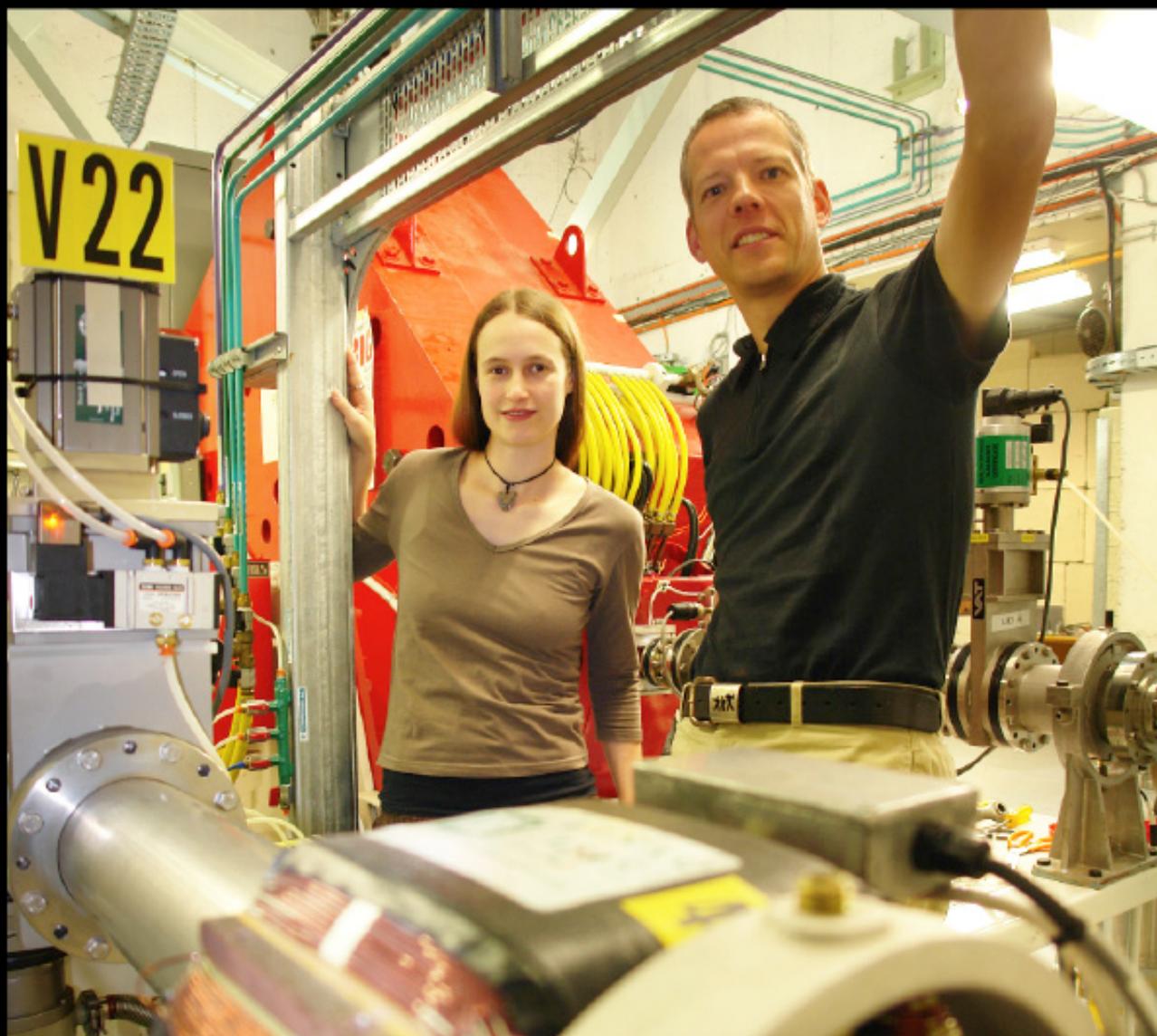


RESEARCH SCHOOL  
OF PHYSICAL SCIENCES  
& ENGINEERING



ANNUAL REPORT 2008

ANU COLLEGE OF SCIENCE

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## DIRECTOR'S REPORT



*Professor Jim Williams*

The Research School of Physical Sciences and Engineering (RSPSE) represents Australia's largest university based research and teaching activity in the physics discipline. The School is home to a number of major national facilities such as Australia's largest Heavy Ion Accelerator, the National Stellarator Facility and the nanofabrication and materials characterisation facilities that contribute to NCRIS. Over 130 academics, as well as technical staff, administrative staff and students form the School's greatest asset, its people. The School's research programs most often involve a critical mass of researchers and research infrastructure that allow significant interdisciplinary research challenges to be addressed. A testament to the School's National research leadership is its involvement in three Australian Research Council Centres of Excellence, one Cooperative Research Centre and its hosting of three Australian Research Networks.

The underlying thrust of the School's research is of fundamental importance but most programs cover the entire spectrum from fundamental to pre-commercial, with substantial interaction with spin-off companies and industry. Broad research themes and programs cover quantum science and technology, advanced materials science and technology and energy and the environment.

In 2008 RSPSE continued to serve both a national and international role as Australia's foremost physical sciences research establishment through its outstanding research achievements in areas that remain appropriately aligned to national and international priorities. Outstanding research achievements during 2008 have covered a broad range of interdisciplinary areas including:

- quantum information science, progress in understanding nuclear and atomic quantum decoherence, quantum atom optics, quantum noise, Bose-Einstein condensation and atomic and molecular interactions with electrons and positrons;
- novel materials, nanoscience, optoelectronics and devices covering development and understanding of photonic crystals, metamaterials, nanowires and new semiconductor and optical materials, as well as world record optoelectronic device performance in compound semiconductors and chalcogenide glasses;
- energy and environmental science that includes new methods to assist efficient fossil fuel exploration, novel fuel cells, compound semiconductor photovoltaics, leading Australian fusion research and involvement with ITER, plasma thrusters for efficient space travel, innovative methods for carbon sequestration, the ozone layer and contributions to the nuclear energy debate; and
- significant contributions to biomedical research involving radioactive nanoparticles attaching to specific parts in the body, interactions of positrons with biomaterials and tissue, use of nanoscience, optics, lasers and plasmas in medical research.

Other key activities during 2008 have included the:

- merger of the Research School of Physical Sciences and Engineering (RSPSE) and the Department of Physics forming the Research School of Physics and Engineering (RSPE) in order to enhance research-led education of students;

- identification of three large scale thematic strategic directions in the areas of: Energy, Advanced Materials and Quantum Science that build on research strengths and national leadership;
- maintenance of excellence in education and training standards in order to ensure quality educational experience for all students and an increase in the number of PhD students compared with 2007; a high level of PhB participation and a record level of honour students;
- establishment of Digicore Laboratories, a new spin-off company to service the analytical requirements of the Oil and Gas industries, as well as providing the research support for three further spin-offs from the School;
- launching of an Oliphant Fellowship program to recruit outstanding young scientists and engineers to the School with Michal Matuszewski as the first awardee;
- appointment of an experienced consultant to create a Development Plan for the School to provide a template for strategic planning and securing of adequate resources from government, industry, foundations and endowments;
- meeting with the Minister for Innovation, Industry, Science and Research, the Honourable Kim Carr and his advisor to discuss long term strategic investment in facilities of wider significance to the ANU and of national importance;
- implementation and restructure of funding arrangements to take advantage of recent success in competitive awards and achieving long-term budgetary sustainability, encouraging areas within the School to offset centrally funded staff costs against external income, providing specific targets to assist in this process and continuing a strong performance in securing external funding (around \$25m in 2008);
- leading of a cross-campus effort to coordinate energy research at the University which is now one of three key platforms of the ANU Climate Change Institute;
- undertaking of a review of School Services to develop a sustainability plan for the future; and
- agreement on academic exchanges between RSPSE with a number of institutions such as the University of Delhi and the Tianjin University.

#### *Awards & Academic Promotions*

- Dr Anna Wilson - Award for Teaching Excellence from the Australian Learning and Teaching Council
- Dr Christine Charles - Award of Lectureship from the Australian Institute of Physics Women in Physics
- Ms Maryla Krolikowska - Vice-Chancellor's Award for Career Achievement
- Mr Ken Staples - Vice-Chancellor's Award for Career Achievement
- Ms Laura Walmsley - Vice-Chancellor's Award for Career Achievement
- Promoted to Level E - Professors John Close and Michael Shats
- Promoted to Level C - Drs Duk Yong Choi, Anton Desyatnikov, Xi-Wen Guan, Patrick Kluth, Thomas Symul and Stephen Tims
- Promoted to Level B - Almarnun Ashrafi, Wen Lei, Quing Li, David Powell

### *Leadership & Honours*

- Professor Kenneth Baldwin – President, Federation of Australian Scientific and Technological Societies
- Professor Kenneth Baldwin – Fellow, American Physical Society
- Professor Roderick Boswell – Fellow, Australian Academy of Science
- Professor Robert Dewar – Network Convenor, Australian Research Council Complex Open Systems Research Network (COSNet)
- Professor Chennupati Jagadish – Network Convenor, Australian Research Council Nanotechnology Network (ARCNN)
- Professor Chennupati Jagadish – Fellow, American Vacuum Society
- Professor John Love – Honorary Life Member, Australian Optical Society
- Professor Jim Williams – Network Convenor, Australian Research Network for Advanced Materials (ARNAM)
- Professor Jim Williams – Fellow, Materials Research Society USA

### *External Collaborations*

- published works with external authors – 68% (312 of 460) , see PUBLICATIONS appendices;
- research grants with external investigators – 43% (65 of 150), see GRANTS appendices; and
- visiting researchers – 50 visitors joined the School for three months or more during 2008 as a Visiting Fellow to undergo research with our staff, see DEPARTMENTS appendices.

### *Conferences & Workshops*

- 12<sup>th</sup> Gaseous Electronics Meeting, Batemans Bay, 3-6 February
- Australian Research Council Centre of Excellence for Antimatter-Matter Studies Workshop, Batemans Bay, 6-8 February
- Early Career Researcher and Postgraduate Student Symposium, Melbourne, 23-24 February
- International Conference on Nanoscience & Nanotechnology, Melbourne, 25-29 February
- International Commission for Optics, Sydney, 7-10 July
- International Conference on Electronic Materials, Sydney, 28 July-1 August
- 8<sup>th</sup> Annual Workshop in Nuclear Techniques, Canberra, 29 September-2 October
- School Founder's Day, Canberra, 17 October
- Siemens Science Experience, Canberra, 9-10 October
- The 8<sup>th</sup> Asian International Seminar on Atomic and Molecular Physics, Perth, 24-28 November

- Australian Research Council Centre of Excellence for Quantum-Atom Optics, Lorne, 26-28 November
- Australian Research Council Centre of Excellence for Antimatter-Matter Studies Workshop, Perth, 20-21 November
- 22<sup>nd</sup> Canberra International Physics Summer School on Complex Physical, Biophysical and Econophysical Systems, Canberra, 8-19 December
- Australia Japan Nanophotonics Workshop, 9-10 December