Research School of Physical Sciences & Engineering

Introduction

In 2005, the School's research and external funding achievements have been outstanding. External funding now accounts for more than 60% of the School's total income. The School is the major contributor to physical sciences research in the country and continues to set the benchmark in this area. Indeed, our strong focus on fundamental research has not only led to substantial competitive funding, but has spawned some very significant applied research that has led to commercialisation. A decided strength of the School continues to be its balance between fundamental, strategic and applied research and the exceptional expertise and resources it has harnessed across this spectrum.

The major single source of external funding into the School is the Australian Research Council, where more than $13.5 million has been derived from all ARC schemes in 2005 alone. RSPhysSE holds more than 80 active ARC Discovery Projects and more than 105 grants from the ARC in total. Included in the above total were the award of 23 new Discovery or Linkage projects in 2005, one Centre of Excellence in Matter-Antimatter Studies, five LIEF grants, and several Linkage Fellowship awards. Several staff of the School were recognised for the excellence of their research or their service to their profession in 2005. Professor C. Jagadish and Professor Stephen Hyde were elected to the Australian Academy of Science and Professor Barry Luther-Davies to the Australian Academy of Technological Sciences and Engineering. Professor George Dracoulis was awarded the 2005 Boas Medal and Professor Jagadish was elected as a Fellow of the Optical Society of America. Professor Anatoli Kheifets was elected to the Fellowship of the American Physical Society and Professor Murray Batchelor and Dr John Howard as Fellows of the Institute of Physics (UK). Our students continued to win gold medals and prizes for oral and poster presentations at international conferences. In addition to those staff and student award winners, all School staff and students have contributed to a very successful 2005. The School's general staff, including our very talented technical staff, are acknowledged for their invaluable contributions to the School's research.

The training of research students continues to be a high priority for the School and in 2005 around $1.75 million was invested directly into scholarships, recruitment, tuition and support of higher degree research (HDR) students, including awards. In 2005 there were 94 enrolled HDR students but also a similar number of students from other Australian universities and from overseas who accessed unique facilities, expertise and programs in the School. There were also more than 50 undergraduate students (honours, PhB and final year project students) who undertook research projects in RSPhysSE. The School also hosted a third very successful National Physics Competition in December for the top undergraduate physics students from across Australia and New Zealand. This is now a premier national event and receives considerable commercial and government sponsorship. In 2005, the School stepped up its commercialisation efforts with the launch of a third spin-off company, WRiota P/L. The technology transferred to WRiota involves an innovative phase change (silicon-based) high density memory device. Overall, the School continued to exploit the commercial potential of much of its applied

research. Industry interactions, research contracts from the private sector and income through the School's spin off companies contributed more than $6 million in external funds to the School in 2005. In addition, the School has now more than 25 joint grants with industry from sources such as ARC Linkage, ACT Government Knowledge Fund, DITR/Innovation Access and AusIndustry schemes, as well as direct industry contracts. It is hoped that such interactions will lead to further avenues for commercialisation of the School's research in the future.

The refurbishment of the School's fifty-year old buildings continued apace during 2005, with the completion of refurbishment of the west wing of the Cockcroft Building and a start to the refurbishment of the Le Couteur Building. In the case of the Le Couteur Building, around 2000 sq metres of new space will be obtained for the growing staff and student numbers in the School. This will be achieved by the closure of the School library and the building of a two storey link between Le Couteur and the Oliphant Buildings. The new link building will include space for a student common room. There was also agreement to develop a conceptual design for a nanofabrication facility called PicoFab on land adjacent to the university in the ANU Exchange Precinct. If constructed, this new Facility will go a long way to alleviating a critical need for new laboratory space in the School by allowing the School's extensive nanofabrication facilities to be relocated into the new Facility.

The School continued to play a leadership role in shaping the research agenda nationally. Examples in 2005 are the initiative in bringing together the advanced materials, nanotechnology and nanofabrication communities from across the country to lobby for substantial research infrastructure investment in these fields under the National Collaborative Research Infrastructure Scheme (NCRIS), and the lobbying for a significant Australian role in the International Thermonuclear Experimental Reactor project, which has stimulated significant national debate on energy. In terms of collaboration across campus, there was the opening of the cross-campus Mathematical Physics initiative which brings together mathematicians and physicists to strengthen both the educational and research efforts in this important area. In addition, several research highlights achieved international acclaim during 2005. For example, some achievements in areas that cover the spectrum from fundamental to applied research are: new approaches to the slowing and stopping of light in solids that were reported by the Chinese Academy of Science as one of the 10 most significant scientific achievements of the past five years; the discovery of a new form of carbon nanofoam that exhibits some intriguing magnetic properties, a finding that was reported as one of the top three highlights at the 2005 American Physical Society March Meeting; fabrication of semiconductor nanowires that can be used as templates for novel nanowire devices; using a plasma stream to provide the thrust for a new type of space propulsion; and using physics to predict trends in financial markets in the new field of econophysics. All of these and other research highlights are outlined in this annual report.