

A large, complex piece of scientific equipment, possibly a synchrotron or X-ray diffractometer, is shown in a dimly lit environment. The equipment is primarily metallic and has a complex, multi-tiered structure. A person is visible in the lower-left quadrant, working on a circular component of the machine. The overall scene conveys a sense of advanced scientific research and engineering.

RESEARCH SCHOOL
OF PHYSICS & ENGINEERING
ANNUAL REPORT 2011



Australian
National
University

ANU COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES

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DIRECTOR'S REPORT



Professor Jim Williams

The Research School of Physics and Engineering (RSPE) is the leading institution in the country for physics research and its applications. It is the largest physics-based research activity by some measure with over 150 academic staff during 2011.

RSPE maintains excellence in education and training standards and ensures a quality educational experience for all our students. We continue to develop our staff to their full potential whilst ensuring that staff skills are matched to priority directions, and implement appropriate succession planning to replace key late career staff. It is the ability of the School to launch appropriately resourced research efforts built around outstanding staff in a number of important areas of national significance, the unique and integrated research infrastructure and the interdisciplinary collaboration with colleagues across the ANU, nationally and internationally, that distinguish the School's research effort and capacity.

Grant successes during the year from the Australian Research Council included two new Centre of Excellence nodes, 19 discovery projects, nine Future Fellowships, two linkage projects and one linkage infrastructure Equipment and Facility (LIEF). The School is also involved in four externally-led LIEF grants, with some of the equipment being located at the School. Along with the award of five super science fellowships and other grant successes of note were the award of an Australian Space Research Program from the Department of Innovation, Industry, Science and Research (DIISR), three from the Australian Nuclear Science and Technology Organisation (ANSTO) and eight from the Australian Synchrotron Company Ltd.

During 2011 the School continued to ramp up its development program to grow non-conventional funding through focusing on individual donors, foundations and companies including the appointment of a Development Manager, the formation of a Development Board, the consolidation of School endowments and planning towards philanthropic endowed funds (initially endowed chairs in areas of research strength) the encouragement of work place giving and a stronger engagement with Alumni and friends of the School.

The School continued to lead the cross-campus effort to coordinate energy research at ANU, through the Energy Change Institute. We continue to communicate our research achievements through *ScienceWise* and *ANU Reporter* as well as key press releases of scientific breakthroughs.

External collaborations with colleagues from national or international institutions are indicated through: Published works - 66% (330 of 499) have been as a result of collaborations with external authors;

Research Grants - 49% (81 of 179) have been as a result of collaborations with external institutions; and Visiting Fellows – 62 visiting fellows have spent a substantial period of time at the school during the year.

The School also continued its strong performance in commercialization of its research through more than 30 grants or research contacts with industry and four active spin-off companies in 2011.

Jim Williams

STAFF ACCOMPLISHMENTS

External Honours & Awards

Mr Seiji Armstrong

Prime Minister's Australia Asia Award

Professor Christine Charles

Finalist for the World Technology Awards (Space / Individual category)

Finalist in the Australian Innovation Challenge (Manufacturing and Hi-Tech design category)

Dr Cormac Corr

2011 ACT Young Tall Poppy Science Awards

Professor Mahananda Dasgupta

Elected Fellow of the Australian Academy of Science

Awarded ARC Laureate Fellowship and inaugural ARC Georgina Sweet Fellowship.

Professor David Hinde

Elected Fellow of the American Physical Society

Dr Matthew Hole

Appointed Judge of one of the Eureka Prizes for Science

Distinguished Professor Chennupati Jagadish

Elected as a Fellow of the School of Engineering at The University of Tokyo

IEEE Nanotechnology Council Distinguished Service Award

Professor Yuri Kivshar

Fellowship of the Institute of Physics, UK

Professor John Love

Master of Mathematics Degree, University of Cambridge

Professor Jim Williams

2011 Thomas Ranken Lyle Medal for research in Physics by the Australian Academy of Science



Professor Mahananda Dasgupta

STAFF AWARDS AND ACHIEVEMENTS



VC award recipients pictured left to right: David Llewellyn, Liz Micallef, James Williams, David Anderson and Boyd Blackwell

Internal Honours & Awards

Mr David J Anderson

Vice-Chancellor's Award for Career Achievement

Dr. Boyd Blackwell

Vice-Chancellor's Award for Career Achievement

Ms Liz Micallef

Vice-Chancellor's Award for Innovation & Excellence in Service Quality

Mr David Llewellyn

Vice-Chancellor's Award for Innovation & Excellence in Service Quality

Professor James Williams AM

Chancellor's awards- Peter Baume Award

Professor Andrew Stuchbery

ANU 25 Years Service Award

Mr John Bottega

ANU 25 Years Service Award

Mr Graeme Cornish

ANU 25 Years Service Award

Dr Stephen Gibson

ANU 25 Years Service Award

Professor Stephen Hyde

ANU 25 Years Service Award

Professor George Dracoulis

2011 Australian National University Media Award (with Aidan Byrne) Winner in category of Best Response from a Media Event: Japan Tsunami Crisis

Allan Cooper

Tom Rhymes Technical Development Award

Caleb Gudu

Tom Rhymes Technical Development Award

Alan Harding

Tom Rhymes Technical Development Award

Justin Heighway

Tom Rhymes Technical Development Award

Alistair Muirhead

Tom Rhymes Technical Development Award

John Bockwinkel

Tom Rhymes Technical Development Award

Tom Tunningley

Tom Rhymes Technical Development Award



30 year pins

Ron Cruikshank 30/04/1981

Keith Fifield 07/01/1981

Emeritus Staff of the School

Hans Bachor

Bob Dewar

George Dracoulis (awarded 2010)

Neville Fletcher

Promotions

Level B

Dr Andrew Kingston

Dr Avi Shalav,

Dr Dinesh Venkatachalam

Dr Zhiyong Xu

Level C

Dr Ilya Shadrivov

Level D

Dr Tibor Kibedi

Dr Stephen Madden

Dr Dragomir Neshev

Dr Matthew Sellars

Dr Andrew Truscott

Dr Anna Wilson

Dr Yin (Jenny) Wong Leung

Level E

Professor Christine Charles

Professor Craig Savage

Professor Tim Senden

FELLOWSHIPS OF LEARNED SOCIETIES

American Association for Advancement of Science

Professor Chennupati Jagadish (since 2007)

American Physical Society

Professor Ken Baldwin (since 2008)

Professor Murray Batchelor (since 1993)

Professor Rod Boswell (since 1998)

Professor Peter Bouwknecht FAIP (since 2000)

Professor Stephen Buckman (since 1998)

Emeritus Professor Robert Crompton (since 1995)*

Adjunct Professor Mukunda Das (2003)*

Professor Robert Dewar (since 1980)

Emeritus Professor George Dracoulis (since 1993)*

Professor Rob Elliman (since 1994)

Professor David J. Hinde (since 2011)

Professor Chennupati Jagadish (since 2003)

Professor Anatoli Kheifets (since 2004)

Professor Yuri Kivshar (since 2006)

Professor Brenton Lewis (since 2001)*

Professor David McClelland (since 2010)

Emeritus Professor Erich Weigold (since 1990)*

Professor Jim Williams (since 2006)

American Vacuum Society

Professor Chennupati Jagadish (since 2008)

Astronomical Society of Australia

Professor David McClelland (since 2006)

Australian Academy of Science

Professor Vladimir Bazhanov (since 2010)

Professor Rod Boswell (since 2008)

Emeritus Professor Robert Crompton (since 1979)*

Professor Mahananda Dasgupta (since 2011)

Professor Robert Dewar (since 1992)

Emeritus Professor George Dracoulis (since 1997)*

Emeritus Professor Neville Fletcher (since 1976)*

Professor David Hinde (2006)

Professor Stephen Hyde (since 2005)

Professor Chennupati Jagadish (since 2005)

Professor Yuri Kivshar (since 2002)

Professor Stjepan Marcelja (since 1991)*

Emeritus Professor Barry Ninham (since 1978)*

Emeritus Professor Erich Weigold (since 1986)*

Professor Jim Williams (since 2003)

Australian Academy of Technological Sciences and Engineering

Professor Rod Boswell (since 1999)

Emeritus Professor Neville Fletcher (since 1987)*

Professor Chennupati Jagadish (since 2002)

Professor Barry Luther-Davies (since 2005)

Emeritus Professor Erich Weigold (since 1996)*

Professor Jim Williams (since 1992)

Australian Institute of Physics

Professor Hans Bachor (since 1987)

Professor Ken Baldwin (since 1995)

Professor Stephen Buckman (since 1992)

Professor Mahananda Dasgupta (since 2004)

Emeritus Professor George D. Dracoulis (since 1990)*

Professor L. Keith Fifield (since 1997)

Emeritus Professor Neville Fletcher (since 1960)*

Professor David J. Hinde (since 1996)

Professor Yuri Kivshar (since 2000)

Professor David McClelland (since 2000)

Professor Susan Scott (since 2004)

Professor Andrew Stuchbery (since 1992)

Dr David C. Weisser (since 1992)

Australian Mathematical Society

Professor Murray Batchelor (since 2001)

Professor Peter Bouwknecht FAustMS (since 2001)

Electrochemical Society

Professor Chennupati Jagadish (since 2006)

European Academy of Sciences

Professor Susan Scott (since 2002)

Institute of Electrical and Electronics Engineers

Professor Chennupati Jagadish (since 2002)

Institute of Physics (UK)

Professor Hans Bachor (since 1999)

Professor Ken Baldwin (since 2006)

Professor Murray Batchelor (since 2004)

Professor Stephen Buckman (since 1995)

Professor Rob Elliman (since 2003)

Emeritus Professor Neville Fletcher (since 1956)

Professor David J. Hinde (since 2005)

Professor Chennupati Jagadish (since 1998)

Professor Yuri Kivshar (since 2012)

Professor Susan Scott (since 1999)

International Society for Optical Engineering

Professor Chennupati Jagadish (since 2006)

Institution of Engineering and Technology

Professor Chennupati Jagadish (since 2007)

Institute of Nanotechnology

Professor Chennupati Jagadish (since 2001)

Materials Research Society

Professor Jim Williams (since 2008)

Optical Society of America

Professor Nail Akhmediev (since 1996)

Professor Hans Bachor (since 2009)

Professor Ken Baldwin (since 2000)

Professor Chennupati Jagadish (since 2005)

Professor Yuri Kivshar (since 2001)

Professor Wieslaw Krolikowski (since 2007)

Professor Brenton Lewis (since 2003)*

Professor Barry Luther-Davies (since 2006)

Royal Society of New Zealand

Emeritus Professor George D. Dracoulis (Hon)* (since 1997)

The Acoustical Society of America

Emeritus Professor Neville Fletcher (since 1975)*

The Australian Acoustical Society

Emeritus Professor Neville Fletcher (since 1980)*

* *retired*

STAFF OUTREACH ACTIVITIES



RSPE staff and guests enjoying the barbeque lunch on Founder's Day

The RSPE Founder's Day was held on Friday 14 October with invited guests from ANU, government organisations, industry and the media, as well as former employees. Over 400 people attended the day's celebrations.

The following are examples of some major research and student events where RSPE staff members were key organisers:

- In January 2011 staff and students were involved in organizing the lab visit by the participants of the National Youth Science Forum.
- Staff at Nuclear Physics Department gave over 100 TV, radio and phone interviews to national and international media covering problems at the Fukushima nuclear power station after the Tohoku earthquake and tsunami in Japan in March 2011.
- Dr Greg Lane gave a series of four public lectures at Questacon entitled, 'Radiation, nuclear power and what went wrong at Fukushima.' Two of these were given as part of Australian Science Week. He also gave seminars and demonstrations at local ACT schools. In addition, Dr Lane was the Local Director for the ACT Science Experience that was held from 5th to 7th of October. In the 2011 program, 45 Year 9 and 10 students from across the ACT and NSW visited a number of scientific laboratories at both the Australian National University and Geoscience Australia.
- James Sullivan gave presentations to senior physics/chemistry students and two year 8 classes at Merici College, Braddon ACT and also spoke to 2nd and 3rd year students at Flinders University and at other Universities.
- In the week of September 26th to 30th, the Department of Nuclear Physics hosted 20 undergraduate students from the University of Wollongong for the annual 'Workshop on Nuclear Measurement Techniques.' The students produced long-lived radioactivities using the 14UD accelerator and then characterised the decay by measuring changes in the emitted gamma-rays over the course of the week.
- Dr Christine Charles was an invited panel member for Café Scientifique Lecture and Workshop and presented 'Children of the stars, plasma is the fourth state of matter'.
- Prof. Michael Shats gave radio interviews on *ABC Canberra*, *ABC Queensland* and *Radio Adelaide News* in February 2011.

- Prof. Michael Shats was also interviewed on the *ABC News Breakfast* television programme, 8 February 2011.
- Dr. H. Xia and Prof. M. Shats contributed to several media releases about predicting cyclones.
- Dr Cormac Corr's article 'Pinching the plasma' was published in *ScienceWise*, Spring 2011.
- Prof Christine Charles received several mentions in print media: 'Finalist Christine Charles: Helicon Double Layer Thruster' (*The Australian*), 'Australian National University Developing Plasma Thruster' (*Daily Launch*), 'One small thrust for man, one giant leap for ANU' (*The Canberra Times*) and 'Rockets and all that jazz' (*ANU Reporter*).
- Professor Ken Baldwin was General Chair of the International Quantum Electronics Conference/CLEO Pacific Rim Conference in Sydney from August 29 - September 1, 2011, which with over 1,000 delegates was the largest laser-based conference to be held in the Southern hemisphere. He also presented several public lectures on the Energy Change Institute in Canberra and the region.
- Frank Mills co-convened and co-chaired 'Comparative Atmospheres of the Giant Planets and Their Satellites' session at the International Union of Geodesy and Geophysics quadrennial conference, Melbourne, was a member of the Education panel at the International Conference Energy & Meteorology, and was lead organizer of the 7th Australia and New Zealand Aerosol Workshop, Canberra.