DIRECTOR'S REPORT

Professor Stephen Buckman Director



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 in Australia by some measure, with over 160 academic staff and a similar number of PhD students during 2013. We are also supported by more than 110 outstanding professional staff. The School has an excellent track record in innovative research and development and we support these activities through a large number of research grants from the Australian Research Council, other government agencies, and industry.

RSPE also pursues and achieves excellence in research-led education, and we strive to maintain the highest training standards and ensure 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 in the national and international landscape.

Grant successes were again strong in 2013, as were research outputs that flowed from this funding, and these measures are detailed in the report from the Deputy Director Research (Professor Ken Baldwin). We maintained a strong presence in three ARC Centres of Excellence, continue to host significant national research infrastructure in Nuclear, Plasma and Materials science, as well as a number of other facilities of national importance.

The Deputy Director Education (Professor John Close) had his first full year at the helm of the School's education program, ably assisted by a strong team of Lecturers from across the School, Year Convenors, and Departmental Education coordinators. One of the key strategies of the School in the Physics Education area is to increase the size of our undergraduate program by attracting the best students from around Australia and, increasingly, we anticipate, from south-east Asia, through coordinated partnerships with other institutions. Some of the important education milestones for 2013 are recorded in Professor Close's report.

During 2013 the School continued to ramp up its Development program in both commercial and philanthropic directions and these activities are recorded in the reports of Deputy Director, Technology Development (Professor Tim Senden), and the School Development Manager (Ms Kavitha Robinson). A new joint Business Development Officer appointment between the School, College and Technology Transfer Office is a key indicator of the importance that the School places on technology transfer, as is the establishment of the Sirtex Chair, sponsored by one of Australia's largest biomedical companies, and awarded to Professor Ross Stephens of the Department of Applied Mathematics. This commercial activity has been more than matched in the Philanthropic and Alumni relations area with our School Endowment funds growing from four in 2010 to ten in 2013.

At a time of considerable political and funding uncertainty, the School remains focused on maintaining excellence in research and education and pursuing a range of opportunities in order to diversify our funding base and reduce the risk associated with reliance on any one major source of income.

ALUMNI RELATIONS AND PHILANTHROPY



Ms Kavitha Robinson Development Manager

RSPE has made considerable progress in connecting with its alumni and cultivating a sense of community through alumni and friends' events and the enewsletter 'Resonance'. The School embraces the importance and support that physics alumni contribute through time, talent and wealth.



Alumni Relations Overview

The Research School of Physics and Engineering has embraced new programs of engagement and communication together with the ANU Alumni Relations and Philanthropy Office to celebrate achievements and create a sustainable on-going engagement with its alumni. . This includes key programs such as the Alumni Awards, Golden Graduates Reunion (for Alumni 60+) and Alumni Volunteer leadership program.



Professor Denis Sullivan and Dr Gregory Clark at the inaugural Golden Graduates Reunion

Philanthropic Development

Philanthropic support from our alumni, staff and friends since 2010 has benefited our students, researchers, professional staff and the broader School and community.

2013 was a significant year in terms of philanthropic success and activities at the school. The culture of staff giving has continued to develop, resulting in the establishment of the Heavy Ion Accelerator Facility (HIAF) Endowment Fund. Three seniors members of the Department of Nuclear Physics joined forces to create and enhance opportunities for technical staff, the next generation of researchers and new accelerator based research initiatives and applications.

(TO)



HIAF founders Profs. Keith Fifield, Nanda Dasgupta and David Hinde

This period also saw an industry partnership towards biomaterials technology for medical applications in infectious disease and liver cancer. A new industry sponsored Chair was established by one of Australia's largest biomedical companies, Sirtex. Professor Ross Stephens who leads the biomedical research team at the Department of Applied Mathematics was appointed as the Sirtex Chair.



Professor Ross Stephens

Our perpetual endowments established at the School grew from four in 2010 to ten in 2013 due to the generous support of donors. This includes the Oliphant Endowment Fund and nine named endowment funds (as listed below).

- Wanda Henry Endowment Fund
- John Carver Endowment Fund
- Dunbar Endowment Fund
- Ben Williams Endowment Fund
- Robert & Helen Crompton Endowment Fund
- Boswell Technologies Endowment Fund
- Jagadishwar Mahanty Endowment Fund

- Tom Rhymes Technical Development Endowment Fund
- Heavy Ion Accelerator Facility Advancement
 Endowment Fund

The following collection of highlights showcase the generosity of donors and the impact they have had on our community. The achievements and developments mentioned here focus on the initiatives and successes in 2013.

Industry Partnership towards cancer research

A new industry sponsored Chair is shifting the way we view cancer treatment. The sponsorship from Sirtex allows imaging to make sure that radiation treatment is localised at the right spot by creating new materials that incorporate imaging radioisotopes and discovering how to stick them onto the surface of spheres.

"Our collaboration with Sirtex has been fantastic. They have introduced us to so many people doing things that can really complement our work."

Physical Legacy

A generous bequest from one of the University's past Deputy Vice-Chancellors is bringing the best physics students to Canberra through the Dunbar Endowment Fund.

> " If I met the donor, I would thank them for the opportunities they have opened to me, as well as pledge to give my studies everything I can."



Robert Walker 2013 Dunbar Physics Honours Scholar

STAFF ACCOMPLISHMENTS

External Honours & Awards

Walter Boas Medal

Professor Chennupati Jagadish was awarded the 2013 Walter Boas Medal of the Australian Institute of Physics for promoting excellence in research in Physics in Australia.

Joseph F Keithley Award

Prof David McClelland, American Physical Society's Joseph F Keithley Award for Advances in Measurement Science.

Doctor technices honoris causa

Professor Wiesiek Krolikowski was awarded an Honorary Doctorate from the Technical University of Denmark. The doctor technices honoris causa is the highest honour the university offers.

Fulbright Postdoctoral Scholar

Dr Rose Ahlefeldt was awarded a Fulbright Postdoctoral Scholarship to focus on developing ultra low broadening rare-earth materials for quantum computing. In particular, she will study materials which may be applied to quantum computing, a method that uses the quantum properties of matter to perform some calculations much faster than a classical computer.

Internal Honours & Awards

25-year Service Award from the University.

Mr David Anderson was awarded a 25-year Service Award from the University.

Mr Graeme Blackburn was awarded a 25-year Service Award from the University.

Mr Paul Tant was awarded a 25-year Service Award from the University.

Professor David McClelland was awarded a 25-year Service Award from the University.

Mr Tibor Kibedi was awarded a 25-year Service Award from the University.



Prof Jagadish and Dr Rob Robinson presenting the Walter Boas Medal



Professor Krolikowski receiving the Honorary Doctorate from the President of the Technical University of Denmark, Professor Anders Bjarklev during the award ceremony on 3 May 2013 in Copenhagen.

University Award for advancing the reputation of the University through media

Professors Nanda Dasgupta and Ping Koy Lam were presented with the 'University Award for advancing the reputation of the University through media' at the ANU Strategic Communication and Public Affairs (SCAPA) Annual Awards.

40-year Service Award

Emeritus Professor John Love was awarded a 40-year Service Award from the University.

John has been a champion of philanthropy supporting the Wanda Henry Scholarship in Photonics and Third Year Physics Prize endowment funds at the School. Recently, John donated \$1 million dollars to the ANU community, which has been his de-facto family for the past 40 years to fund a new scholarship to help students who most need financial support.

Excellence in Education Award

Dr Nick Robins, Dr John Debs and the Foundations of Physics Team were awarded the Colleges of Science Excellence in Education Award.

2013 Promotions

Level B

Dr Maurits Evers, Nuclear Physics Dr Bianca Haberl, Electronic Materials Engineering Dr Taehyun Kim, Electronic Materials Engineering Dr Patrick Parkinson, Electronic Materials Engineering Dr Matias Rodriguez, Electronic Materials Engineering Dr Yan Sheng, Laser Physics Centre Dr Isabelle Straude, Nonlinear Physics Centre

Level C

Dr Andrey Miroshnichenko, Nonlinear Physics Centre David Ridout, Theoretical Physics

Level D

Dr Jodie Bradby, Electronic Materials Engineering Dr Lan Fu, Electronic Materials Engineering Dr Patrick Kluth, Electronic Materials Engineering Dr Adrian Sheppard, Applied Mathematics Dr James Sullivan, Atomic and Molecular Physics Laboratory

Level E

Dr Daniel Shaddock, Department of Quantum Science Dr Hark Hoe Tan, Electronic Materials Engineering



Professor John Love



Drs Nick Robins and John Debs

HIAF Endowment Career Development Award

Dr Peter Linardakis was awarded the 2013 HIAF Endowment Career Development Award



Dr Peter Lindardakis



Professors Stephen Buckman and Andrew Roberts

30-year pin

Professor Stephen Buckman received a commemorative clock in celebration of his 30 years of service to the School. The clock was presented by the Dean, Professor Andrew Roberts on Founder's Day.

Director's Awards

Miro Peric

For engineering excellence and outstanding contribution to the Research School of Physics and Engineering Mechanical Workshop

SCU team

For their excellent and prompt service and advice on computing and web-based matters

Andrew Papworth

For excellence in providing educational opportunities to high school students and the greater community through outreach

Kathleen Hicks

For her enthusiasm, positive energy, professionalism and outstanding support to the research activities of the School

Alan Cooper

For exceptional innovations in particle accelerators and amazing support to the School succession initiatives



Andrew Papworth, Yuri Kivshar for Kathy Hicks, Alan Cooper, Julia Wee, Miro Peric, Stephen Buckman and James Irwin representing the School Computer Unit.

STAFF OUTREACH ACTIVITIES

National Youth Science Forum

Quantum Science, Plasma Research Lab and Nuclear Physics ran six sessions for the National Youth Science Forum and presented a mix of "hands on" experiments and laboratory demonstrations; with a visit to the Gravitational Wave research facilities. The students came from a wide range of backgrounds throughout Australia and for us it was an opportunity to discuss the Physics being taught In the various States and Schools.

PRL organisied tours and visits with the National Youth Science Forum, local high schools, national and international undergraduate and graduate students, and other interested parties.

ACT Science Experience

Dr Gregory Lane was the Local Director for the ACT Science Experience, a 3 day program of scientific talks and visits attended by year 9 and 10 students hailing from schools across the ACT and country NSW. The 2013 program was held from 2nd to 4th of October, based at the ANU and Geoscience Australia.

Canberra Family Science

CSIRO: We worked with the CSIRO Education Centre to promote photonics and provide a series of hands on activities for visitors to the Canberra Family Science spectacular over a weekend in August. This event was very well attended as part of Science Week and attracted several thousand visitors.

Like us? RSPE Facebook and Twitter

A/Prof Jodie Bradby launched the RSPE Facebook and Twitter accounts.

Man Meets Ancestor

A life-sized reconstruction of a Devonian fish meets one of his discoverers, Dr Gavin Young. The model was constructed for the Canberra museum exhibition jointly curated by RSES and RSPE in 2012-2013 and published in *PLoS One* in 2013.



Gavin Young (RSES) and a life sized model of Edenopteron kiethcrooki.



Left to right: Nick Stranks (Master Founder, School of Art), Ante Dabro (Sculptor), Tim Senden (HoD), Barry Ninham (Dept Founding HoD), Steve Buckman (Director).

Barry or Bust

A larger-than-life reconstruction of founding Head, Professor Barry Ninham. A celebration of Barry's continuing contribution to the ethos of the Department Prominent artist, Ante Debro, donated his skills to render Barry's character as an enduring reminder of Barry's life principle, "If you get the basics right, the rest will follow".

Nuclear Physics Experiments for School and Community Groups

Dr Gregory Lane and Prof Andrew Stuchbery, with help from Dr Matthew Reed and Dr Sankha Hota, hosted almost 20 different visiting groups (mostly high school students and teachers) for tours of the 14UD accelerator that included hands-on experiments looking at natural and artificial radioactivity. Dr Gregory Lane also provided hands-on activities for visitors to

School visits

About 20 different school groups were accommodated through the year with the emphasis on experimental work. Burgmann College spent a whole day with us and were able to complete a number of sophisticated experiments. School visits are a great way to engage the community, potential students and to be a good corporate citizen. Visits to the ANU in the wider Physics area were also very popular.

Physics Project Market Day

Questacon on Marie Curie's birthday.

August saw the introduction of the first Physics Project Market Day for students to attend and discuss physics projects with supervisors. Associate Profs Jodie Bradby, James Sullivan, Patrick Kluth and Cormac Corr ran a very successful day.

60

Scientists in Schools

A/Prof Jodie Bradby was involved in the Scientists in Schools program with Curtin Primary.

Work Experience Students

PEC was host for 10 work experience students through the year and our efforts are much appreciated by the schools an students.

The PEC laboratory experience for students and demonstrators was again successful this year and was augmented by further hands on experiments left around the building as part of the Corridor Physics initiative.

Science Teachers Conference

Dr Steve Tims gave an invited presentation titled "Earth and Environmental Science enlightenment via radioactive atoms" to the Science Teachers Association of New South Wales as part of their Earth and Senior Science Teachers Conference, in Sydney, on Mon 13th May 2013.

Public Lectures

Peter Riggs gave a public lecture on the physics of time travel and its implications. It was presented in the Manning Clark Centre, ANU on 28 August 2013.

Professor Hans Bachor gave a public lecture series: *Physics for our Future - the AIP turns 50* ANU / Questacon H.Bachor / P.Healan given 2013 /14 in Perth, Adelaide, Melbourne and Canberra.

SP3 co-hosted the AIAA public lecture by NASA Astronaut Dr Greg Chamitoff in Canberra on July 25, 2013.

Professor Hans Bachor gave a public lecture series: Lasers can do anything. ANU / Questacon H.Bachor / P.Healan given in 2013 /14 Perth, Wollongong, Melbourne Brisbane, Canberra

ANU Secondary College

2014 was our most successful year with their teachers and the students totally engaged with the program. In addition to the resources needed to run the program we provided visual demonstrations each week for the students. The program was very successful in introducing students to the campus; and especially "Subway"

Radio Interview

Peter Riggs gave an interview on the topic of time travel on the *Drive* program, ABC Radio 666 (Canberra) on 25 November 2013.

Conferences

SP3 organised the 21st International Symposium on Plasma Chemistry (August 4-9, 300 attendees) and associated Summer School (30 participants) in Cairns co-chaired by Prof. Rod Boswell and Dr Tony Murphy. Prof. Charles was a local committee member.

SP3 organised the Electron Beam workshop in Thredbo (May 30-June 3 with 20 participants) chaired by Prof. Rod Boswell. Prof. Charles was a local committee member. The full program and uploaded presentations can be found at the workshop website (http://physics.anu.edu.au/prl/sp3/events/BPM2013/).

Higher Education Whisperer Review

On 29 August 2013, the website *Higher Education Whisperer* (an on-line review of vocational and university course design, learning, teaching and research) published a short, complimentary appraisal of the 2013 public lecture on time travel.

ANU News Article

An article dealing with Peter Riggs research into the nature of time entitled: 'Dr Who at ANU?', was published in *ANU News* on 23 November 2013.

FELLOWSHIPS OF LEARNED SOCIETIES

The Acoustical Society of America

Emeritus Professor Neville Fletcher (since 1975)*

American Association for Advancement of Science

Professor Chennupati Jagadish (since 2007)

American Physical Society

Professor Ken Baldwin (since 2008) Professor Rod Boswell (since 1998) Professor Peter Bouwknegt (since 2000) Professor Stephen Buckman (since 1998) Professor Christine Charles (since 2013) Emeritus Professor Robert Crompton (since 1995)* Professor Mukunda Das (since 2003)* Professor Robert Dewar (since 1980) Emeritus Professor George Dracoulis (since 1993)* 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) Adjunct Professor Robert Robson (since 1994) Emeritus Professor Erich Weigold (since 1990)* Professor Jim Williams (since 2006)

* Retired

American Vacuum Society

Professor Chennupati Jagadish (since 2008)

Asia-Pacific Academy of Materials

Professor Chennupati Jagadish (since 2013)

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 (since 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)

FELLOWSHIPS OF LEARNED SOCIETIES

Institute of Physics (UK)

Professor Hans Bachor (since 1999) Professor Ken Baldwin (since 2006) Professor Murray Batchelor (since 2005) Professor Stephen Buckman (since 2004) Professor Mukunda Das (1998) Professor Rob Elliman (since 2003) Emeritus Professor Neville Fletcher (since 1961) Professor David J. Hinde (since 2005) Professor John Howard (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)

International Society on Plasma Chemistry

Professor Rod Boswell (from 2013)

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) Professor Chennupati Jagadish (since 2010)

Optical Society of America

Professor Nail Akhmediev (since 1996) Professor Hans Bachor (since 2009) Professor Ken Baldwin (since 2000) Professor Chennupati Jagadish (since 2005)

Royal Meteorological Society

Adjunct Professor Robert Robson (since 1977)

Royal Society of New Zealand

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

The World Academy of Sciences

Professor Chennupati Jagadish (since 2013)

Professor Yuri Kivshar (since 2001) Professor Wieslaw Krolikowski (since 2007) Professor Brenton Lewis (since 2003)* Professor Barry Luther-Davies (since 2006)

Australian Academy of Technological Sciences and Engineering

Professor Rod Boswell (since 1999) Emeritus Professor Neville Fletcher (since 1987)* Professor Chennupati Jagadish (since 2002) Professor Mark Knackstedt (since 2011) Professor Barry Luther-Davies (since 2005) Emeritus Professor Erich Weigold (since 1996)* Professor Jim Williams (since 1992)

The Australian Acoustical Society

Emeritus Professor Neville Fletcher (since 1980)

Australian Institute of Physics

Professor Hans Bachor (since 1987) Professor Ken Baldwin (since 1995) Professor Murray Batchelor (since 1993) Professor Vladimir Bazhanov (since 2006) Professor Stephen Buckman (since 1992) Professor Mukunda Das (1991) Professor Mahananda Dasgupta (since 2004) Emeritus Professor George D. Dracoulis (since 1990)* Professor Rob Elliman (since 1994) Professor L. Keith Fifield (since 1997) Emeritus Professor Neville Fletcher (since 1960)* Professor David J. Hinde (since 1996) Professor Chennupati Jagadish (since 1993) 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) Professor Jim Williams (since 1988)

Australian Mathematical Society

Professor Murray Batchelor (since 2001) Professor Vladimir Bazhanov (since 2006)

Professor Peter Bouwknegt (since 2001)

Electrochemical Society

Professor Chennupati Jagadish (since 2006)

European Academy of Sciences

Professor Susan Scott (since 2002)

Higher Education Academy

Professor John Close (Senior Fellow since 2014) A/Prof Paul Francis (Senior Fellow since 2014) Dr Joe Hope (Senior Fellow since 2014) Professor Craig Savage (Senior Fellow since 2013)

Institute of Electrical and Electronics Engineers

Professor Chennupati Jagadish (since 2002)