maintains a number of paper sets of these graphs in his office for convenient distribution.

If you will kindly send me your Fed-Ex address (to ncarron@alum.mit.edu) I will be happy to send you a set (together with book errata).

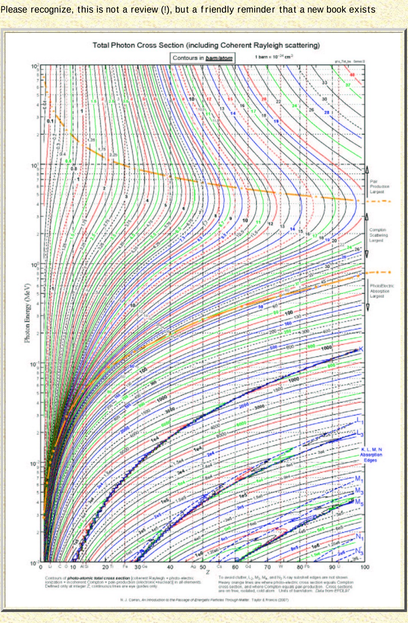
The book should be of interest to radiation physicists in applied research, or nuclear engineers, or to educators as a text or for supplementary reading.

The book is available, e.g., at Amazon:

http://www.amazon.com/Introduction-Passage-Energetic-Particles-through/dp/0750309350/sr=11-1/qid=1168484351/ref=sr_11_1/102-9098909-3996133

where one may view its Table of Contents.

Please recognize, this is not a review (!), but a friendly reminder that a new book exists



MEMBERS' REPORTS

Changes in Scientific Initiatives in Argentina

Marcelo Rubio

CEPROCOR
Agencia Córdoba Ciencia, Alvarez de Arenales 230
Barrio Juniors, X5004 AA, Córdoba, ARGENTINA

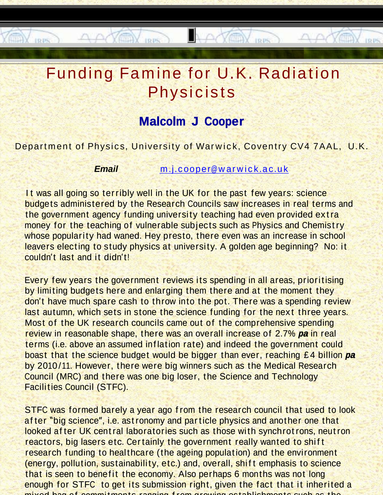
Email : mrubio@ceprocor.uncor.edu

The inauguration last December 10 of Cristina Kirchner as president of Argentina may well mark the beginning of an historic era for Argentinean science and technology.

Coming at a time of increasing economic growth in Argentina, the new government is well situated to leverage investments in scientific research for purposes of advancing industry throughout the country and addressing social needs.

Accordingly, one of the first government measures was to create the Ministry of Science, Technology and Productive Innovation, a very significant development that is broadly supported by the local scientific and technological community and which effectively elevates the priorities of scientific research to the highest levels of government decision making in Argentina. As a consequence of this initiative, government investment in science and technology is expected to double, from the present level of 0.5 % of gross domestic product to 1 %, and ambitious plans are being put in place for development of scientificinfrastructure, associated staffing of related government agencies, and increased funding of the Argentinean agencies ANPCyT and CONICET, which oversee most of the scientific research activities of academic and technical institutes throughout the country.

Successful implementation of new policy initiatives will require that the new minister of science and technology work closely with the new president to define overall objectives for scientific activities and delegate responsibilities among associated government agencies. In this context, President Kirchner has designated Dr. Marcelo Rubio, a member of the IRPS, as President of ANPCyT, the National Agency for the Promotion of Science and Technology (commonly known as the Argentinean funding Agency). The position carries with it responsibilities for directing the majority of the country's investments over the next four years in scientific research and technological innovation. Shortly after assuming his new post on December 10, 2007, Dr. Rubio contacted Dudley Creagh about the possibility of coordinated activities involving the IRPS and ANPCyT in the near future.



Dr. Marcelo Rubio (right) is sworn in as President of ANPCyT by Minister of Science and Technology of Argentina, bio-chemist Dr. Lino Barañao (left).

Funding Famine for U.K. Radiation Physicists

Malcolm J Cooper

Department of Physics, University of Warwick, Coventry CV4 7AAL, U.K.

Email m.j.cooper@warwick.ac.uk

It was all going so terribly well in the UK for the past few years: science budgets administered by the Research Councils saw increases in real terms and the government agency funding university teaching had even provided extra money for the teaching of vulnerable subjects such as Physics and Chemistry whose popularity had waned. Hey presto, there even was an increase in school leavers electing to study physics at university. A golden age beginning? No: it couldn't last and it didn't!

Every few years the government reviews its spending in all areas, prioritising by limiting budgets here and enlarging them there and at the moment they don't have much spare cash to throw into the pot. There was a spending review last autumn, which sets in stone the science funding for the next three years. Most of the UK research councils came out of the comprehensive spending review in reasonable shape, there was an overall increase of 2.7% ***pa*** in real terms (i.e. above an assumed inflation rate) and indeed the government could boast that the science budget would be bigger than ever, reaching £4 billion ***pa*** by 2010/11. However, there were big winners such as the Medical Research Council (MRC) and there was one big loser, the Science and Technology Facilities Council (STFC).

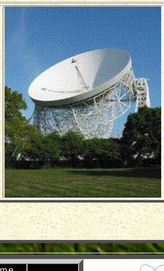
STFC was formed barely a year ago from the research council that used to look after "big science", i.e. astronomy and particle physics and another one that looked after UK central laboratories such as those with synchrotrons, neutron reactors, big lasers etc. Certainly the government really wanted to shift research funding to healthcare (the ageing population) and the environment (energy, pollution, sustainability, etc.) and, overall, shift emphasis to science that is seen to benefit the economy. Also perhaps 6 months was not long enough for STFC to get its submission right, given the fact that it inherited a mixed bag of commitments ranging from growing establishments such as the DIAMOND Light Source, the UK's shiny new synchrotron that has just opened, to declining establishments like the Daresbury Synchrotron Radiation Source that is just closing (by the end of this year), plus a plethora of international commitments with their attendant problems of fluctuating exchange rates (you guessed it, the pound is in decline against most of the relevant currencies) and big, big bills for big, big international projects. Anyway, without apportioning blame (plenty of my colleagues are busy doing that, of course) STFC finds itself needing to save £80M and wanting to save a further £40M to create "headroom" for new ideas, rather than inherited commitments. Ouch, that amounts to a 25% cut and that hurts!What does a 25% cut translate into? Well, how about absolute withdrawal from the International Linear Collider project? That's going to be one of the biggest and most prestigious international projects: 1TeV is pretty unimaginably high energy and the cost is commensurate. Many UK universities were already heavily involved in the project and withdrawal will mean much pain and redundancies. How about withdrawal from Gemini, the project centred on twin 8-metre telescopes in Chile and Hawaii? Well, first we were out, which apparently led to the Union Jack being lowered down the flagpole at Gemini HQ, then we were back in (Union Jack presumably raised again) but seeking to sell off half of our time during the next 4 years to the highest bidder.

You may not have heard of the Gemini project, but you will have surely have heard of Jodrell Bank and the iconic telescope, now named after the 94 year-old astronomer, Sir Bernard Lovell, who built it and reportedly still turns up for work each day. Eight million pounds has been spent on making the telescope 30 times more powerful, but the e-Merlin project based at Jodrell Bank costs £2.7M pa of STFC's money to run and they threaten to pull the plug. When I was a child the Lovell telescope was probably the largest scientific structure in the UK, certainly the largest in the public eye. I can recollect sitting on top of the hills surrounding my home town and being able to see it 30 miles away in the Cheshire plain. It is amazing that it is still state-of-the-art (remember my childhood is, indeed, a distant memory!) and it is sad that it now faces the axe.

But what about those of us outside astronomy and particle physics? Can we just express sympathy, show solidarity and then get on with our own radiation physics research unscathed, say a spot of neutron scattering or x-ray diffraction? Oh no, STFC now runs those facilities and therefore we are all going to feel the pain. One proposal is that the ISIS spallation Neutron Source, which of course attracts international users as well as British scientists, will operate for only 3 of its 4 annual cycles, thereby saving an electricity bill (but not a lot else!). Upgrade plans for Europe's premier research reactor at the Institut Laue Langevin (ILL) and the adjacent European Synchrotron Radiation Facility (ESRF) could also be under threat, so it will be hard times all round until the next government spending review in three year's time, which will be too late for many projects to be resurrected.

Reportedly the STFC is keen on manned space missions and some of my colleagues have been eager to suggest STFC executives as the first to be fired into space!

It is not the best time to be a radiation physicist in the UK: now where are those job adverts for a new life in a new country.....?



Jodrell Bank's famous Lovell Radio Telescope is under threat from funding cuts

Reproduced by permission of I. Morison

Link to John Hubbell's Papers

John's body of work is being used as part of a set of example analyses for the Web of Science analysis tool, HistCite. It cross-references citations to and from papers, making it easier to find background material for new work and to trace interconnectivity between researchers.

A compilation of John Hubbell's papers can be accessed via

http://garfield.library.upenn.edu/histcomp/index-hubbell.html

Previous | Home Page | Next

Nominations for the ICRU Gray Medal Invited

The International Commission on Radiation Units and Measurements (ICRU) is seeking nominations for the fourteenth award of the ICRU Gray Medal. The Gray Medal was established by the ICRU in 1967. It is awarded for outstanding contributions to basic or applied radiation science of interest to the ICRU and honors the late Louis Harold Gray, former member and Vice-Chairman of the Commission.

The first award of the medal was made to Dr. Lewis V. Spencer in 1969. Subsequent recipients have been Dr. John W. Boag, Dr. Mortimer M. Elkind, Professor Maurice Tubiana, Dr. Harald H. Rossi,
Dr. Dietrich Schulte-Frohlinde, Dr. H. Rodney Withers, Dr. Paul Lauterbur, Dr. Herman Suit,
Dr. R. Michael Fry, Dr. Martin Berger and Dr. Charles Metz.

The thirteenth award was presented to Dr. Eric J. Hall at the 13th ICRR Meeting in San Francisco, California on July 11, 2007.

For the fourteenth Gray Medal award, the Commission will give preference to individuals who have made major contributions to basic science.

Nominations for the medal may be made by any person or organization. They must include a complete biographical sketch (curriculum vitae) of the nominee, selected reprints or records which show the significant contributions made by the nominee, and letters of support evaluating the importance of the contributions. Nominations should be directed to

the Chairman of the ICRU
Suite 400, 7910 Woodmont Avenue
Bethesda, Maryland, USA 20814

and must be received by the ICRU no later than June 1, 2008.

For further information contact:

Patricia Russell,
Executive Secretary, ICRU
Suite 400, 7910 Woodmont Avenue,
Bethesda, Maryland, USA 20814

Phone: (301) 657-2652, Ext.31 ***Fax:*** (301) 907-8678
Email: icru@icru.org

Home Page

Previous

AWARD AT ISRP-11

In consideration of the great value that students and young scientists have brought to previous ISRP's over the years, the IRPS Bulletin is welcoming technical submissions from students and postdocs for consideration for an award to be given at ISRP-11.

To be considered eligible for this award, submissions must be received before December 31, 2008.

Further details will be in the next IRPS Bulletin, and then added to this page.

Home Page