RESEARCH SCHOOL OF PHYSICAL SCIENCES & ENGINEERING

THE AUSTRALIAN NATIONAL UNIVERSITY

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Research School of Physical Sciences & Engineering

Annual Report 2004

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Research School of Physical Sciences & Engineering 2004

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Contents

Professor Jim Williams - Director

Director's Report

In 2004, despite budget pressures and considerable change brought about by the fact that the majority of the School's budget was from external sources for the first time, the School's research achievements were outstanding. The School continued to make substantial contributions to Australia's research and research training activities across many areas of the physical sciences and engineering. Indeed, our strong focus on fundamental research has not only led to substantial funding, from various Australian Research Council (ARC) programs, but has spawned some very significant applied research that has led to commercialisation. A decided strength of the School is its balance between fundamental, strategic and applied research and the expertise and resources it has harnessed across this spectrum.

In 2004, the ANU subjected itself to an extensive review of its research in which a body of outputs (publications, etc) from almost all researchers were assessed by a panel of international experts in each discipline and sub-discipline area. The outcome of this review for the School was outstanding, with our research topping the ANU on almost all scorecards. For example, around 85% of the School's submitted publications (560 in number) were considered to be in the top 25% internationally and many of our research activities were assessed as the leading effort internationally. In addition, the School's external funding in 2004 continued to grow faster than expected, with around 55% of the School's budget for 2004 coming from external income. A major success has been from the range of Australian Research Council funding schemes, with more than $11.5 million derived from such sources for 2004 alone. For example, by the end of 2004, RSPhysSE held more than 75 active ARC Discovery Projects and more than 100 grants from the ARC in total. Included in the above total were the award of 24 Discovery or Linkage projects in 2004, 2 internal ARC LIEF grants, 3 ARC Research Networks in the areas of Advanced Materials, Complex Systems and Nanotechnology and several Linkage Fellowship awards.

Several staff of the RSPhysSE were recognised for the excellence of their research or their service to their profession in 2004. Professors C. Jagadish and Stephen Hyde were awarded prestigious Federation Fellowships by the ARC, bringing to four the number of such awards in the School. Dr Ken Baldwin won the 2004 Eureka Prize for Promoting Understanding of Science and Professor Jagadish and Dr Das were elected as Fellows of the American Physical Society. 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 2004. 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 is a high priority for the School and in 2004 around $1.6 million was invested directly into scholarships, recruitment, tuition and support of higher degree research (HDR) students. In 2004 there were 81 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 around 50 undergraduate students (honours, PhB and final year project students) who undertook research projects in RSPhysSE. The School enhanced its efforts on student recruitment in 2004 with the appointment of a student development officer and this has had immediate results, with an increase of about 10% in HDR student numbers. The School also hosted a second very successful National Physics Competition in December for the top undergraduate physics students from across Australia and New Zealand. This is now acknowledged as a premier national event and receives considerable commercial and government sponsorship.

In 2004, the School continued to exploit its applied research through commercialisation. Industry interactions, research contracts from the private sector and income through the School's spin off companies contributed more than $5 million in external funds to the School in 2004. A new spin off company was established with external investment at the end of 2004 to commercialise IP related to an innovative silicon-based high density memory device. This new company is called WRiota P/L. In addition, the School has now more than 20 joint grants with industry from sources such as ARC Linkage, ACT Government Knowledge Fund and DITR/ Innovation Access and AusIndustry schemes. It is hoped that such interactions will lead to new spin off company opportunities and other avenues for commercialisation of the School's research in the future.

The refurbishment of the School's fifty-year old buildings continued apace during 2004. The new Erich Weigold Building was officially opened in July and the refurbishment of the entire Cockcroft Building was essentially complete by year's end. This completes refurbishment of about 55% of the School over the past decade. The next stage, subject to funding, will be the Le Couteur Building, where we would hope to gain additional space for the growing staff and student numbers in the School from a partial or complete closure of the Physical Sciences Library. New laboratory space is already a growing issue and late in 2004 there was considerable support for consolidating much of the School's photonic devices facilities into a purpose-built building called PicoFab in the City West zone adjacent to the ANU. If this goes ahead over the next two years it will help solve laboratory space issues for the foreseeable future.

In terms of research highlights, there have been many that have gained international acclaim during 2004. For example, some achievements in areas that cover the spectrum from fundamental to applied are: world records for stopping light in solids, development of a string theory that pulls together the fundamental forces of nature, fabrication of photonic crystals by drilling nanometer holes in chalcogenide glasses, development of novel quantum dot lasers, using a heavy ion accelerator to study climate change and using plasma diagnostics to measure temperature and material profiles in steel manufacture. The string theory example is taken from the area of mathematical physics which was a new cross-campus initiative in 2004. All of these and other research highlights are outlined in this annual report.