Research School of Physical Sciences & Engineering

Annual Report 2003

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Professor Jim Williams - Director

Director's Report

In 2003, the School continued to make substantial contributions to Australia's research and research training activities across many areas of the physical sciences and engineering, with specific programs providing a balance between fundamental, strategic and applied research. In addition to the strong emphasis on front line fundamental research and the advancement of knowledge, the School also very actively focuses on the commercialisation of its research results where applicable.

The School's success with external funding in 2003 substantially exceeded expectations. This outcome will result in around 55% of the School's budget for 2004 coming from external sources. A major success has been from the range of Australian Research Council funding schemes, with more than $9 million derived from such sources for 2004 alone. For example, in the 2003 Discovery Project round, for funding from 2004 onwards, RSPhysSE was again extremely successful, winning nearly $6.5M in funding, some involving other parts of the ANU. The School now holds 67 active ARC Discovery Projects and more than 90 grants from the ARC in total. Included in the above total were the award of four Linkage Projects, three major Linkage Infrastructure (LIEF) grants totalling $1.5 million, partnership in a third Centre of Excellence in Functional Nanomaterials and several Linkage Fellowship awards. The ARC success has resulted in a large influx of early career researchers into the School. Indeed, by early 2004, the School will have in excess of 130 academic staff, more than half being early career researchers. The major non-ARC competitive grant success in 2003 was the award of $2.7 million from AusIndustry for the establishment of the Australian Materials Technology Network (AMTN), in which ANU was the lead institution. AMTN has research and industry association partners in almost all states and territories and its mission is to substantially enhance the connection between Australian industry and the country's world-leading materials research.

Several staff of the RSPhysSE were recognised for the excellence of their research and/or research support in 2003. Professor Barry Luther-Davies was awarded a Federation Fellowship by the ARC and Professor Jim Williams was elected as a Fellow of the Australian Academy of Science. Some other noteworthy honours include the award of the Lyle Medal in 2003 to Professor George Dracoulis, Centenary Medals awarded to 14 School staff, two Fellowships of the American Physical Society and Michael Aggett was awarded the 2003 Council Medal for General Staff Excellence. In addition, the previous Director of the School, Professor Erich Weigold, has been appointed as Executive Director of the ARC's Physical, Chemical and Geosciences Panel.

The School has continued to play a leading role in the National Institute of Physical Sciences and is heavily involved with three other National Institutes. Indeed, Science ANU, that brings together the five science-health-engineering National Institutes, was largely an initiative of this School. Science ANU already plays a prominent role in promoting science and engineering both within and external to the University and continues to support a range of flagship outreach programs such as the National Youth Science Forum, the Science Olympiads, The Science Circus, the Australian Science Festival and Adopt a Physicist programs. In 2003, the School also hosted the very successful first National Physics Competition for the top undergraduate physics students from across Australia and New Zealand.

The School places particular emphasis on training of research students, not only those enrolled through the School but students from across the country and internationally.

For example, in addition to the School's higher degree research students in 2003 (around 70) there were more than 40 visiting national students and a similar number of international students who undertook much of their higher degree research in the School. There were also around 45 undergraduate students (honours, PhB and final year project students) who undertook research projects in the School. It is also noteworthy that almost all of our PhD students have the opportunity to present their research at overseas conferences or conduct some of their research at overseas laboratories as part of their research program. Many of these students are involved with the more than 200 (national and international) collaborative research programs that are active in the School.

During 2003, the School continued to put in place mechanisms and procedures to assist in exploiting our intellectual property through commercialisation. The co-location of Mr Tony Cooke from Anutech in the School has greatly assisted in identifying opportunities for industry interaction and commercialisation. The School is currently involved with three 'spin off' companies and a further company is very likely to be set up in 2004 to further the commercialisation of an innovative silicon-based high density memory device. In addition, the School has taken great strides in building interactions with industry by attracting them to partner with us in grant applications, for example, ARC Linkage, ACT Government Knowledge Fund and DITR/Innovation Access and AusIndustry schemes. It is hoped that such interactions will lead to larger joint ventures in the future, as well as opening up new commercialisation opportunities.

The major program to refurbish the School's fifty-year old buildings continued apace during 2003. A new building, to be called the Erich Weigold Building, to replace the Roundhouse and other temporary buildings is complete and will be opened around mid-2004. This will enable the Atomic and Molecular Physics Laboratories and part of the Plasma Research Laboratory to be rehoused in modern facilities meeting current safety standards. Redevelopment of the eastern half of the Cockcroft Building is now nearing completion and the refurbishment of the western half will begin early in 2004. Despite this major capitals works program, there is much still to be done to provide adequate buildings with appropriate safety and other facilities for our staff. Our external funding success has resulted in some extreme pressures on space for both laboratories and people in the School.

In terms of research highlights, there have been many that have gained international acclaim during 2003. Three achievements worthy of mention here are: the first demonstration of a working two-qubit quantum logic gate using an optical technology with solid state impurity sites that is the forerunner of a quantum computer; the development of a plasma thruster that is attracting much interest from the European Space Agency; and synthesis of novel materials that casts doubt on the validity of nanofossils and Martian life. A paper on the last topic has recently appeared in the journal *Science*. These and other research highlights are outlined in this annual report. Overall, the research profile of the School has never been stronger and we look forward to the future with much expectation and excitement.

The newly completed Erich Weigold Building