

## National and International Links



Professor Jim Williams  
Director RSPHysSE

The School continues to have a strong focus on external interactions that cover national and international collaboration, securing funding support for its programs from external sources, encouraging staff to play leading roles in professional societies, activities and outreach programs and in exploring opportunities for commercialising its research. This section summarises such activities in 2002.

Domestic and international collaborations continue to be a major ingredient in the success of all of the major School research programs. We had approximately 215 collaborative projects in 2002 that have either resulted in joint publications or have attracted external funding support. We also report many national and international Collaborative Agreements or Memoranda of Understanding. Such collaborations have brought a large number of visitors to the School. For example, in excess of 100 of these visitors have either presented departmental seminars or have participated in joint research projects. Another important collaborative function for the School is the support of major national experimental facilities that would not otherwise be viable at regional universities. These facilities include the H-1 National Plasma Fusion Research Facility in the Plasma Physics Laboratory and the Heavy Ion Accelerator Facility in the Department of Nuclear Physics. Together with major suites of laboratories supporting semiconductor optoelectronic device and photonic components programs, such facilities provide a focus for students and researchers (from ANU and other institutions) to participate in large-scale physics research. The School's research centres are also a focus for collaboration and we report the activities of the Australian Photonics Cooperative Research Centre, the Cooperative Research Centre for Functional Communication Surfaces, the Centre for Complex Systems and the Centre for the Mind in this section.

The School has placed an increasing emphasis on attracting external funding in recent years, particularly with progressive entry into the Australian Research Council (ARC) programs and the National Competitive Grants Scheme. In terms of overall external income, the School was the recipient of more than 130 R&D grants (from various government and non-government sources) or industry contracts, amounting to in excess of \$8 million in 2002. The range of industrial funding support covered direct project funding and service contracts by industry, support of PhD students and postdoctoral fellows, funding for equipment and facilities in lieu of industry access, partners in government grants and centre funding. Interactions with industry not only bring income into the School but are important precursors to commercialisation of the School's intellectual property. Some of the commercialisation ventures pursued by the School in 2002 are outlined in this section.

Strong involvement in professional societies, demonstrating international leadership in the profession and outreach activities are also important School priorities. It is noteworthy that academic staff of the School serve on the editorial boards of over 30 domestic and international journals, a similar number of international advisory committees, have organised (and chaired) seven international conferences/workshops and acted as international proposal reviewers for several organisations in 2002. Outreach activities include strong involvement with high schools, summer school programs, public lecture series and the Australian Science Festival.

# Collaborations, Agreements & Memoranda of Understanding



## Applied Mathematics

Dr C.H. Arns  
Project: Geostatistical Analysis of Tomographic Data  
Partner: Professor D. Stoyan, University of Freiberg, Germany

Professor S. Hyde, Dr M.A. Knackstedt, Dr V. Robins and Mr G. Schröder  
Project: Signatures of Spatial Morphology in Ordered and Disordered Media  
Partner: Dr K. Mecke, Max-Planck-Institut für Metallforschung, Germany

Dr M.A. Knackstedt  
Project: Correlating Microstructure to Elastic Properties of Porous Materials  
Partner: Dr E. Garboczi, National Institute of Standards and Technology, USA

Dr M.A. Knackstedt and Dr C.H. Arns  
Project: Integral Geometric Measures of Real Complex Media  
Partner: Dr K. Mecke, University of Stuttgart and Max-Planck-Institut für Metall-forschung, Germany

Dr M.A. Knackstedt, Dr T.J. Senden and Dr A. Sakellariou  
Project: Imaging, Visualising and Modelling Tissue Engineered Constructs  
Partners: Professor B. Milthorpe, University of New South Wales; Dr D. Huttmacher, National University of Singapore, Singapore

Project: Tomographic Imaging of Dental Materials  
Partners: Professor M. Swain, University of Sydney; Nicky Kilpatrick, Department of Dentistry, Royal Children's Hospital, Victoria

Dr M.A. Knackstedt, Dr A.P. Sheppard and Dr R.M. Sok  
Project: Characterisation of Porus Media  
Partner: Professor W.B. Lindquist, State University of New York at Stonybrook, USA

Dr M.A. Knackstedt, Dr A. Sakellariou, Dr T.J. Senden, Dr A.P. Sheppard, Dr R.M. Sok and Dr C.H. Arns  
Project: Interpretation of Laboratory Core Measurements  
Partners: Professor W.V. Pinczewski, University of New South Wales; Mr G. Bunn and Mr C. Smith, BHP Billiton

Dr V. Robins  
Project: Computational Topology for the Analysis of Scientific Data  
Partner: Dr E. Bradley, University of Colorado, USA

Dr T.J. Senden  
Project: Nanomechanics of Lipid Membranes  
Partner: Professor J.-M. di Meglio, Paris VII, France

Project: Novel Single Molecule Detection using Force Microscopy  
Partner: Dr J. Gooding, University of New South Wales

Dr T.J. Senden and Mr R. Roberts  
Project: Liquid Penetration into Paper Products and Coatings  
Partners: Dr M.B. Lyne, International Paper Pty Ltd, USA; Dr W. Schrof, BASF Ludwigshafen, Germany

Dr R.M. Sok and Dr A.P. Sheppard  
Project: Network Modelling of Multi-phase Flow in Porous Media  
Partners: Professor W.V. Pinczewski and Dr L. Paterson, Australian Petroleum CRC

Project: Pore-scale Network Models for Sedimentary Rock  
Partners: Professor W.V. Pinczewski, Australian Petroleum CRC; Professor W.B. Lindquist, State University of New York at Stonybrook, USA

## Atomic and Molecular Physics Laboratories

Professor S.J. Buckman  
Project: Low Energy Electron-molecule Scattering  
Partners: Dr M.J. Brunger and Professor P.J.O. Teubner, Flinders University

Project: Electron Scattering from Molecular Radicals  
Partners: Dr M.J. Brunger and Professor W. Lawrance, Flinders University

Project: Electron Scattering from Metal Vapours  
Partners: Professor P.D. Burrow, University of Nebraska, USA; Professor K. Bartschat, Drake University, USA

Project: Electron-molecule Scattering  
Partners: Professor H. Tanaka, Sophia University, Japan; Professor H. Cho, Chungnam National University, Korea

Project: Positron Scattering from Atoms and Molecules  
Partner: Professor C. Surko, University of California, USA

Professor S.J. Buckman and Professor L.T. Chadderton  
Project: Rainbows in Scattering of Electrons from Molecules  
Partner: Professor S.A. Cruz, Metropolitan Autonomous University, Mexico

Dr S.J. Cavanagh  
Project: (e,2e) Experiments on Water  
Partner: Professor B. Lohmann, Griffith University

Project: Threshold Double Photoionization from Water and Sulfur Dioxide  
Partners: Professor G.C. King, University of Manchester, UK; Professor P. Bolognesi, IMAI del CNR, Italy

Professor L.T. Chadderton  
Project: Atomic Force Microscopy of Fission Fragment Irradiated Quartz, Fullerite, Apatite and Natural Opal  
Partners: Professor G. Espinosa and Professor S.A. Cruz, Metropolitan Autonomous University, Mexico

Project: Phase Changes in Transition Metal Dichalcogenides due to GeV Heavy Ion, and MeV Fullerene Ion Bombardments: Transmission Electron Microscopy and Surface Force Microscopy  
Partner: Dr A. Dunlop, École Polytechnique, France

Project: Radiation Effects on Polymers and Semiconductors  
Partner: Dr D. Fink, Hahn-Meitner Institute, Germany

Project: (e,2e) Primary Current Electron Spectroscopy and other Surface Technical Investigations of the Graphite/Fullerene Radiation-Induced Phase Change  
Partner: Professor P.B. Möller, Niels Bohr Institute, Denmark

Project: GeV Ion Tracks in Alkali and Alkali Earth Halides  
Partner: Dr C. Trautmann, GSI, Germany

Project: Annealing of Fission Tracks in Apatite: Kinetics, Effects of Pressure and Applications in Geothermometry  
Partners: Dr R. Jonckere, University of Freiberg, Germany; Dr A. Wendt, British Antarctic Survey, UK

Professor L.T. Chadderton; Professor E. Gamaly (AM)  
Project: Studies of Plasma Effects, and Electronic and Nuclear Vicinage in the Stopping of Swift Clusters in Solids  
Partner: Professor S.A. Cruz, Metropolitan Autonomous University, Mexico

Project: Theory and Practice of Organic Radical Formation and Motion in GeV Ion-Irradiated Polymers  
Partner: Professor S.A. Cruz, Metropolitan Autonomous University, Mexico

Professor L.T. Chadderton; Dr S.Y. Kun (TP)  
Project: Studies of Ultrafast Coherent Dynamics of Localised Modes in Many-body Systems  
Partners: Professor W. Greiner, University of Frankfurt, Germany; Professor S. Haas, University of Strasbourg, France

Professor L.T. Chadderton; Dr A. Stewart (AM)  
Project: Radioactivity in the Fine Structure of Precious Opal; Exploration and Artificial Opal Synthesis  
Partners: Dr B. Senior, Senior and Associates, Canberra; Dr R. Jonckere, University of Freiberg, Germany

Dr A.S. Kheifets  
Project: Multiple Atomic Ionization  
Partners: Professor I. Bray, Murdoch University; Professor B. Joulakian, University of Metz, Germany; Professor R. Dörner, Frankfurt University, Germany; Professor Y. Azuma, Photon Factory, Tsukuba, Japan; Dr A. Dorn, Max-Planck Institute for Nuclear Physics, Germany

Professor B.R. Lewis  
Project: Rotational Distributions in Ozone Photolysis  
Partners: Professor R.J. Donovan, Dr H.A. Sheard *et al.*, University of Edinburgh, Scotland

Professor B.R. Lewis and Dr S.T. Gibson  
Project: Analysis of REMPI Spectra  
Partners: Professor M.L. Ginter, University of Maryland, USA; Dr J.S. Morrill, Naval Research Laboratory, USA; Dr R.A. Copeland, SRI International, USA

Project: Coupled-channel Calculations of Linewidths for the  $b$  state of  $N_2$   
Partners: Professor H. Lefebvre-Brion, Université de Paris-Sud, France; Professor J.-M. Robbe, Université de Lille, France

Project: Anomalous Isotopic Predissociation  
Partners: Professor G. Stark, Wellesley College, USA; Dr J.B. West, Daresbury Laboratory, UK

Project: Review of Molecular Oxygen  
Partners: Professor M.L. Ginter, University of Maryland, USA; Dr J.S. Morrill, Naval Research Laboratory, USA

Professor B.R. Lewis; Dr K.G.H. Baldwin (LPC)  
Project: XUV Laser Spectroscopy of Isotopic Nitrogen  
Partner: Professor W. Ubachs, Vrije Universiteit, The Netherlands

Professor B.R. Lewis and Dr M. Kono; Dr K.G.H. Baldwin (LPC)  
Project: Development of Ultra-high Resolution VUV Laser Sources  
Partner: Professor B.J. Orr, Macquarie University

Dr J.C.A. Lower  
Project: Collaborative Experiments on the Ionization of Laser-excited Atoms  
Partner: Dr A. Dorn, Max-Planck-Institute for Nuclear Physics, Germany

Project: Development of Particle Detector and Fast Data Collection Technologies  
Partner: Professor H. Schmidt-Böcking, University of Frankfurt, Germany

Professor R.P. McEachran  
Project: Electron Ionization of Rare Gases  
Partners: Mr M.A. Hayes and Professor B. Lohmann, Griffith University; Mr D.A. Biava and Professor D.H. Madison, University of Missouri-Rolla, USA; Professor C.T. Whelan, Old Dominion University, USA; Professor H.P. Saha, University of Central Florida, USA; Dr E. Engel and Professor R. Dreizler, University of Frankfurt, Germany

Project: Electron Excitation of Atoms  
Partners: Dr R. Srivastava, Roorke University, India; Professor A.D. Stauffer, York University, Canada

Project: Sherman Function for Krypton  
Partners: Mr M.R. Went, Professor B. Lohmann and Professor W.R. MacGillivray, Griffith University

Project: Positron Excitation of Argon  
Partner: Professor A.D. Stauffer, York University, Canada

Project: Positron Scattering from Xenon  
Partners: Dr L.A. Parcell, Macquarie University; Professor A.D. Stauffer, York University, Canada

Project: Positron Ionization of Atoms  
Partners: Dr R.I. Campeanu and Professor A.D. Stauffer, York University, Canada

Dr R.E. Robson  
Project: The Electron-hydrogen Vibrational Excitation Cross Section  
Partners: Professor M.A. Morrison, University of Oklahoma, USA; Dr R. White, James Cook University

Project: Negative Mobility Phenomena in Weakly Ionised Plasmas  
Partner: Professor Z. Petrovic, Institute of Physics, Serbia

Project: Eigenvalue Methods in Low Temperature Plasma Physics Transport Theory  
Partner: Professor Y. Sakai, Hokkaido University, Japan

Dr M. Vos  
Project: A Comparative Study of the Scattering of Electrons and Neutrons at High Momentum Transfer  
Partners: Professor E. Gray, Griffith University; Professor Dr C.A. Chatzidimitriou-Dreismann, Berlin Technical University, Germany

Dr M. Vos, Dr A.S. Kheifets and Professor E. Weigold  
Project: Electron Correlations in Solids  
Partners: Dr F. Aryasetiawan, National Institute of Advanced Industrial Science and Technology, Japan; Dr M. Usuda, Japan Atomic Energy Research Institute, Japan

Professor E. Weigold  
Project: Electron Momentum Spectroscopy of Atoms and Molecules  
Partners: Dr M.J. Brunger and Professor I.E. McCarthy, Flinders University

Project: Correlations in the Helium Asymptotic Wavefunction  
Partner: Professor H. Schmidt-Böcking, University of Frankfurt, Germany

Project:  $(e,2e)$  Collisions in He  
Partners: Professors H. Schmidt-Böcking, S. Hagmann and A. Knapp, University of Frankfurt, Germany

Professor E. Weigold and Dr J.C.A. Lower

Project:  $(e,2e)$  Processes with Polarized Electrons and Targets  
Partners: Dr J. Berakdar, Max Planck Institut für Mikrostruktur Physik, Germany; Dr S. Mazevet, Los Alamos Laboratory, USA

## Centre for the Mind

Professor A. Snyder  
Project: Savants arising from FTL Dementia  
Partner: Professor B. Miller, University of California, USA

Project: Personalised Video Games  
Partner: Dr K. Mogi, Sony Laboratories, Japan

Project: The Physics of Network Computation: Mathematical Modelling of the Non-conscious  
Partner: Professor T. Bossomaier, Charles Sturt University

Project: Math Prodigies  
Partner: Professor M. O'Boyle, University of Melbourne

Professor A. Snyder and Professor J. Mitchell  
Project: fMRI Scanning of Spontaneous Savants  
Partner: Professor J. Hirsch, Columbia University, USA

Project: EEG assisted Neurofeedback  
Partner: Dr M. Brüne, University of Tübingen, Germany

Project: Intelligent Computer System to access Information directly from the Brain using High Resolution EEG and rTMS  
Partners: Professor W. Foley and Professor S. Gandevia, University of New South Wales

Project: Savant-like Skills Exposed in Normal People By Suppressing the Left Temporal Lobe  
Partners: Dr J. Taylor, Professor S. Gandevia and Professor P. Sachdev, University of New South Wales

## Electronic Materials Engineering

Dr M. Buda  
Project: DFB Lasers  
Partners: Dr T.G. van de Roer and Professor Dr G.A. Acket, Eindhoven University of Technology, Netherlands

Ms C. Carmody and Professor C. Jagadish  
Project: Self Assembled Monolayers on Semiconductor Surfaces  
Partners: Dr B. Raguse and Dr V. Braach-Maksvytis, CSIRO Telecommunications and Industrial Physics

Ms C. Carmody, Dr H.H. Tan and Professor C. Jagadish  
Project: Ultrafast Photodetector Materials  
Partners: Mr A. Gaarder, Dr S. Anand and Dr S. Marcinkevicius, Royal Institute of Technology, Sweden

Dr Y. Chen, Mr M. Conway, Ms Y. Jun and Professor J.S. Williams; Professor L. Chadderton (AMPL)  
Project: Synthesis of C and BN Nanotubes using Mechano-thermal Process  
Partner: Dr J. FitzGerald, Research School of Earth Sciences

Dr Y. Chen  
Project: H Storage by C and BN Nanotubes  
Partner: Professor E. Gray, Griffith University

Project: Microanalysis of Nanotube Materials  
Partner: Dr Jin Zou, University of Sydney

Project: Mossbauer Study of Metal Catalysts for Nanotube Formation  
Partner: Professor S. Campbell, Australian Defence Force Academy

Ms V. Coleman, Dr P.N.K. Deenapanray, Dr H.H. Tan, Dr S.O. Kucheyev, Professor J.S. Williams and Professor C. Jagadish  
Project: Ion Beam Processing of Zinc Oxide  
Partners: Professor M. Yano and Professor M. Inoue, Osaka Institute of Technology, Japan

Dr P.N.K. Deenapanray, Dr L. Fu and Professor C. Jagadish  
Project: Analysis of Semiconductor and Insulating Thin Films by XPS  
Partners: Dr Bin Gong and Professor R. Lamb, University of New South Wales

Professor R.G. Elliman  
Project: Ion Beam Mixing of Metallic Thin Films on Ceramic Substrates  
Partners: Dr A. Balogh and Mr W. Berkey, Darmstadt University of Technology, Germany

Project: Optical and Physical Properties of Semiconductor Nanocrystals  
Partner: Professor Suk-Ho Choi, Kyung Hee University, Korea

Project: Light Emission from Silicon Nanocrystals – the Effect of Impurities  
Partner: Professor G. Ross, INRS-Energie et Matériaux, Canada

Professor R.G. Elliman and Ms T.D.M. Weijers  
Project: Heavy-ion Beam Analysis of Materials  
Partners: Dr H. Timmers, Australian Defence Force Academy; Dr S. Butcher, Macquarie University

Project: Heavy-ion Stopping in Solids  
Partners: Professor H. Whitlow, University of Lund, Sweden; Dr H. Timmers, Australian Defence Force Academy

Dr L. Fu, Dr H.H. Tan, Dr M. Buda and Professor C. Jagadish  
Project: Optoelectronic Devices  
Partner: Dr F. Karouta, Eindhoven University of Technology, Netherlands

Mr Q. Gao, Ms P. Lever, Ms C. Carmody, Ms V. Coleman, Ms K. Stewart, Dr L. Fu, Dr P.N.K. Deenapanray, Dr M. Buda, Dr H.H. Tan and Professor C. Jagadish  
Project: Optical Spectroscopy of Semiconductor Quantum Structures and Devices  
Partners: Mr P. Reece, Dr B.Q. Sun, Dr M. Zhang and Professor M. Gal, University of New South Wales

Professor C. Jagadish, Dr H.H. Tan, Mr S. Kucheyev and Professor J.S. Williams  
Project: Processing of GaN and Related Compounds for Blue Light Emission  
Partner: Dr A.G. Li, Ledex Corporation, Taiwan

Mr S.O. Kucheyev, Ms V. Coleman, Ms P. Lever, Ms K. Stewart, Dr P.N.K. Deenapanray, Dr H.H. Tan, Professor J.S. Williams and Professor C. Jagadish  
Project: Cathodoluminescence Studies of Semiconductor Epitaxial Layers and Quantum Structures  
Partner: Professor M.R. Philips, University of Technology, Sydney

Ms P. Lever, Dr H.H. Tan and Professor C. Jagadish  
Project: Optical Spectroscopy of Quantum Dots  
Partner: Professor J. Wolter, Eindhoven University of Technology, Netherlands

Dr M. Ridgway  
Project: Semiconductor Nanocrystal Formation and Characterisation  
Partners: Dr P. Fichtner, University Federal do Rio Grande do Sul, Brasil

Project: Formation of Dilute  $GaAs_xN_{1-x}$  and  $Ga_xMn_{1-x}As$  Alloys by Ion Implantation  
Partners: Dr O. Dubon, University of California at Berkeley, USA, Dr K.M. Yu, Lawrence Berkeley National Laboratory, USA

Dr M. Ridgway, Dr G. Azevedo and Mr C. Glover  
Project: EXAFS Characterisation of Amorphous Semiconductors  
Partners: Dr K.M. Yu, Lawrence Berkeley National Laboratory, USA; Dr G.J. Foran, ANSTO

Dr M. Ridgway and Professor J.S. Williams  
Project: Nanocavity Evolution in Si under Ion Irradiation  
Partners: Dr H. Bernas, Dr M.-O. Ruault and Dr F. Fortuna, Centre National de Recherche Scientifique, France

Dr M. Ridgway; Dr A.P. Byrne (NP)  
Project: Irradiation-induced Defect Characterisation with Perturbed Angular Correlation  
Partner: Dr R. Vianden, University of Bonn, Germany

Ms K. Stewart, Dr L. Fu, Dr M. Buda, Dr H.H. Tan and Professor C. Jagadish  
Project: Tuning of Detection Wavelength of Quantum Dot Infrared Photodetectors  
Partners: Dr A. Stiff-Roberts and Professor P. Bhattacharya, University of Michigan, USA

Dr H.H. Tan and Professor C. Jagadish  
Project: Thermionic Cooling in Semiconductors  
Partner: Professor R. Lewis, University of Wollongong

Professor J.S. Williams, Ms J.E. Bradby and Ms B. Haberl  
Project: Microindentation of Semiconductors  
Partners: Professor M.V. Swain and Dr P. Munroe, University of Sydney

Professor J.S. Williams, Dr J. Wong-Leung, Dr M. Petracic and Mr M.J. Conway  
Project: Metal Gettering to Cavities  
Partner: Dr A. Kinomura, Osaka National Research Institute, Japan

Project: Open Volume Defects in Silicon  
Partners: Professor B. Stritzker and Dr J. Lindner, University of Augsburg, Germany

Dr J. Wong-Leung, Dr H.H. Tan, Ms C. Carmody, Professor C. Jagadish and Professor J.S. Williams  
Project: Electron Microscopy Study of Defects in Ion Implanted Semiconductors  
Partners: Dr J. Zou, University of Sydney; Dr J. Fitzgerald, Research School of Earth Sciences; Professor D.J.H. Cockayne, Oxford University, UK

Dr J. Wong-Leung and Professor J.S. Williams  
Project: Removal of Metals from Solar Materials  
Partners: Dr A. Kinomura, Osaka National Research Institute, Japan; Dr D. Macdonald and Professor A. Cuevas, Faculty of Engineering and Information Technology

Dr J. Wong-Leung, Dr P.N.K. Deenapanray and Professor C. Jagadish  
Project: Defects in Semiconductors  
Partners: Professor B.G. Svensson, Dr M. Linnarsson, Dr A. Kuznetsov, Dr A. Hallen, Mr M. Janson, Ms H. Kortegaard-Nielsen and Dr P. Leveque, Royal Institute of Technology, Sweden

## Laser Physics Centre

Dr K.G.H. Baldwin; Professor B.R. Lewis (AMPL)  
Project: High Resolution XUV Laser Spectroscopy of Isotopic Nitrogen  
Partners: Professor W. Ubachs and Professor W. Hogervorst, Vrije Universiteit, Netherlands

Project: Development of Ultra-high Resolution VUV Laser Sources  
Partner: Professor B.J. Orr, Macquarie University

Dr W. Krolikowski  
Project: Optical Beams in Nonlocal Nonlinear Media  
Partners: Dr O. Bang, Technical University, Denmark; Professor J. Wyller, Norway Agricultural University, Norway; Professor J. Rasmussen, Riso National Laboratory, Denmark

Project: Localised Structure in Second Harmonic Generation  
Partner: Professor M. Saffman, University of Wisconsin, USA

Project: Photorefractive Solitons  
Partner: Professor C. Denz, University of Münster, Germany

Dr M. Lederer  
Project: Passive Mode-locking of the Novel Yb:YAB Laser Crystal  
Partner: Dr J. Dawes, Macquarie University

Professor N.B. Manson and Dr M. Sellars  
Project: Quantum Computing using the Nitrogen-vacancy Centre in Diamond  
Partners: Professor M. Scully and Professor P. Hemmer, T & M University, USA; Dr D. Pulford, Defence Science and Technology Organisation, Canberra; Professor S. Prawer, University of Melbourne

Dr A. Rode  
Project: Laser Induced Forward Transfer with Fs-laser Pulses  
Partners: Dr O. Uteza and Professor M. Sentis, Centre National de Recherche Scientifique, France

Project: Laser Decomposition of BN-nanostructures  
Partner: Dr D. Golberg, National Institute for Material Science, Japan

Project: Magnetic Properties of Laser-Deposited Carbon Nanofoam  
Partners: Dr J. Giapintzakis, Institute of Electronic Structure and Lasers, Greece; Dr D. Tomanek, Michigan State University, USA

Project: Sub-picosecond Laser Deposition of Optical Films  
Partner: Professor B.N. Chikov, Laser Zentrum Hannover e.V., Germany

Dr A. Samoc and Dr M. Samoc  
Project: Crystal Structure of the Second Order Nonlinear Optical Addition Complex AsI<sub>2</sub>•3S<sub>8</sub>  
Partners: Dr E.R. Krausz and Dr A.C. Willis, Research School of Chemistry

Dr A. Samoc, Dr M. Samoc and Professor B. Luther-Davies  
Project: Third-order Optical Nonlinearities of Oligomers, Dendrimers and Polymers Derived from Solution Z-scan Studies  
Partner: Dr M. Humphrey, Faculty of Science

Project: Synthesis and Third-order Nonlinear Optical Properties of End-functionalized Oligophenylenevinylenes  
Partner: Dr M.S. Wong, Baptist University, Hong Kong

Project: Nonlinear Optical Properties of Soluble Oligomers of PPV  
Partner: Dr M.S. Wong, Baptist University, Hong Kong

Project: Optical Properties of Polymer Fiber Preforms  
Partners: Dr G.D. Peng and Mr T. Whitbread, University of New South Wales

Dr M. Samoc  
Project: Nonlinear Optics and Nanophotonics  
Partner: Professor P.N. Prasad, State University of New York at Buffalo, USA

Project: Nonlinear Properties of Evaporated Films of Disperse Red  
Partner: Professor M.O. Tjia, Bandung Institute of Technology, Indonesia

Dr M. Sellars  
Project: Diode Laser Frequency Stabilisation via Locking to Spectral Hole  
Partners: Professor R. Cone and Dr G. Pryde, Montana State University, USA

## Nuclear Physics

Dr R.A. Bark and Professor G.D. Dracoulis  
Project: Intrinsic and Rotational Bands in <sup>100</sup>Ta  
Partners: Professor G. Sletten, Niels Bohr Institute, Denmark; Euroball Collaboration, France

Dr A.P. Byrne  
Project: Ion Implanter for Radioisotopes  
Partners: Dr H. Timmers and Associate Professor D.H. Chaplin, Australian Defence Force Academy

Project: Superallowed Fermi Decays  
Partner: Associate Professor P.H. Barker, University of Auckland, New Zealand

Dr A.P. Byrne; Dr M.C. Ridgway (EME)  
Project: PAC Studies of Materials  
Partners: Dr R. Vianden and Dr F. Ruske, University of Bonn, Germany

Dr M. Dasgupta and Dr D. Hinde  
Project: Dependence of Breakup and Fusion Of <sup>6,7</sup>Li on Target Mass  
Partners: Professor P. Gomes and Dr R. Anjos, University of Niteroi, Brazil

Project: Fusion and Incomplete Fusion In <sup>6,7</sup>Li + <sup>209</sup>Bi Reactions  
Partners: Dr N. Carlin and Professor A. Szanto de Toledo, University of Sao Paulo, Brazil

Project: Modelling Breakup and Fusion Processes  
Partner: Dr K. Hagino, Kyoto University, Japan

Dr M. Dasgupta, Dr D. Hinde and Dr A. Mukherjee  
Project: Measuring Fusion and Breakup with Light Nuclei  
Partner: Dr H. Timmers, Australian Defence Force Academy

Professor G.D. Dracoulis  
Project: High-K Isomers  
Partners: Professor P.M. Walker, University of Surrey, UK; Dr D.M. Cullen, University of Liverpool, UK

Project: High-K Isomers in Hafnium  
Partners: Dr F.G. Kondev and Dr R. Janssens, Argonne National Laboratory, USA; Dr D. Hartley, University of Tennessee, USA

Project: Systematics of Isomer Structure in the N = 74 Region  
Partner: Dr A.M. Bruce, University of Brighton, UK

Project: Laser Spectroscopy of Deformed Isomers  
Partners: Dr J. Billowes, University of Manchester, UK; Professor J.A.R. Griffith, University of Birmingham, UK; Dr P. Dendooven, University of Jyväskylä, Finland

Project: Spectroscopy of Heavy Nuclei  
Partner: Professor A.R. Poletti, University of Auckland, New Zealand

Professor G.D. Dracoulis, Dr R.A. Bark and Dr A.P. Byrne  
Project: Deep-inelastic Excitation of High-K States  
Partner: Dr S.M. Mullins, National Accelerator Centre, South Africa

Professor G.D. Dracoulis, Dr A.P. Byrne and Dr G.J. Lane  
Project: Realistic Shell Model Calculations for Trans-lead Nuclei  
Partner: Professor A. Covello, University of Naples, Italy

Professor G.D. Dracoulis, Dr G.J. Lane and Dr A.P. Byrne  
Project: Neutron Rich Trans-lead Nuclei using Radioactive Beams  
Partners: Professor P.M. Walker, University of Surrey, UK; Dr G. de France, GANIL, France

Professor G.D. Dracoulis, Dr G.J. Lane and Dr A.P. Byrne  
Project: Spectroscopy of Neutron Deficient Lead and Thallium Nuclei  
Partners: Dr A.M. Baxter, Faculty of Science; Dr A.O. Macchiavelli, Lawrence Berkeley National Laboratory, USA

Professor G.D. Dracoulis, Dr G.J. Lane, Dr A.P. Byrne and Dr T. Kibédi  
Project: Shape Co-existence in Very Neutron-deficient Pb Nucleus  
Partners: Dr J. Gerl, GST, Germany; Dr A. Andreyev, University of Liverpool, UK

Dr D. Hinde and Dr M. Dasgupta  
Project: Fusion Barrier Calculations  
Partner: Dr I. Gontchar, Omsk State University, Russia

Dr D.J. Hinde, Dr M. Dasgupta and Dr C. Morton  
Project: Sub-barrier Breakup  
Partner: Professor B.R. Fulton, University of York, UK

Dr M.C. Ridgway (EME); Dr A.P. Byrne  
Project: Damage in Compound Semiconductors Induced by Very High Energy Ions  
Partner: Professor W. Wesch, Universität Jena, Germany

Dr A.E. Stuchbery  
Project: Nuclear Moments and Structure Changes in Exotic Nuclei  
Partner: Dr P.F. Mantica, Michigan State University, USA

Project: Excited-state G-Factor Measurements with Radioactive Ion Beams  
Partner: Dr P.F. Mantica, Michigan State University, USA

Project: Evidence for Proton Excitations in <sup>130,132,134,136</sup>Xe Isotopes from Measurements of G Factors of 2<sup>+</sup>, And 4<sup>+</sup> States  
Partners: Professor N. Benczer-Koller, Rutgers University, USA; Professor K.-H. Speidel, University of Bonn, Germany; Dr A. Pakou, Ioannina, Greece; Dr A. Macchiavelli, Lawrence Berkeley National Laboratory, USA

Project: Competing Core and Single Particle Excitations in the 2State of <sup>46</sup>Ca  
Partners: Professor N. Benczer-Koller, Rutgers University, USA; Dr C. Beausang, Yale University, USA

Project: Electric Field Gradient in Ferromagnetic Iron Measured with Beta-detected Modulated Adiabatic Passage on Oriented Nuclei  
Partners: Associate Professor D.H. Chaplin and Dr W.D. Hutchinson, Australian Defence Force Academy; Dr S. Ohya, Niigata University, Japan

Project: Hyperfine Interactions Spectrometer  
Partners: Dr A.P. Byrne, Faculty of Science; Associate Professor D.H. Chaplin, Australian Defence Force Academy; Professor H.H. Bolotin, University of Melbourne

Dr A.N. Wilson  
Project: High-Spin States in Nuclei with A=120 Near the Proton Dripline  
Partners: Dr J.F. Smith, Manchester University, UK; Dr C.J. Chiara, Washington University, USA; Dr E.S. Paul, Liverpool University, UK

Dr A.N. Wilson, Professor G.D. Dracoulis, Dr G.J. Lane, Dr A.P. Byrne, and Dr P.M. Davidson  
Project: Superdeformation in Light Pb Isotopes  
Partners: Dr A.O. Macchiavelli, Dr P. Fallon, Dr R. Clark and Dr A. Görge, Lawrence Berkeley National Laboratory, USA

## Plasma Research Laboratory

Dr B.D. Blackwell and Dr J. Howard  
Project: Soft X-ray Measurements on H-1NF  
Partner: Associate Professor A.D. Cheetham, University of Canberra

Dr G.G. Borg and Professor J.H. Harris  
Project: Plasma Antenna Concept Demonstrator  
Partner: Dr N.M. Martin, Defence Science and Technology Organisation

Dr G.G. Borg and Mr P. Linardakis  
Project: Plasma Switches for Mobile Phones  
Partner: Dr R. Scheer, Motorola, USA

Professor R.W. Boswell and Dr C. Charles  
Project: Helicon Assisted Reactive Evaporation (HARE)  
Partners: Professor D. MacKenzie and Professor M. Bilek, University of Sydney

Professor R.W. Boswell and Mr O. Sutherland  
Project: High Brightness Ion Source  
Partner: FEI Company, USA

Dr C. Charles and Professor R.W. Boswell

Project: Plasma Deposition of Palladium  
Partners: Dr A.L. Thomann and Dr P. Brault, University of Orleans- Centre National de Recherche Scientifique, France

Project: Helicon Source Modelling  
Partners: Professor M. Lieberman, University of Berkeley, USA; Associate Professor Suwon Cho, Kyonggi University, Korea

Dr J. Howard  
Project: Spectroscopic Studies of the Plasma Divertor in W7-AS  
Partners: Dr R. Konig and Mr J. Chung, Max Planck Institute for Plasma Physics, Germany

Project: Measurement of Electric Field in H-1NF using Laser Induced Fluorescence Techniques  
Partners: Professor B.W. James and Mr D. Anduczyk, University of Sydney

Dr M.G. Shats  
Project: Electron Cyclotron Heating of Plasma in Stellarators  
Partner: Dr K. Nagasaki, Kyoto University, Japan

Project: Confinement Studies in Stellarators  
Partner: Professor K. Toi, National Institute for Fusion Science, Japan

Project: Turbulent Structures and Transport in Plasmas  
Partner: Professor P.H. Diamond and Dr D. Rudakov, University of California, USA

## Theory Cluster

### Applied Photonics Group & Nonlinear Physics Group

Ms R. Jarvis  
Project: Densification of HARE-deposited Film with e-beam Irradiation  
Partner: S. Garcia-Blanco, University of Glasgow, Scotland

Professor Yu.S. Kivshar  
Project: Harmonic Generation in Nonlinear Photonic Crystals  
Partners: Dr M. de Sterke, University of Sydney; Professor S.M. Saltiel, University of Sofia, Bulgaria

Project: Nonlinearity-induced Conformational Dynamics of Biopolymers  
Partner: Professor P.L. Christiansen, Technical University of Denmark, Denmark

Project: A Book for Academic Press: Optical Solitons: From Waveguides to Photonic Crystals  
Partner: Professor G. Agrawal, University of Rochester, USA

Project: A Book for Springer-Verlag: The Frenkel-Kontorova Model: Concepts and Methods of Nonlinear Physics  
Partner: Professor O.M. Braun, Institute of Physics, Ukraine

Project: Stability Analysis of Solitary Waves  
Partner: Professor D.E. Pelinovsky, McMaster University, Canada

Project: Nonlinear Photonic Crystals: Concepts and Applications  
Partner: Dr M. Scalora, US Air Force Research Laboratories, USA

Project: Nonlinear Localized Spin Waves  
Partner: Professor H. Benner, Technical University of Darmstadt, Germany

Professor Yu.S. Kivshar and Dr E. Ostrovskaya  
Project: Dynamics of the Dispersion-managed Solitons in Fiber Transmission Systems  
Partners: Professor D. Anderson and Professor M. Lisak, Chalmers University of Technology, Sweden; Dr A. Berntson, Ericsson, Sweden

Project: Topological States in Atomic-molecular Bose-Einstein Condensates  
Partner: Dr P. Julienne, National Institute of Standards and Technology, USA

Project: Multimode Spatial Optical Solitons  
Partner: Professor C. Denz, University of Münster, Germany

Project: Dynamics of Multicomponent Matter Waves  
Partner: Dr C. Savage, Faculty of Science

Professor Yu.S. Kivshar and Dr A. Sukhorukov  
Project: Parametric Optical Conversion due to Cascaded Nonlinearities  
Partner: Professor S.M. Saltiel, University of Sofia, Bulgaria

Project: Self-written Optical Waveguides in Polymerized Materials  
Partner: Professor S. Kawata, Osaka University, Japan

Project: Spatial Optical Solitons in Waveguide Arrays  
Partner: Professor Y. Silberberg, Weizmann Institute of Science, Israel

Professor J.D. Love  
Project: Holey Optical Fibres  
Partner: Professor R. Stolen, Virginia Tech University, USA

Project: Multimode Fibres & Devices  
Partner: Professor D. Abrahams, University of Manchester, UK

Project: Chapter for the 'Handbook of Optoelectronics'  
Partner: Institute of Physics, UK

Project: Fibre Pigtailling to Buried Channel Waveguides  
Partners: Dr S. Huntington, University of Melbourne; Dr S. Law, University of Sydney; Mr D. Thorncraft, Bishop Innovations, Sydney

Professor J.D. Love and Dr A. Ankiewicz  
Project: Transition Loss in Bent Fibres and Waveguides  
Partners: Dr F. Payne, Bookham Technology, UK; Dr S. Huntington, University of Melbourne; Mr J. Katsifolis, La Trobe University

Dr D. Neshev  
Project: Dynamics of Ring-dark Solitary Waves  
Partners: Professor A. Dreischuh, University of Sofia, Bulgaria; Dr G.G. Paulus, Max-Planck Institute for Quantum Optics, Germany

Project: Optical Vortices with Non-integer Topological Charges  
Partners: Professor L. Torner, Universitat Politècnica de Catalunya, Spain; Professor M. Vlasov, National Academy of Sciences, Ukraine

### Optical Sciences Centre

Professor N. Akhmediev  
Project: Quantized Separations of Phase-locked Soliton Pairs in Fiber Lasers  
Partners: Dr J.M. Soto-Crespo, Instituto de Optica, Spain; Dr Ph. Grelu, Université de Bourgogne, France

Project: Pulse Stabilization by High Order Dispersion Management  
Partners: Professor I. Gabbito, Los Alamos National Laboratory and University of Arizona, USA; Professor J. Kang, Johns Hopkins University, USA

### Theoretical Physics

Dr R. Ball and R.L. Dewar  
Project: Modelling Plasma Turbulence using the DALF3 Code  
Partners: Dr H. Sugama, National Institute for Fusion Science, Japan; Dr A. Kendl and Dr B.D. Scott, Max Planck Institute for Plasma Physics, Germany; Mr R.W. Brown, Australian Partnership for Advanced Computing

Project: Low-order Dynamical Models for Non-linear Fluid Behaviour in Quasi Two-dimensional Plasmas  
Partner: Dr F.L. Waelbroeck, University of Texas, USA

Professor F.C. Barker  
Project: Levels of 11N  
Partner: Dr V. Guimarães, University of Sao Paulo, Brazil

Project: Diproton Decay Half-life of <sup>45</sup>Fe  
Partner: Professor B.A. Brown, Michigan State University, USA

Project: Neutron-rich Light Nuclei  
Partner: Dr N.A. Orr, University of Caen, France

Professor M.T. Batchelor  
Project: Combinatorics and Solvable Models  
Partners: Dr J. de Gier, University of Melbourne; Professor B. Nienhuis and Mr S. Mitra, University of Amsterdam, Netherlands

Project: Quantum Spin Ladders  
Partners: Mr M. Maslen and Dr X-W. Guan, Mathematical Sciences Institute; Dr J. de Gier, University of Melbourne; Dr K. Sakai, Institute for Solid State Physics, Japan

Project: Random Walks and Carbon Nanotubes  
Partner: Dr B. Henry, University of New South Wales

Project: Stromalite Morphogenesis  
Partners: Dr R. Burne, Faculty of Science; Dr B. Henry, University of New South Wales

Professor V.V. Bazhanov  
Project: Integrable Structure of Conformal Field Theory  
Partners: Professor S.L. Lukyanov and Professor A.B. Zamolodchikov, Rutgers University, USA

Project: Algebraic Properties of Solvable Models  
Partner: Professor S.M. Khoroshkin, Institute for Experimental and Theoretical Physics, Russia

Dr M.P. Das  
Project: Fluctuations in Mesoscopic Systems  
Partner: Dr F. Green, University of New South Wales

Project: Two-dimensional Interacting Coulomb Systems  
Partner: Professor K.I. Golden, University of Vermont, USA

Project: Correlations and Metal-insulator Transition  
Partner: Professor D. Neilson, University of New South Wales

Professor R.L. Dewar  
Project: Quantum Chaos in the Ideal-MHD Spectrum for Stellarators  
Partner: Professor C. Nuehrenberg, Max Planck Institute for Plasma Physics, Germany

R.L. Dewar and M.T. Batchelor  
Project: Centre of Excellence Application: Complex Systems Science  
Partners: Professor S. Benkadda, University of Provence, France; Professor P.H. Diamond, University of California at San Diego, USA; Professor C. Grebogi, University of Sao Paulo, Brazil

Dr M. Gulacsi  
Project: Effects of Phonons on Magnetic Impurities  
Partners: Dr A.R. Bishop, Los Alamos National Laboratory, USA; Dr A. Bussmann-Holder, Max-Planck Institut, Germany

Project: Metal-insulator Transition in Strongly Correlated Electron Systems  
Partners: Professor K.S. Bedell, Boston College, USA; Dr J. Gubernatis, Los Alamos National Laboratory, USA

Project: Ring Exchange Interactions in Two-dimensional Lattices  
Partner: Professor Zs. Gulacsi, University of Debrecen, Hungary

Project: Impurity Effects in Mesoscopic Systems  
Partners: Professor A. Rosengren and Mr A. Juozapavicius, Royal Institute of Technology, Sweden

Dr A. Kheifets  
Project: Multiple Ionization  
Partners: Professor I. Bray, Murdoch University; Professor B. Joulakian, University of Metz, France; Professor R. Dörner, Frankfurt University, Germany; Professor Y. Azuma, Photon Factory, Japan; Dr A. Dorn, Max-Planck Institute for Nuclear Physics, Germany

Project: Electron Correlations in Solids  
Partner: Dr F. Aryasetiawan, National Institute of Advanced Industrial Science and Technology, Japan

Dr S.Y. Kun (TP/DU)  
Project: Slow Phase Randomisation in Microscopic Systems and Nanostructures  
Partners: Professor Y. Abe, Yukawa Institute for Theoretical Physics, Japan; Professor K. Nakamura, Osaka City University, Japan

Dr S.Y. Kun (TP/DU); Professor L.T. Chadderton (AMPL)  
Project: A New Probe for Coherent Many-body Dynamics: Nonergodic Molecules in Continuum  
Partners: Dr A.V. Vagov, University of Sheffield, UK; Professor W. Greiner, Goethe University, Germany

**Project:** Schrödinger Cat States in Highly Excited Strongly Interacting Many-body Systems

**Partners:** Dr L. Benet, University of Mexico, Mexico; Professor W. Greiner, University of Frankfurt, Germany; Dr F. Haas, Centre National de Recherche Scientifique and Louis Pasteur University, France

**Project:** Experimental Test of Quantum Chaos in Highly-excited Many-body Systems

**Partners:** Dr C. Beck, Dr F. Haas, Dr P. Papka and Dr V. Rauch, Centre National de Recherche Scientifique and Louis Pasteur University, France

**Professor S. Kuyucak**

**Project:** Modelling Inward Rectifier Potassium Channels

**Partner:** Dr T. Takahashi, National Institute for Physiology, Japan

**Project:** Study of Ion Selectivity in KcsA Potassium Channel

**Partner:** Dr A. Baumgaertner, Forschungszentrum Juelich, Germany

**Dr B.A. Robson**

**Project:** Antiproton Scattering

**Partner:** Professor Zhang Yu-shun, Institute of High Energy Physics, China

**Dr R.E. Robson**

**Project:** The Electron-hydrogen Vibrational Excitation Cross Section

**Partners:** Professor M. Morrison, University of Oklahoma, USA; Dr R. White, Physics, James Cook University

**Project:** Negative Mobility Phenomena in Weakly Ionised Plasmas

**Partner:** Professor Z. Petrovic, Institute of Physics, Belgrade

**Project:** Eigenvalue Methods in Low Temperature Plasma Physics Transport Theory

**Partner:** Professor Y. Sakai, Hokkaido University, Japan

**Dr S. Sen**

**Project:** Role of Parallel Flow in the Formation of Internal Barrier

**Partners:** Professor A. Fukuyama and Dr M. Uchida, University of Kyoto, Japan

**Project:** Ion Temperature Gradient and Parallel Velocity Shear Instabilities in the Negative Magnetic Shear Mode

**Partners:** Professor D.R. McCarthy, Southeastern Louisiana University, USA; Professor A. Punjabi, Hampton University, USA

**Project:** Formation of Transport Barrier by Radio Frequency Waves

**Partner:** Professor R.A. Cairns, University of St Andrews, UK

**Project:** A Novel Method of Transport Barrier Formation on STOR-M Tokamak

**Partners:** Professor A. Hirose and Professor C. Xiao, University of Saskatchewan, Canada

**Dr W. Xu**

**Project:** Spintronics

**Partners:** Professor P. Vasilopoulos, Concordia University, Canada; Professor C.S. Tang, National Centre for Theoretical Sciences, Taiwan

**Project:** Interaction between Semiconductor Nanostructures and Intense Laser Fields

**Partners:** Professor L.B. Lin, Sichuan University, China

## International Collaborative/ Cooperative Agreements

The School holds collaborative/cooperative agreements and/or memoranda of understanding with the following institutions and organisations:

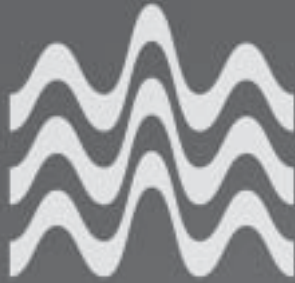
- Samsung Electronics Co. Ltd, Korea
- Shanghai Institute of Technical Physics (SITP), Chinese Academy of Sciences, China
- The Physics Department, University of Pretoria, South Africa
- Institute of Advanced Energy, Japan
- Tsinghua University, China
- The European Union-Australia Science & Technology Agreement, DIST
- Deutscher Akademischer Austauschdienst (DAAD) Exchange Service
- ANU-Engineering & Physical Sciences Research Council Agreement (ANU-EPSRC), UK (The ANU-EPSRC agreement in effect covers a range of UK universities)
- Beijing University, China
- National Institute for Fusion Science, Japan
- Lockheed Martin Energy Research Corporation, Oak Ridge National Laboratory, USA
- L'Ecole Polytechnique, France
- Royal Institute of Technology, Sweden
- Ericsson Components AB, Sweden
- British Telecom Laboratories, UK
- Cambridge University, UK
- Telecom Korea, Seoul
- OFT Associates, USA
- Department of Communications, Canada
- ATLAS Accelerator Facility, Argonne National Laboratory, USA
- Physics Division, Lawrence Berkeley Laboratory, USA
- HHRI, Oak Ridge National Laboratory, USA
- Physics Department, University of Jyväskylä, Finland
- National Accelerator Facility and FRD, South Africa
- GANIL IN2P3, France
- Hahn-Meitner Institute, Germany
- RCNP, Japan
- Institute of Nuclear Physics, Belgium
- Ericsson Fibre Optic Research Centre, Sweden
- British Telecom Research Laboratories, UK
- Bell Laboratories, USA
- Lucent Technologies, USA
- Princeton Plasma Physics Laboratory, Princeton University, USA
- Stanford Linear Accelerator Center, Stanford Synchrotron Radiation Laboratory, USA
- Institute of Mathematics Modelling, Technical University of Denmark, Denmark
- COBRA Inter-University Research Institute on Communication Technology, Eindhoven UTech, The Netherlands
- National Laboratory for Infrared Physics, Shanghai Institute of Technical Physics, Chinese Academy of Sciences, China
- Lightwave Microsystems Corporation, USA
- Oxford University, UK
- University of Augsburg, Germany

## National Collaborative Agreements

The School holds the following collaborative agreements under the IAS/Other Australian University Collaboration Scheme and has various independent agreements with Australian industries:

- Royal Melbourne Institute of Technology
- Macquarie University
- La Trobe University
- University of Newcastle
- University of Canberra
- University of Wollongong
- University of Queensland
- University of South Australia
- Griffith University
- Curtin University of Technology
- University of New England
- University College, Canberra,
- Monash University
- James Cook University
- University of Melbourne
- University of New South Wales
- University of Sydney
- Central Queensland University
- Flinders University
- University of Western Australia
- Faculty of Business and Technology, University of Western Sydney
- AGEN Pty Ltd, Brisbane
- Ericsson Australia Pty Ltd, Melbourne
- ADC Australia, Canberra
- Siemens Ltd, Sydney
- Photonic Technologies Pty Ltd, Sydney
- Hypatia Analytic Thought Pty Ltd, Melbourne
- The Powerhouse Museum of Applied Arts & Sciences, Sydney
- JDS/Uniphase, Sydney
- Canberra Institute of Technology

## The Australian Photonics Cooperative Research Centre (Canberra Division)



The Australian Photonics Cooperative Research Centre (APCRC) is in its eleventh year of operation. It is an unincorporated collaborative venture established in 1992 under the Commonwealth Government's Cooperative Research Centre scheme. The following organisations are partners in the APCRC: The Australian National University, the Universities of Melbourne, Sydney, and New South Wales, RMIT University, TAFE NSW, ABB Transmission and Distribution Ltd, ADC Australia Ltd, Allen and Buckeridge Pty Ltd, the Australian Electrical and Electronic Manufacturers Association, Australian Photonics Pty Ltd, BAE Systems Australia Limited, Bishop Innovation Pty Ltd, CEOS Pty Ltd, Coherent Scientific Pty Ltd, Defence Science & Technology Organisation, Ericsson Australia Pty Ltd, Future Fibre Technologies Pty Ltd, JDS Uniphase Pty Ltd, Macquarie Photonics Pty Ltd, Nextrom OY, Nufern Inc, Redfern Photonics Pty Ltd, Telstra Corporation Ltd, Electricity Transmission Authority (Transgrid), Tenix Systems Pty Ltd, and VPISystems Inc.

The objectives of the APCRC include:

- enhancing the Centre's status as Australia's centre of excellence in photonics with an internationally recognised, commercially relevant basic, strategic and applied research program that integrates research strengths from enabling technologies to applications;
- improving the international competitiveness of Australian industry through transfer of photonic technology through a commercialisation program that enables established firms to access technology and skills while creating new firms, through access to technology, markets, skills and finance.

Continued turbulence in the telecommunications industry worldwide has created large challenges for the Centre particularly as several multi-national photonics companies closed their Australian operations. During the year JDS Uniphase – which grew out of the APCRC start-up company IndX Pty Ltd – announced it was closing its North Ryde plant; Ericsson announced the closure of AsiaPacificLab in Australia; Corning closed its optical fibre plant in Victoria; and ADC pulled out of photonics, although its Canberra plant, reborn as AOFR, remains operational under new ownership. Companies spawned by the APCRC were equally affected with Nufern closing its Sydney facility; and Redfern Optical Components; RPO Pty Ltd; and Kadence Pty Ltd all reducing operations to attempt to sit out the photonics "winter". As a result of the industry downturn opportunities for industry funding of the APCRC have substantially diminished. Fortunately things have not all been gloomy, RBNi had a bright year having entered a strategic partnership with a significant US distributor of telecommunications equipment and having completed successful field trials of its products in US and Hong Kong. The company—received the Innovation Award for the RBNi 8200 from the Institution of Engineers, Australia in November against a highly competitive field ([www.RBNi.com](http://www.RBNi.com)).

In response to the industry downturn, and recognising the APCRC's mission to develop a strong photonics industry for Australia, the APCRC is moving its research focus to areas where it believes the best commercial opportunities will emerge. It is clear that the market is no longer able to sustain the high cost of discrete photonic components, and lower cost processes and increased integration and advanced manufacturing techniques provide the means for cost reductions. In this context the work of RPO Pty Ltd— the first photonics spin-off from APCRC operations at the ANU – has been particularly noteworthy. The company has recently demonstrated that its low cost manufacturing process for planar waveguides is capable of reliably producing waveguide devices with challenging specifications. RPO has maintained its strong links with researchers at the ANU who have undertaken contract work to assist the development of the company.

## Research

APCRC research in Canberra is focussed on the development of planar integrated circuits; nonlinear materials; future photonic technologies; and optical signal processing.

The existence of RPO has motivated continued APCRC research into hybrid glasses similar to those used in the RPO production process to make planar integrated circuits. A series of new materials with reduced optical losses in the 1550 nm telecommunications bands have been investigated as well as novel approaches to the synthesis of glass resins. Because of an emerging interest in fabricating electro-optic modulators from hybrid glasses, the APCRC and RPO have supported research into electro-optic chromophores for incorporation within a hybrid glass host material. A disperse red type molecule with polymerisable end groups suitable for incorporation in a polysiloxane resin has been successfully synthesised and will be used to test the poling behaviour of hybrid glass films. A range of novel chromophores with improved electro-optic properties are also being developed. This work is undertaken with the support of Dr Mark Humphrey in the Department of Chemistry.

The APCRC supports work on the HARE PECVD system in the Plasma Research Laboratory. During this year the HARE team have made significant progress towards deposition of OH-free Ge-SiO<sub>2</sub> waveguide films and have fabricated rib waveguide structures to allow the optical losses to be determined over a wide wavelength range.

Another film forming technology supported by the APCRC is the ultra-fast pulsed laser deposition facility in the Laser Physics Centre. Emphasis this year has been on the development of appropriate laser hardware required to fully explore the potential of the process (reported under the Laser Physics Centre entry).

Chalcogenide glass films are routinely produced for waveguide research. We have investigated both chemical etching and plasma etching as routes for defining waveguide structures in these materials with promising results. We have completed characterisation of the nonlinear properties of various compositions of glasses as well as their magneto-optic properties.

ANU researchers from the Director's Unit continue to make strong contributions in modelling and theory of both linear and nonlinear photonic devices. A wide range of modelling work has been undertaken supporting the design of novel fibre or planar waveguide structures required for the research and commercialisation activities of the APCRC as well as in support of industry. The work on nonlinear photonics involving spatial and temporal solitons, as well as nonlinear phenomena in structured media has continued albeit with a reduced level of APCRC support.

The APCRC contributes to work on Silicon Photonics in the Department of Electronic Materials Engineering; nonlinear optical materials in the Laser Physics Centre; 4D holography for photonic signal processing in the Laser Physics Centre; spatial solitons and other nonlinear guided waves in the Director's Unit, Optical Sciences Centre and Laser Physics Centre; polymer optical fibres for voltage sensing in the Laser Physics Centre (with support of a contract from ABB and Transgrid).

During the year four new patents have been filed, making a total of thirteen patents from ANU APCRC research under prosecution.

The Canberra Division received \$939,742 of Commonwealth and \$93,974 of ANU funding in 2001/2002. The budget for 2002/2003 is set at \$1,144,406 Commonwealth and \$114,000 ANU funding.

## STAFF

Group Head (ANU); Director of Research; Director of Australian Photonics Pty Ltd  
Professor Barry Luther-Davies

### Researchers

Professor Nail Akhmediev (Key Researcher)  
Dr Adrian Ankiewicz  
Professor Rod Boswell  
Professor Rob Elliman  
Dr Anke Freydank  
Dr Reiner Friedrich (until December)  
Ms Ruth Jarvis  
Professor Yuri Kivshar (Key researcher) (until June)  
Dr Wieslaw Krolikowski  
Professor John Love (Program Manager, Key Researcher)  
Professor Neil Manson  
Dr Dragomir Neshev  
Dr Elena Ostrovskaya (from September)  
Dr Andrei Rode  
Dr Anna Samoc  
Dr Marek Samoc (Key researcher)  
Dr Matt Sellars

Technical Officers  
Mr Peter Alexander

Ms Maryla Krolikowska  
Ms Lily Luo (until January)  
Mr Craig Macleod (until June)  
Mr Ian McRae  
Ms Anita Smith

### Office Manager

Ms Belinda Barbour (from January)  
Ms Helen McMartin (until January)

### Administrative Assistants

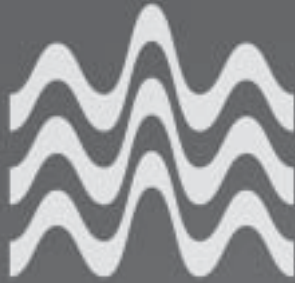
Ms Kristina Milas (until April)  
Ms Renee Vercoe (from July)

### Postgraduate Students

Mr Tristram Alexander  
Ms Vicki Au  
Ms Ruth Jarvis  
Ms Xinshi Luo (from January)  
Mr Glen McCarthy (from October)  
Ms Yinlan Ruan  
Mr Darryl Scott  
Mr Andrey Sukhorukov  
Ms Snjezana Tomljenovic-Hanic



## The Photonics Institute



The School has strong links with the Photonics Institute Pty Ltd, a subsidiary company of the Australian Photonics CRC that is responsible for the education, training and outreach activities of the CRC. The Institute is supported by Commonwealth and ACT Government grants and by the CRC, and its offices are located on the Bruce Campus of Canberra Institute of Technology (CIT). Mr Brendan Smyth, ACT Minister for Business, Tourism and the Arts, officially opened the Photonics Institute on 5 September 2001.

Professor John Love is the CRC Director of Education and Training, Dr Andrew Stevenson is the Manager for Educational Development and Mr Satis Arnold from Tekhne Pty Ltd is a consultant to the Institute focusing on government links. Dr Stevenson and Mr Arnold are both Visiting Fellows in the Applied Photonics Group.

The Photonics Institute, supported through a Science Lectureship Initiative grant, is developing a package of undergraduate teaching modules and supporting resources for the higher-education sector. These modules cover various aspects of guided wave photonics, technology and devices and are being designed to suit direct 'face-to-face' as well as distance education modes. Dr Adrian Ankiewicz, Prof John Love and Dr Andrew Stevenson are contributing to these modules. The Institute through Professor Love and Dr Stevenson is also advising and collaborating with Canberra Institute of Technology to develop curricula and courses for an Advanced Diploma of Photonics Technology, and for the VET sector nationally.

The Institute engages in a variety of activities to promote photonics awareness and skills in the academic and industrial arenas and in the general community. Within Australia these activities range from supporting development of curricula and laboratory experiments for high schools, through to community events, presentations to teachers, careers advisers and students, specialised industry courses and conferences.

Activities that involve the Institute and the School in photonics include the annual Australian Conference on Optical Fibre Technology (ACOFT), the ACT Siemens Science and Engineering Experience, the Korea-Australia and the Singapore-Australia Photonics Schools, the National Science Teachers Summer School, the ACT Science Teachers Workshop, the National Science Festival, the National Youth Science Forum and the CIT Advanced Diploma in Photonics Technology. Postgraduate students from the School have been closely involved in several of these Institute outreach activities with local schools and the general community, including hands-on photonics workshops for secondary school students, outreach visits to schools to promote photonics courses, and the Photonics Institute display at the ActewAGL Amazing World of Science during the National Science Festival.



## Centre for Complex Systems



*Theoretical Studies: From the  
Cosmos to Quantum Systems,  
from Statistical Mechanics to  
Biophysics.*

<http://www.rphysse.anu.edu.au/ccs>

The Centre for Complex Systems (CCS) plays a major role in drawing together the disparate complex systems science components of the National Institute of Physical Science (NIPS) at the Australian National University.

The aims of the Centre are:

- to provide a framework for bringing researchers together and stimulating interaction and synergy between them;
- to promote innovative, interdisciplinary research through seminars and topical workshops; and
- to foster graduate education and research through summer schools.

The CCS continues the outreach activities of its predecessor, the Centre for Theoretical Physics, while fostering innovative application of the powerful tools of modern theoretical physics and applied mathematics to problems ranging from the physical to the biological sciences, and even beyond to complex systems with a social dimension. A key feature in these systems is a large number of individual units interacting collectively and the emphasis is on the emergent behaviour beyond the elementary laws of interaction. The unifying theoretical and mathematical tools include statistical mechanics, many body theory and nonlinear dynamics, as well as numerical simulation.

Administrative support is provided by the Department of Theoretical Physics, RSPHYSSE.

The formation of the CCS in late 2001 came at a very opportune time because of the declaration in January 2002 of complex/intelligent systems as an ARC priority area and CSIRO's designation of complex systems as an emerging science area, coupled with funding to set up a CSIRO Centre for Complex Systems Science headquartered in Canberra.

During 2002 the CCS played a leading role in fostering communication between researchers with an interest in complex systems science at ANU, other universities and the CSIRO through the organisation of a series of meetings culminating in the formation of a consortium to bid for an ARC Centre of Excellence in Complex Systems Science.

The main formal events of 2002 were the summer school in January, CCS seminars by David Green and John Conway, and a joint workshop with the Australia and New Zealand Industrial and Applied Mathematics (ANZIAM) ACT division of the Australian Mathematical Society.

**The 15th Canberra International Physics Summer School DynamicSummer: *Topics in Nonlinear Dynamics, Collective Phenomena and Complexity***

January 21 to February 12, 2002  
Convener: Dr Rowena Ball

Committee: Professors Robert Dewar and Nail Akhmediev and Dr Vanessa Robins

The Summer School was principally funded by the Department of Theoretical Physics, RSPHYSSE, and was also supported by the Asia Pacific Centre for Theoretical Physics as an external activity. The lectures will be published by World Scientific, continuing the *Canberra International Physics Summer Schools* series and also as an inaugural volume in its new series *Lecture Notes in Complex Systems*.

The event was well attended, with 62 participants attending over the two-week period. Thirty-six graduate-level one-hour lectures were presented by nine excellent lecturers from Australia and overseas:

Dr Brian Davies (ANU):  
*Nonlinearity and Complexity: An Introduction*

Professor Alan Newell (University of Warwick, Arizona):  
*Wave Turbulence and Pattern Formation*

Professor Mark Ablowitz (University of Colorado, Boulder):  
*Nonlinear Waves, High-speed Communications and Discrete Solitons*

Dr Cathy Holmes (University of Queensland):  
Large Resonances in Hamiltonian Systems, with Applications

Professor Nalini Joshi (University of Sydney):  
*Hunting Nonlinear Mathematical Butterflies*

Professor Carl Weiss (Physikalisch Technische Bundesanstalt, Braunschweig):  
*Pattern Formation and Spatial Solitons in Nonlinear Optical Resonators*

Professor Tony Roberts (University of Southern Queensland)  
*Low-dimensional Modelling of Dynamical Systems as Applied to Dissipative Fluid Mechanics*

Professor Mike Lieberman (University of California, Berkeley):  
*The Dynamics of Fermi Acceleration: From Cosmic Rays to Discharge Heating*

Dr Jorgen Frederiksen (CSIRO Atmospheric Research):  
*Renormalization Theory for 2-D Turbulence*

### CCS Seminars:

29 April, 2002, David G. Green, *What a Tangled Web – The Network Model of Complexity*

1 August, 2002, John H. Conway, *The Game of Life*

### Joint CCS/ANZIAM meeting:

9 December, 2002. Guest speaker: Hartmut Benner, Institut für Festkörperphysik, Darmstadt, Germany,

*Control of Chaos by Time-delayed Feedback: Theory and Applications*; followed by ten 15 minute talks from local speakers, the ANZIAM AGM and a barbecue.

### 2003 Summer School:

Preparations are well in hand for the 16th Canberra International Physics Summer School: *The New Cosmology*, 3–14 February 2003.

### STAFF

#### Director

Professor Robert L. Dewar, FAA

#### Deputy Director

Professor Murray T. Batchelor

#### Chair of Board

Professor Rodney Baxter, FAA, FRS



The Summer School Promotional Poster

## Cooperative Research Centre for Functional Communication Surfaces



The Cooperative Research Centre for Functional Communication Surfaces (CRC FCS) began operations on July 1, 2001, following funding from the Australian Government. Principal academic partners are located in Chemical Engineering, Monash University, Applied Mathematics, RSPHYSSE, and the CSIRO Divisions of Forestry and Forest Products and Molecular Sciences (Clayton, Victoria). Industrial partners include AMCOR Packaging (Australia) Pty Ltd, Carter Holt Harvey Tissue Pty Ltd, Norske Skog Paper Mills (Australia) Ltd, Note Printing Australia Ltd and PaperlinX Pty Ltd (Australian Paper). Total Commonwealth funding over a seven year period is ca. \$14 M, to be distributed among the various research groups.

The brief of the CRC FCS is to advance Australia's printing and packaging technology and expertise, with particular emphasis on advanced papers and polymeric materials (including banknotes), smart packaging indicators, improved recycling of paper and enhancement of cardboard packaging. Unglamorous though these areas sound, they are major industries in the Western world, and even minor incremental improvements in these areas are of major benefit to consumers and producers. A number of research areas are covered by the CRC FCS partners, including extensional rheology, surface chemistry and energy, polymer rheology, colloid science, three-dimensional imaging of microstructures, and print quality analyses. The ANU node is focussed on providing accurate microstructural data of relevant materials, analysing the surface physics of imbibition of, for example, inks into papers, developing accurate mechanical models and measures of mechanical properties of various printing substrates. A novel feature of our contribution is the insistence that Applied Mathematics focus on the fundamental aspects of research. This tack has been welcomed by our industrial partners, who recognise the dearth of fundamental understanding of many processes associated with printing and paper and board production. The industry remains largely empirical, despite its enormous economic importance, and the group in Applied Maths are ideally equipped to investigate a number of important and interesting issues from our fundamental research perspective. While the issues are industrial in motivation, a number of fascinating problems that call on our skills are being tackled. The work is experimental, theoretical and computational, in keeping with the philosophy of Applied Maths. Projects are making extensive use of the new X-ray CT machine, the Surface Forces Apparatus, Atomic Force Microscope and Ellipsometer.

In this the first complete year of the Center, the ANU program worked on four fundamentally based projects and a fifth, strategic project aimed at addressing specific industry problems. Here we describe highlights of research from the four fundamental projects that have commenced.

### Structural Characterisation of Paper and Coatings

In this program we aim to experimentally image and characterise the morphology of paper and coatings in three dimensions. We have utilised the Applied Maths X-ray micro-CT facility along with two-photon confocal facilities overseas. A limitation of X-ray CT techniques to paper science has been the poor contrast of different soft (lower X-ray dense) materials. Phase contrast tomography has been proposed as a method to quantitatively image samples consisting of lighter elements. We have shown the feasibility of using X-ray phase contrast tomography for paper.

We have also experimentally noted that one can resolve the flux of fluid droplets into paper and visualise ink and pigments on paper with the CT apparatus. This will lead to results which enable better measures of print quality within the fibre web as well as on the paper surface.

### Dynamic Behaviour in Paper and Coatings

In this program we aim to experimentally study fluid wetting phenomena in fibre webs and porous coatings. The structure of the pore space together with local surface energy considerations are the chief determinants of fluid penetration processes. In the first year we have conducted experiments visualising the penetration of a wetting fluid into

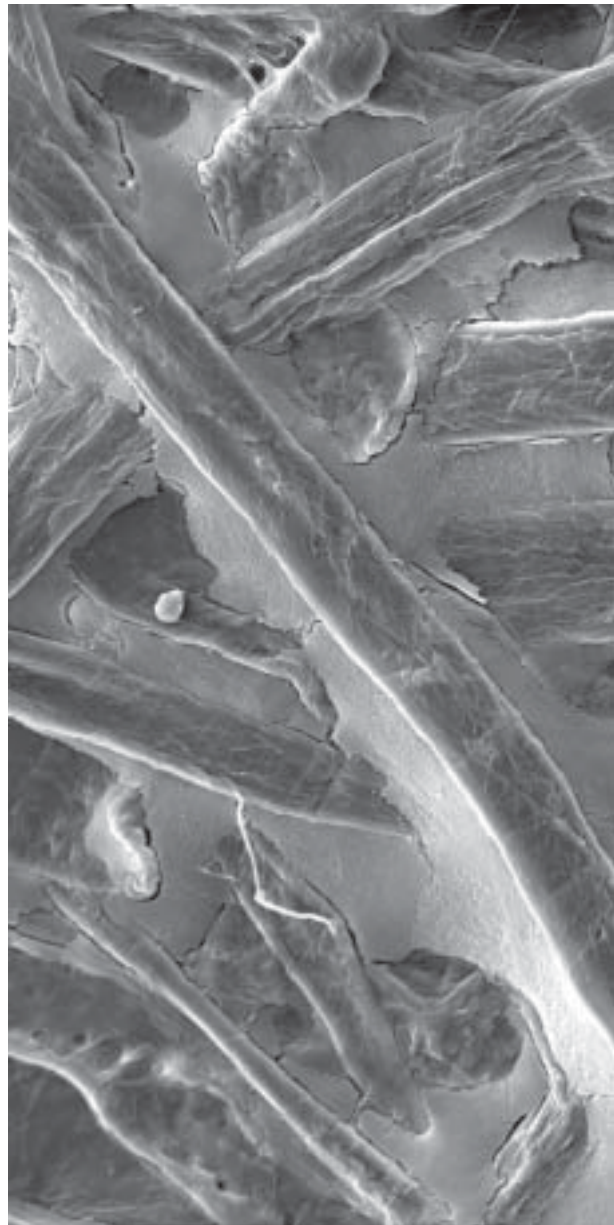
paper fibre webs. To date, industry has characterised fluid flow by an advancing wetting front moving through the bulk of the pores. Experiments on saturating papers have shown that the fluid movement is instead in the form of bulk liquid films moving along channels formed by fibre overlaps. This has important implications to décor paper and laminated materials. Most paper and board is hydrophobised to a degree to suit an end-use, for example, enhance wet strength, improve printability by controlling ink spreading. Experiments on hydrophobised paper shows that the mechanism of fluid flow is now isolated to within the cellulose fibre cell wall. Implications to printing interactions are to be studied.

## Force Measurements Applicable to Papermaking and Paper Performance

Here we aim to experimentally determine fundamental surface properties of papers and pulps and evaluate their role in paper performance. Work in the first year included the development of a chamber to perform environmentally controlled experiments and a capacitance sensor to measure the mechanical properties of paper fibres. With the installation of a LIEF/CRC funded Atomic Force Microscope the task of measuring local surface forces in hydrated samples has been included. The potential for measuring material properties such as elastic modulus on the nanometer scale will also be investigated.

## Modelling the Penetration, Spreading and Flow of Fluids on Realistic Paper and Coating Morphologies

In this program we aim to develop a multiphase flow solver to accurately model in 3D, fluid penetration, spreading and flow on realistic substrates. This ambitious project is based on the need of industry for accurate models of two- and three-phase fluid flow on complex morphologies in which both viscous and capillary effects are properly accounted for. Moreover, films, which have been shown experimentally by our Group to dominate flow properties have yet to be treated correctly when modelling multiphase flow. This year a unified dynamic model was developed that accounted for different modes of fluid displacement. Computational development and implementation is the next step to be considered.



*Fluid flow in a saturated unsized paper showing flow between fibres*

## STAFF

**Program Manager**  
Dr Mark Knackstedt

**Program Leaders**  
Dr Vince Craig  
Dr Tim Senden

**Researchers**  
Dr Armin Bauer (from September)  
Professor Stephen Hyde  
Professor Barry Ninham  
Mr Stuart Ramsden  
Dr Arthur Sakellariou  
Dr Adrian Sheppard  
Dr Vassili Yaminsky

**Student**  
Mr Drew Evans (from August)

**CRC Administrator**  
Mr Ray Roberts

**Technical Staff**  
Mr Anthony Hyde  
Mr Tim Sawkins

## Centre for the Mind



*The Centre for the Mind is a joint venture of two of Australia's premier universities, The Australian National University and the University of Sydney. The Centre invests in daring research on fundamental topics of wide general interest. It stage manages spectacular initiatives which challenge and inspire and it acts as a nexus for the great minds of the world.*

[www.centreforthemind.com](http://www.centreforthemind.com)

The Centre is a powerful joint venture of the Australian National University and the University of Sydney. News Limited provided our foundation sponsorship. Nelson Mandela is our Millennium Fellow and Dr Oliver Sacks our Foundation Fellow.

The Centre is recognised internationally. It is known by millions of people around the globe. The Centre is mentored through its board and advisory council by Australia's most influential and creative minds, including Phillip Adams, Nobel Prize Laureate Peter Doherty and film director/producer Baz Luhrmann. It has received worldwide media focus, including dedicated television and radio profiles; documentaries by the British BBC, the American NBC, the Tokyo Broadcasting System, and the Australian ABC; as well as extended features in the *New York Times*, the *Times of London*, many other leading international media publications, and the esteemed scientific journals *Nature* and *Science*.

The Centre's research focuses on creativity and human potential with a view to benefiting society.

### Highlights

The Centre opened 2002 in style with the Centre's director having just been awarded the "world's foremost prize in communications and information technology" (the Marconi international prize) in New York and delivered the prestigious Royal Society's Clifford Paterson Prize Lecture in London. He is the only Australian to have received this honour.

Our 2002 Penguin book *What Makes A Champion!* sold out its initial print-run in weeks, requiring a second reprint. It crystallised the views of extraordinary individuals and encapsulates intense research through multidisciplinary focus groups. The book was launched on 3 April at the spectacular harbour setting overlooking the Opera House and attended by a cavalcade of celebrity champions.

The Centre collaboratively organised the unique *Dalai Lama Science Forum* at the ANU where Professor Snyder gave the keynote address.



*Professor Allan Snyder, Professor Peter Baume, Dalai Lama*

## Research

The Centre's neuropsychology research is noteworthy. In 2002 we established a state-of-the-art mind laboratory, with magnetic pulse stimulation and brain wave sensing electroencephalography apparatus. This enabled our revolutionary findings about the mind's hidden skills which have been submitted to Nature. These could inspire a new wave of exploration into human creative potential and ultimately open the door to technological applications for amplifying creativity. This research has enticed major corporations and we are processing a patent application.

We obtained the first ever functional brain scanning (fMRI) images of a spontaneous savant – a boy who became a calendar calculator after being hit on the head at age 10. This is a collaborative study with Professor Hirsch at Columbia University Medical School, New York. Other collaborative interactions include: A scientist from the University of Tübingen (Germany) will be a Visiting Fellow at our laboratory until early in 2003; Professor Bruce Miller, University of California, San Francisco on savants arising from FTL dementia; Dr Ken Mogi, Sony Laboratories, Tokyo, Japan, on personalised video games; and we are processing a patent application on controlling machines with the mind.

## Activities

Professor Snyder delivered the:

1. Keynote address entitled "The Nonconscious Mind" at the Dalai Lama Mind Science Forum (24 May 2002).
2. Keynote address "Genius, Madness and TMS" to the National Symposium on Genes, Neurons and Mental Illness at the University of Sydney (21 June 2002).
3. Opening address "Personalised Video Games" at the Nonconscious Processing National Conference, Sony Laboratories, Tokyo, Japan (1 October 2002).
4. Dinner address "Genius, Madness, and Innovation", to the Australian Academy of Technology Science and Engineering, held in Parliament House, NSW (18 November 2002).

5. Keynote address "We're Blinded by the Big Picture" to the Complex Systems National Symposium at Charles Sturt University (2 December 2002).

Dr Oliver Sacks, acclaimed author and neurologist visited the Centre in 2002. A lunch held in his honour was attended by the Editor and Chief of Time magazine and Head of Microsoft Australia.

## Outreach and Media

The Centre received world-wide media attention, including dedicated television and radio profiles, extended features in the popular press and documentaries devoted to the Centre's research.

Examples include:

- USA's Discovery magazine "The Inner Savant" (February 2002) devoted to the Centre's magnetic pulse stimulation.
- ABC TV's Catalyst program "The Thinking Cap" (aired 14 March 2002).
- Nine/WIN network aired feature on the Today show (aired 3 April 2002).
- Channel 10's Good Morning Australia.
- Numerous radio interviews about the book, What Makes A Champion!
- The American network, NBC TV, filmed a documentary in the Centre for the Mind's Sydney office to be shown in early 2003 (July 2002).
- The Tokyo Broadcasting System also filmed a documentary to be shown in early 2003.
- The New York Times is preparing an extended feature following their reporter visiting from New York.

### STAFF (ANU and University of Sydney)

Professor and Head of Centre  
Allan Snyder FRS FAA FTSE

Professor and Associate Director  
Professor (Doug) John Mitchell

Postdoctoral Fellow  
Dr Elaine Mulcahy  
Dr Martin Brüne

Visiting Fellow  
Dr Elaine Mulcahy  
Professor Terry Bossomaier

Research Assistant  
Rowena Henery

Project Manager  
Dr Angela Yates

Project Officer  
Mr Stuart Stark (until March)  
Ms Jackie Bailey (from September)

Web development, Event Management, Sydney Administration  
Ms Natasja Worsely  
Mr Matt Immonen (until August)

Departmental Administrators  
Ms Cheryl Morse (until March)  
Ms Anita Kuffner (March to June)  
Mrs Amanda Greaves (from June)

## Commercialisation



The School channels its commercialisation activities through its Commercialisation Committee.

The Committee's first task has been the preparation of a set of procedures for adoption by the School to guide staff, students and visitors in their responsibilities and obligations regarding the intellectual property (IP) generated by the School's activities.

The procedures will be used as the basis for staff training in IP management and will be included in new employee and departmental visitor orientation and during induction of new students to the School. During 2002, there were a range of projects in the School that were at various stages of commercialisation. In addition, the School continues to provide an office for Mr Tony Cooke of Anutech and the closer interaction that this allows between him and the staff has proved to be beneficial.

This section reports on commercialisation ventures and also projects showing promise for commercialisation. Some of these activities are contained in the report of Anutech.

### RPO Pty Ltd

RPO, a start-up company operating from the Innovations Building on the ANU campus, has continued to develop Inorganic Polymer Glass™ technology for the production of low cost planar lightwave circuits. A large amount of work on the materials themselves, the process conditions for the creation of optical circuits, and environmental stability of the resulting photonic chips has verified the technology for low cost telecommunications applications. Due to the downturn in the telecommunications markets the company has downsized and ownership was transferred from Redfern Photonics to Australian Photonics Pty Ltd at the end of the year. A number of ANU staff remained contracted to provide support to the company. In 2002 these included Professor Barry Luther-Davies, Dr Wieslaw Krolikoski, Dr Reiner Friedrich, Dr Anke Freydank, Ms Ruth Jarvis, Professor John Love, Dr Weitang Li, Mr Ian McRae and Ms Maryla Krolikowska.

### Semiconductor Laser Commercialisation

A \$350,000 grant was obtained from the ACT government to explore commercialisation opportunities in the area of semiconductor lasers. There are now five patents protecting the IP in this area of technology. Strong interest has been shown by an Australian company in investing in the technology. The current direction, while the telecommunications market remains depressed, is to pursue and consolidate semiconductor laser IP and to further develop novel prototype components. Professor Jagdish and a large team from EME and the School have been involved in this project.

### High Brightness Helicon Plasma

A research contract with FEI Corporation continued in this area. While it proved to be more challenging to meet the FEI Corporation performance requirements than had been anticipated, FEI decided to renew the research contract with somewhat different milestones.

The first milestone has now been achieved and it is expected that the contract will continue during 2003.

The work has also resulted in a request for another ion source from another part of the FEI Corporation.

A source has been designed and tested and is anticipated to be delivered in early 2003.

The FEI Corporation has also agreed to provide industrial support for an ARC Linkage grant to further investigate Helicon Ion Sources for ion implantation machines.



## Modulated Solid State Spectrometer (MOSS)

The MOSS instrument has been developed by Dr John Howard of PRL to measure the density and properties of plasmas in the H-1 National Plasma Fusion Research Facility. The instrument may be used in single or multi-channel format. In multi-channel format it can provide a two-dimensional picture of the properties of a plasma stream when coupled to an appropriate display. Two MOSS instruments have been supplied to overseas research groups. The first, a multi-channel instrument, was supplied to the Max Planck Institute in Germany. The second, a single channel instrument, was supplied to Associazione Euratom-Eneasulla Fusione. Each instrument was delivered with software and instructions for its use. The multi-channel instrument was supplied coupled to a CCD camera that provided a false colour display of the plasma stream. Both instruments were profitable to the School and with further development could provide the basis for a standard instrument of plasma research.

## Emissivity Independent Infrared Thermography

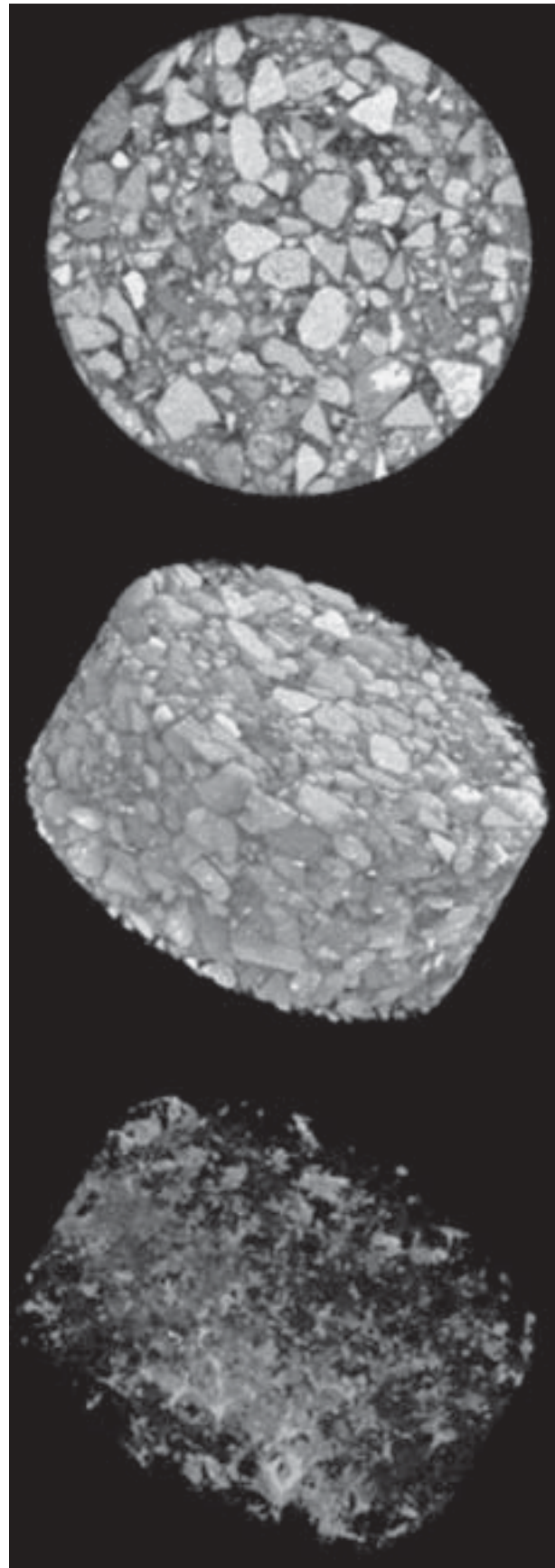
Dr John Howard has developed an optical method of measuring the temperature of objects that does not depend on knowledge of the emissivity of the surface of the object being measured. Furthermore, this is achieved with a single measurement of the radiation from the surface of the object. In the last year Dr Howard has greatly refined and developed two variants of the method – the first in the frequency domain and the second in the space domain. There are advantages to each approach and it is anticipated that both methods will be developed to commercial prototype stage. A provisional patent has been rolled into a PCT application with considerable modifications to take into account the developments of the last year. We are presently considering whether to lodge a second patent covering the space domain method.

To assist the commercialisation of the instruments, a Knowledge Fund grant has been obtained from the ACT Government that will assist in building a prototype of the frequency domain instrument. We then expect that commercial interests will take over full commercial development of these instruments.

## Visualisation of the Pore Structures and Modeling of the properties of Porous Structures

The high resolution X-ray computerised scanning tomography instrument developed by Dr Mark Knackstedt and his group from the Department of Applied Mathematics and the UNSW Oil and Gas Petrology Group continues to attract commercial interest. A number of different organisations have approached Dr Knackstedt to perform scans of samples of their products and materials. These have been done at commercial rates in most instances and it is apparent that many may lead to longer term research contracts. Indeed the demand for work is such that it may be necessary to consider the construction of an additional instrument.

The Group in conjunction with their associates at UNSW has also undertaken to supply a complete instrument for the Indian National Petroleum Group. It is anticipated that this will be supplied during 2003 and that it will lead not only to profits to the School on the sale of the instrument but also to training of the Indian operatives, supply of updates to the software and ongoing cooperation in research with the Indian Group.



*Images of rock core samples by computed tomography*

The involvement of the Group with the CRC for Functional Communication Surfaces has also resulted in contact with other divisions of companies involved in the CRC and has extended the scope of their work. For example, BASF of Germany has three groups from their organisation that are either working with the facility or have expressed interest in providing work.

## Bushlan

As reported last year, Bushlan (a novel communication system for Rural Australia) has generated considerable interest. The Plasma Physics Laboratory contributed to the Parliamentary Inquiry into Broadband Communications and Professor Jeffrey Harris and Dr Gerard Borg were asked to prepare the consolidated report of the committee for Parliament. The Group applied for and received an ACT Government Knowledge Fund Grant to fund the construction of a three-node network to continue the work on the measurement of the performance of a Bushlan system. This will allow better estimates to be made of the carrying capacity of the network under more realistic conditions.

## Carbon and BN Nanotubes

Carbon or Boron Nitride (BN) nanotubes produced by Dr Ying Chen in the School can be provided at a competitive cost. A brochure for BN nanotubes has been posted on the RSPHysSE Nanotubes site and on the Anutech site. Publicity for these materials is planned in the near future.

## Active Ball Milling

Carbon and BN nanotubes were developed from the Active Ball Milling Program. Active Ball Milling uses high energy impacts to drive chemical reactions or to fine grind and intimately mix normally incompatible materials. For example, it can be used to make, by physico-chemical methods, alloys of metals that will not form by conventional methods because they may be mutually insoluble in the molten state. It has recently been reported that these methods can also be used to form polymer alloys where similar compatibility problems apply. Thus there is likely to be considerable interest in this method of formation of exotic materials in the immediate future.

The Standards and Industrial Research Institute of Malaysia (SIRIM) have had a program in active ball milling for some time but were unable to obtain the results that they wanted. Dr Abdul Kadir Masrom undertook a two-week training course with our Group to help resolve their difficulties. It is expected that this may lead to further interaction with the group from SIRIM.

Commercialisation of RSPHysSE has developed several innovative devices to solve specific problems with which they are involved. Several of these devices are under consideration for commercialisation.

*Automated Liquefied Gas Dewar Filler*—there are many scientific instruments that use liquefied gases (usually liquid Nitrogen) to cool them to operating temperature. Their temperature is maintained at the boiling temperature of the liquefied gas by its evaporation and thus the Dewar flask that surrounds the instrument needs to be regularly refilled. One of the common duties of workshop personnel is the filling of Dewars and Mr Tony Cullen has developed an automated filler that will maintain the contents of a Dewar at a predetermined level as well as determining if there are any leaks in the system. Suppliers of liquefied gases are being approached to ascertain their interest in the commercial use of such a device.

*Smart Tags for Motors*—changes in electrical safety regulations require that all motors and other devices including hand and fixed tools such as welders, extension leads, drills, angle grinders, lathes and the like shall be inspected annually. This imposes a huge administrative load on an organisation such as the workshop which carries large numbers of motorised tools. Mr Cullen proposed that this could be handled by the use of a smart tag with each motor or electrical device that carries information on the device and the testing to which it has been subjected. Each of the tradesman could carry a tag reader that would interrogate the tags in its immediate vicinity and sound an alarm when it detects a device requiring testing. The tradesman would then test the device or arrange for its testing and update the record on the smart tag. Development work is continuing on such a device since it will have considerable commercial application.

## Fuller Utilisation of the Automated Workshop Equipment

Whilst much of the workshop equipment is fully utilised there are some machines that can be set up and allowed to run overnight without human supervision. This includes the EDM machine. A program is being devised to market this machine's capabilities externally.

## New Patents

*Quantum Computing*—the Laser Physics Group have developed a means for stabilising complex quantum entanglements for sufficient time for measurement of their entangled state. This is an enabling technology for quantum computing and it would appear that successful development of the technology would open up opportunities for its commercial exploitation. A provisional patent is in the course of preparation.

*Nanotitre Plates*—Professor Rod Boswell in association with Professor Dos Remedios and others at the Faculty of Medicine at the University of Sydney have developed a large scale multi-cell plate for the screening reaction to a range of drugs, proteins, synthetic and naturally occurring chemicals by living cells. The dimensions of the reaction wells on these plates are an order of magnitude smaller than those presently available, allowing a much larger number of reaction wells to be incorporated into the base plate. The size of each well is such that it can be used to determine the reaction of individual living cells and in contrast to other similar devices has novel properties that allows them to be washed, cleaned and to be used repeatedly. In addition the reactive surfaces of the reaction wells can have different surfaces that are tailored to trap specific cells so that their reactions to drugs can be readily monitored. A provisional patent is in the course of preparation.

In 2002, the School's annual recurrent grant (\$14,725M) was supplemented by additional income from University Major Equipment Committee funds (\$624K), and by a significant number of outside grants from a variety of sources. These outside grants, which are shown below, reflect the School's income opportunities and some of its collaborative activities.

### Applied Mathematics

#### Australian-German Joint Research Co-operation Scheme

Professor S. Hyde  
*Signatures of Spatial Morphology in ordered and Disordered Media*  
July 2002– July 2004 \$ 17,100

Dr V. Craig  
*Flow in Confined Spaces*  
2001 --2002 \$ 10,400

#### Australian Partnership for Advanced Computation

Professor S.T. Hyde and Dr M.A. Knackstedt  
*Mesoscale Physics Computation*  
2001 --2003 \$250,000

#### Australian Research Council (ARC) Grants and Awards

ARC Discovery Project Grants  
The University of New South Wales  
Dr T.J. Senden (ANU Participant)  
*The Application of Chemical Force Microscopy for Monitoring DNA Hybridization: A New Sensing Concept Capable of Detecting Single Molecules*  
2002 \$ 50,000

Professor S. Marcelja  
*Surface Forces in Aqueous Electrolytes*  
2002 – 2004 (terminated April 2002) \$180,000

Dr V. Craig  
*Surface Adsorption, Repulsion and Attraction: A New Experimental Approach to Surface Forces*  
2002 --2006 \$573,782

#### ARC Discovery Research Fellowship

Dr T.J. Senden  
*Dynamic Force Microscopy of Small Molecular Assemblies*  
2002 – 2006 \$391,782

ARC Large Grant  
Dr M.A. Knackstedt  
*Three Dimensional Image Analysis*  
2001 --2003 \$164,961

#### ARC Linkage Infrastructure (Equipment and Facilities)

Dr S. Stowe, A/Professor P R. Munroe and Dr T.J. Senden (Administered at RSBS)  
*Focused Ion Beam System for Multidisciplinary Applications*  
2002 \$320,000

Dr T.J. Senden, Dr V. Craig, A/Prof I. Parker and Mr S. Ramsden  
*Bioscope IV: Advanced Scanned Probe Microscopy*  
2002 \$170,000

#### ARC Postdoctoral Research Fellowship

Dr V. Craig  
*Hydrophobic Attractions and Electrostatic Repulsions: Transitional Effects*  
February 1999 – February 2002 \$177,009

#### ARC SPIRT Award

The University of New South Wales  
Dr M.A. Knackstedt (ANU Participant)  
*Interpretation of Laboratory Core Measurements: Imaging Visualising and Modelling Laboratory Core Floods*  
2001 – 2002 \$140,860

#### BASF A.G.

Dr M.A. Knackstedt  
*Characterization of Foam Morphology and Simulation of Mechanical and Thermal Foam Properties*  
2002 – 2004 \$ 75,000

#### BHP Petroleum

University of New South Wales  
Dr M.A. Knackstedt (ANU Participant)  
*Interpretation of Laboratory Core Measurements: Imaging Visualising and Modelling Laboratory Core Floods*  
2000 --2002 \$ 50,000

#### Department of Industry, Tourism and Resources – CRC for Functional Communication Surfaces

Dr M.A. Knackstedt, Dr T. Senden, Dr V. Craig, Mr R. Roberts and Dr V. Yaminsky  
*Program 1: Fundamental Surface Measurements and Liquid Penetration Sciences*  
July 2001 – June 2008 \$2,864,000  
*Program 6: Education, Scholarship*  
July 2001 – June 2008 \$525,000

#### Statoil

Dr M.A. Knackstedt  
*WAG Injection*  
2002 US\$ 40,000  
Dr M.A. Knackstedt  
*Imaging of Carbonate Core*  
2002 US\$ 40,000

#### Vice-Chancellor's Plan for Growth

Professor S.T. Hyde  
January 2001 – December 2003 \$287,000

#### Vimed Biosciences Pty, Ltd

Dr T.J. Senden  
*Vimed Collaborative Research and Development Agreement*  
July 2002 – June 2003 \$404,364

### Atomic and Molecular Physics Laboratories

#### Australian Academy of Science

Dr A. Kheifets  
*Travelling Fellowship to Germany*  
July 2001 – December 2002 \$ 9,000

#### Australian German Joint Research Co-operation Scheme

Dr A.S. Kheifets (also under TP)  
*Experimental and Theoretical Study of Atomic Double Ionization by Electron and Heavy Ion Impact: Complete Pictures of the Four-body Break up Dynamics*  
July 2001 – June 2002 \$ 9,000

#### Dr M. Vos

*The Determination of the Hydrogen Concentration in Polymer Films by Electron Scattering and Neutron Compton Scattering Experiments*  
March 2002 – March 2003 \$ 7,520

Professor E. Weigold and Dr J. Lower  
*Investigations into Atomic Collisions through the Development of Advanced Technologies*  
March 2001 – March 2003 \$ 19,380

#### Australian Nuclear Science and Technology Organisation

Dr M. Vos  
*A Comparative Study of the Scattering of Electrons and Neutrons at High Momentum Transfer – an Experiment at ISIS, UK*  
November 2002 \$ 8,140

#### Australian Research Council (ARC) Grants and Awards

#### ARC Large Grant

Dr K.G.H. Baldwin and Dr B.R. Lewis (also listed under LPC)  
*Pulsed Nonlinear-optical Spectroscopic Sources: Tunable Narrowband and Multiwavelength Applications* (Held jointly with Macquarie University)  
January 2000 – December 2002 \$153,000

ARC Linkage Infrastructure (Equipment and Facilities)  
Flinders University  
Professor E. Weigold (ANU Participant)  
National Facility for Advanced Molecular Orbital Imaging  
2002 \$215,000

University of Western Australia  
Professor S. Buckman (ANU Participant)  
Ultra High Resolution Electron Recycling Spectrometer  
2002 \$200,000

ARC Postdoctoral Research Fellowship  
Dr S.J. Cavanagh  
Photodissociation Dynamics of Diatomic Sulphur, S<sub>2</sub>, and its Role in Environmentally Friendly Energy Efficient Lamps  
May 2001 – April 2004 \$195,261

CSIRO  
Professor L. Chadderton  
Swift Ions Project  
August 1998 – August 2003 \$150,000

Oak Ridge National Laboratory  
Professor R.W. Crompton  
Grant for attendance at the third ICAMDATA meeting held in Gatlinburg, as Australian representative on the International Advisory Board  
April 2002 \$ 1,600

University of Metz, France  
Dr A.S. Kheifets  
Invited Visiting Professorship  
June – July 2002 \$ 4,000

The Japan Society for Promotion of Science  
Dr A.S. Kheifets  
Visiting Fellowship  
October – November 2002 \$ 10,000

## Centre for the Mind

Australian Research Council (ARC) Grants and Awards

ARC Discovery Grant  
Charles Sturt University  
Professor A. Snyder (ANU Participant)  
The Physics of Network Computation: Mathematical Modelling of the Nonconscious  
2002 – 2004 \$203,000

ARC Linkage  
University of Sydney  
Professor A. Snyder (ANU Participant)  
What Makes a Corporate Champion?  
2002 – 2004 \$210,000

McKinsey and Company  
Professor A. Snyder  
What Makes a Corporate Champion?  
2002 – 2004 \$60,000

## Electronic Materials Engineering

ANU Commercialisation (Venture Capital) Fund  
Professor C. Jagadish  
General Contingency Fund Develop Stage 1 of Acton Lasers  
March 2000 onwards \$500,000

ACT R&D Grant  
Professor J.S. Williams  
Developing Technology Prototype Products & Markets for Semiconductor Lasers  
September 2001 – April 2003 \$350,000

Australian German Joint Research Co-Operation Scheme  
Dr M.C. Ridgway  
Application of the Perturbed Angular Correlation Technique for the Microstructural Identification of Implantation-Induced Disorder in Compound Semiconductors  
July 2001 – December 2002 \$ 10,920

Australian Institute of Nuclear Science and Engineering  
Dr M.C. Ridgway  
Nanocavity Formation Mechanisms in Si Substrates Studied with in-situ Transmission Electron Microscopy  
2002 \$ 11,443

Australian Nuclear Science and Technology Organisation  
Access to Major Research Facilities Program  
Dr P. Deenanaray  
Structural Characterisation of (In)GaAsN Epitaxial Layers by Photoemission Spectroscopy  
October 2002 \$ 4,640

Dr M. Petracic  
Selective Photon Stimulated Desorption of Hydrogen from Hydrogenated GaAs Surfaces  
April 2002 \$ 4,640

Dr M.C. Ridgway  
EXAFS Measurements of Implantation-Induced Disorder in III-V Compound Semiconductors  
January 2002 \$ 7,020

Dr M.C. Ridgway  
Structure of Metal-decorated Nanocavities in Si  
August 2002 \$ 6,700

Australian Synchrotron Research Program  
Dr G. de Madeiros Azevedo  
Characterisation of Nanocrystal Formation in SiO<sub>2</sub> with EXAFS  
November 2002 \$ 4,370

Dr M.C. Ridgway  
EXAFS Measurements of Amorphised Compound Semiconductors and Nanocrystals in SiO<sub>2</sub>  
February – March 2002 \$ 4,370

Dr M.C. Ridgway  
Characterisation of Nanocrystal Formation in SiO<sub>2</sub> and Si with X-ray Diffraction  
March 2002 \$ 4,250

Dr M.C. Ridgway  
EXAFS Measurements of Structural Relaxation in Amorphised Compound Semiconductors  
November 2002 \$ 4,370

Australian Research Council (ARC) Grants and Awards

ARC Discovery Project Grants  
Dr M.C. Ridgway and H. Bernas (Centre de la Recherche Scientifique, France)  
Nanocavities in Si: Structural Evolution and Metal Gettering  
2002 – 2004 \$183,000

University of Sydney  
Professor J.S. Williams (ANU Participant)  
Characterisation of Structural Defects in Ion-beam Processed III-V Nitrides  
2001–2003 \$208,126

University of Melbourne  
Professor N. Fletcher (ANU Participant)  
Acoustics of the Didjeridu  
2002 – 2004 \$253,000

ARC Discovery Grant and QEII Fellowship  
Dr J. Wong-Leung and Professor B.G. Svensson (Royal Institute of Technology, Sweden)  
Ion Implantation Processing in Silicon Carbide for Microelectronic Applications  
2002 – 2006 \$619,411

ARC Large Research Grant\*  
Dr Y. Chen  
Formation of Mechanisms of Boron Nitride Nanotubes Produced by Reactive Ball Milling  
2001 – 2003 \$210,563

University of Newcastle  
Dr M. Petracic (ANU Participant)  
Surface Analysis using a Free Electron Laser  
1999 – 2002 \$120,000

ARC Linkage Infrastructure (Equipment and Facilities)  
University of Western Australia  
Professor C. Jagadish (ANU Participant)  
High Performance Semiconductor Micromachining Facility  
2002 \$940,000

ARC Postdoctoral Fellowships  
Dr P.N.K. Deenanaray  
Defect Engineering of Quantum Well Interdiffusion for Optoelectronic Device Applications  
July 2001 – June 2004 \$168,702

Dr G. de Madeiros Azevedo  
Revealing the Mechanism of Heavy Ion Stopping at High Energies  
January 2002 – December 2004 \$202,118

ARC QEII/ARF Fellowship and Research Support Grant  
Dr Y. Chen  
Investigation of Mechanochemical Reactions with the Formation of Nanosized Ceramic Materials  
1998 – 2002 \$555,000

ARC QEII Research Fellowship  
Dr H.H. Tan  
Growth, Characterisation and Fabrication of GalnNAs Lasers  
May 2001 – May 2006 \$357,590

ARC SPIRT Award  
Professor J.S. Williams  
Indentation Studies of Semiconductor Thin Films  
January 1999 – June 2002 \$ 62,268  
Australian Scientific Instruments contribution \$ 15,000

Defence Science and Technology Organisation  
Dr H.H. Tan and Professor C. Jagadish  
Optoelectronic Device Processing  
2002 \$ 50,000

French Embassy, Canberra  
Dr M.C. Ridgway  
Nanocavity Evolution under Ion Irradiation  
2002 \$ 3,480

Standard Industrial Research Institute of Malaysia  
Mechanical Alloying Training Course for Dr Abdul Kadir Masrom  
Dr Y. Chen  
2002 \$ 14,000

Stanley Melbourne Bruce Science & Industry Fund  
Professor J.S. Williams  
Protection of IP in Respect of an Optoelectronics Materials Opportunity  
February 2000 – February 2002 \$ 60,000

## Laser Physics Centre

ABB Transmission and Distribution Pty Ltd & Transgrid  
Professor B. Luther-Davies et al  
High Voltage Optical Fibre Sensing  
April 2001 – March 2002 \$120,000

Dr A. Samoc  
Fibre Optic Voltage Sensor  
April 1999 – April 2003 \$ 30,000

Australian-German Joint Research Co-operation Scheme  
Dr A. Rode  
100-W Laser System for Ultra-fast Pulsed Laser Deposition  
January 2002 – December 2003 \$ 16,250

Dr A. Rode  
Sub-picosecond Laser Deposition of Optical Films  
July 2001 – December 2002 \$ 18,000

Professor B. Luther-Davies  
Highly Oriented Nanostructures of Nonlinear Optical Materials for Applications in Polarized Light Emitting Diodes and Optical Devices  
July 2002 – July 2004 \$ 16,400

Australian Photonics CRC  
Dr A. Samoc  
*Nonlinear Polymers*  
June 2002  
– May 2003 \$183,447

Australian Research Council (ARC) Grants and Awards  
ARC IREX Award  
Dr O. Uteza  
*Ultrafast Laser Ablation & Deposition of Thin Films*  
June 2001 – May 2002 \$ 63,000

ARC Large Grant  
Dr K.G.H. Baldwin and Dr B.R. Lewis (also listed under AMPL)  
*Pulsed Nonlinear-optical Spectroscopic Sources: Tunable Narrowband and Multiwavelength Applications*  
(Held jointly with Macquarie University)  
2000 – 2002 \$153,000

ARC SPIRT Awards  
Professor B. Luther-Davies  
*Short Pulse Laser for Ranging Applications Incorporating Semiconductor Saturable Absorber*  
June 1999  
– June 2002 \$151,223  
(ElectroOptic Systems Pty Ltd contribution) \$ 45,000

Dr R. Charters  
*Design, Fabrication & Evaluation of Planar Lightwave Circuits in Organically Modified Silicate Glasses for Telecommunications & Other Applications*  
June 1999  
– June 2002 \$220,132  
(AOFR Contribution) \$ 54,000

Defence Advanced Research Project Agency, USA  
Professor N. B. Manson, Professor M.S. Scully and Dr P. Hamer  
Texas A & M University  
*Spin-based Lattice-gas Quantum Computers in Solids using Optical Addressing*  
October 2001  
– October 2004 US \$240,000

Department of Industry, Tourism and Resources  
Professor B. Luther-Davies  
*et al*  
Grant for Australian Photonics Cooperative Research Centre  
July 2001  
– March 2002 \$875,244  
(with further funds until June 2006)

Defence Science and Technology Organisation  
Dr M. Sellars  
*Real-time Optoelectronic Spectrum Analyser System*  
April 2002  
– April 2003 \$ 30,000

Redfern Polymer Optics Pty Ltd  
Professor B. Luther-Davies *et al*  
*Polymer Waveguides & Integrated Optics*  
May 2001 – June 2002 \$746,100

Professor B. Luther-Davies *et al*  
Industry funded PhD scholarship  
October 2001 – September 2004 \$ 90,000

## Nuclear Physics

Australian Nuclear Science and Technology Organisation  
Professor G.D. Dracoulis  
*Competition between Octupole and Multi-Particle Excitations in Po212 and At-213*  
April 2002 \$ 12,000

Dr A.N. Wilson  
*Decay of Superformed <sup>192</sup>Pb Via Isomeric Transitions in the Normal-deformed Well*  
August 2002 \$ 12,000

Australian Research Council (ARC) Grants and Awards  
ARC Australian Postdoctoral Research Fellowship  
Dr C.R. Morton  
*Mechanisms for Formation of Heavy Elements*  
June 2000  
– June 2003 \$179,769

ARC QEII Research Fellowships  
Dr M. Dasgupta  
*Fusion Barrier Distributions: A New Approach to Understanding Complex Nuclear Interactions*  
April 1998  
– March 2003 \$360,000

ARC RIEF Award  
University of New South Wales  
Dr A.E. Stuchbery (ANU Participant)  
*Hyperfine Interactions Spectrometer for Probing Dynamic and Static Atomic Environments*  
March 2001 – March 2002 \$200,000

## Plasma Research Laboratory

ACT Government Knowledge Fund  
Dr J. Howard  
*Development of Absolute Thermal Imaging Systems for Industrial Process Monitoring and Control*  
2002 – 2003 \$ 40,000

Dr G.G. Borg and Professor J.H. Harris  
*BushLAN Development of novel VHF Wireless Internet Technology for Rural Australia*  
2002 – 2003 \$ 25,000

Australian-German Joint Research Co-operation Scheme  
Dr J. Howard  
*Application of Innovative Spectral Imaging Camera for Tomographic Studies of High Temperature Magnetically Confined Plasmas*  
2002 \$ 8,340

Australian Research Council (ARC) Grants and Awards

ARC Large Grant  
Associate Professor B. James (U. Sydney), Dr J. Howard and Professor S. Buckman  
*LIF Measurement of Plasma E Field*  
2000  
– 2002 \$250,000  
(Held jointly with University of Sydney)

ARC SPIRT Award  
Professor J.H. Harris, Dr G.G. Borg, Dr N.M. Martin, Dr D. Thorncraft and Mr L. Lungu  
*The Application of Plasma Antennas to Communications and Radar*  
June 2000  
– May 2002 \$ 62,466  
CEA Technologies Pty Ltd component \$ 15,000

Department of Industry, Tourism and Resources  
Professor J. Harris *et al.*  
National Plasma Fusion Research Facility  
December 1995 – December 2002 \$8,700,000

Defence Science and Technology Organisation  
Dr J. Howard  
*Development of a Radiometer to Distinguish Various Sources of IR Radiation*  
2001 – 2002 \$ 90,000

FEI Company for Ion Source  
Professor R.W. Boswell  
*Development of a High Brightness Focussed Ion Source*  
2002 \$ 45,000

MOTOROLA Inc (USA)  
Professor J.H. Harris  
*Application of Plasma Switches to Mobile Personal Communication Systems*  
June 2000 – June 2002 US \$ 54,826

MOTOROLA Postgraduate Scholarship  
Professor R. Scheer and Mr P. Linardakis  
June 2000  
– June 2002 \$ 30,000

## Theory Cluster

### Applied Photonics Group & Nonlinear Physics Group

Australian Academy of Science  
Professor Y. Kivshar  
Research Visit to Japan  
April 2001 – March 2002 \$ 1,800

Professor Y. Kivshar  
The Sir Mark Oliphant Frontiers of Science and Technology Conference Series: Photonic Crystals Down Under Conference  
July  
– October 2002 \$102,200

Australian Academy of Technological Science & Engineering  
Professor J.D. Love & A/Professor S. Fleming (Sydney University)  
Korea-Australia Photonics School, Seoul, Korea  
September 2002 \$ 25,750

Australian German Joint Research Co-Operation Scheme  
Professor Y. Kivshar  
*Generation, Dynamics, and Interaction of Solitary Waves in Photorefractive Crystals and Magnetic Films*  
August 2001 – December 2002 \$ 14,948

Australian Research Council (ARC) Grants and Awards

ARC Australian Postgraduate Awards (Industry)  
Professor J.D. Love & Dr M.C. Elias (ADC Australia Pty Ltd)  
Ms S. Tomljenovic-Hanic  
June 1999 – May 2002 \$ 86,598  
ADC contribution \$ 15,000

Dr S. Huntington (Uni of Melbourne), Professor J.D. Love & Dr A. Carter (Nufern Inc)  
Mr P. Pace  
December 2001 – November 2004 \$ 86,598  
Nufern contribution \$ 15,000

ARC Discovery Project Grants  
Professor Y. Kivshar  
*Nonlinear Photonic Crystals*  
2002  
– 2004 \$207,000

Professor Y. Kivshar (jointly with Dr C. Savage, Faculties)  
*Dynamics of Multicomponent Matter Waves*  
2002 \$ 50,000

ARC Federation Fellowship  
Professor Y. Kivshar  
*Nonlinear Photonics and All-Optical Technologies*  
October 2002 – November 2007 \$1,448,515

Department of Industry, Tourism and Resources – Australian Photonics Cooperative Research Centre  
Professor J.D. Love & Dr A. Ankiewicz  
*Modelling & Design of Light Processing Devices*  
May 1999 – April 2005 \$700,000

Ericsson Australia Pty Ltd  
Professor J.D. Love & Dr A. Ankiewicz  
*Planar Waveguide Design and Fabrication*  
January 2002  
– December 2003 \$100,000

Japan Society for Promotion of Science  
Professor Y. Kivshar  
*Nonlinear Photonic Crystals*  
April 2001 – March 2002 \$ 10,000

US Air Force Far East Office  
Professor Y. Kivshar  
*Nonlinear Photonic Crystals: Physics and Applications*  
May 2002 – May 2003 \$ 15,000

## Optical Sciences Centre

### US Army Research Office (Far East)

Professor N. Akhmediev  
*Four Wave Mixing in Dispersion Managed Optical Fiber Links*  
March 2001  
– February 2002 \$ 25,038

Professor N. Akhmediev  
*Modelling of Active Optical Systems with Nonlinear Amplifiers*  
April 2002 – March 2003 \$ 20,000

## Theoretical Physics

### Australian Academy of Science

Dr S.Y. Kun (TP / DU)  
Research Visit to Japan  
April 2002 – March 2003 \$ 8,300

Dr S.Y. Kun (TP / DU)  
Research Visit to France  
July 2002 – June 2003 \$ 2,500

### Australian-German Joint Research Co-operation Scheme

Dr A.S. Kheifets (also under AMPL)  
*Experimental and Theoretical Study of Atomic Double Ionization by Electron and Heavy Ion Impact: Complete Pictures of the Four-body Break up Dynamics*  
July 2001  
– June 2002 \$ 9,000

Professor R.L. Dewar  
*Turbulence and Transport in Fusion Plasmas: Towards a Paradigm for Computational Modelling of Complex Systems*  
2002 \$ 6,200

### Australian Partnership of Advanced Computing

Dr Shin-Ho Chung  
*Studies on Biological Ion Channels*  
March 2001 – March 2003 \$71,428

### Australian Research Council (ARC) Grants and Awards

ARC Discovery Grant  
Dr Shin-Ho Chung  
*Theoretical Studies on the KcsA Potassium Channel and L-type Calcium Channels*  
2002 --2004 \$231,000

Professor V.V. Bazhanov, and Professor R.J. Baxter  
*Solvable Models on Regular and Random Lattices in Statistical Mechanics and Field Theory*  
December 2002 – December 2004 \$318,000

### University of Queensland

Professor V.V. Bazhanov, and Professor R.J. Baxter (ANU Participants)  
*Algebraic Structures in Mathematical Physics and their Applications*  
July 2002 – July 2004 Total \$457,836  
ANU part \$ 92,000

### ARC Large Grant

Professor M.T. Batchelor  
*Solvable Models and Pattern Formation*  
2002  
– 2004 \$175,000

### ARC NH&MRC Grant

Dr Shin-Ho Chung  
*Investigation of Biological Ion Channels: Theoretical Formulation, Computer Simulation and Experimental Verification*  
2002 --2004 \$620,000

### ARC Postdoctoral Research Fellowship

Dr R. Ball  
*Turbulence and Anomalous Transport in Magnetically Confined Plasmas: A Theoretical and Computational Study of Transport Barrier Bifurcations*  
June 2000  
– June 2003 \$177,009

Dr M. Hoyles  
June 2000 – June 2003 \$166,131

### ARC Research Fellowship

Dr W. Xu  
*Generation of Coherent-hypersound from Semi-conductor Systems*  
(Transferred from University of Wollongong)  
2002 – 2005 \$354,160

### Centre for Mathematics and its Applications

Professor M.T. Batchelor et al  
National Research Symposium – Combinatorics and Integrable Models  
2002 \$ 7,500

### CSIRO

Dr R. Ball  
Centre for Complex Systems Project  
2002 \$ 30,000

### Faculties Research Grant

Professor M.T. Batchelor et al  
*Development of Mathematical Models for Analysing Stromalite Morphogenesis and Understanding their Significance in Paleobiological and Paleoenvironmental Evolution*  
2002 \$ 6,900

### French Embassy, Canberra

Dr S.Y. Kun (TP / DU)  
*Experimental Test of Quantum Dots*  
July 2002  
– June 2003 \$ 5,950

### International Center of Science, Cuernavaca, Mexico

Dr S.Y. Kun (TP / DU)  
*Chaos in Few and Many Body Systems*  
February – March 2002 \$ 3,000

### Institution of Engineers

Professor R.L. Dewar  
International Conference on Plasma Physics (ICPP 2002)  
June 1998  
– November 2002 \$ 5,000

### Japan Society for Promotion of Science

Dr S.Y. Kun (TP / DU)  
*Slow Phase Randomisation in Nanostructures*  
April 2002 – March 2003 \$ 11,200

### Max Planck Institute for Nuclear Physics, Heidelberg, Germany

Dr S.Y. Kun (TP / DU)  
*Stochastic Aspects of Complex Collisions*  
October – November 2002 \$ 4,000

### University of Washington, Seattle, USA

Dr S.Y. Kun (TP / DU)  
*Chaos and Interactions – From Nuclei to Quantum Dots*  
July-- August 2002 \$ 2,500

### School Services

Vice Chancellor's Plan for Growth  
Recruitment and Training of Technical Staff  
January 2001 – December 2003 \$157,500

### General Endowments

*Donation from Personal Estate*  
June 1997 – indefinite \$222,896

### Named Scholarships and Prizes

*Jagadishwar Mahanty Prize* \$ 16,840



## Applied Mathematics

Dr T. Aste

Founding member and member, Board of 'ARIA-Canberra', the Association for the development of collaborative research between Italy and Australia

Dr T. Di Matteo

Founding member and member, Board of 'ARIA-Canberra', the Association for the development of collaborative research between Italy and Australia

Professor S. Hyde

Consultant with CSIRO, mesostructural characterisation of pharmaceutical delivery agents

Expert witness on an international pharmaceutical patent case for Davies Collision Cave, Melbourne

Dr T.J. Senden

Board Member, The Rio Tinto Australian Sciences Olympiads

Consultant, Vita Life Sciences assisting with FDA submission

Member, Program Committee, AIP Physics Congress, 2005

Dr. A.M. Stewart

Vice President (Academic), Treasurer, ANU Branch, National Tertiary Education Union

## Atomic and Molecular Physics Laboratories

Professor S.J. Buckman

Chair, ACT Chapter of the Fulbright Alumni Association

Member, Executive Committee, Gaseous Electronics Conference (USA)

Member, International Scientific Committee, Symposium on the Physics of Ionized Gases (SPIG 21), Soko Banja, Yugoslavia, August 2002

Member, Futures Committee, International Conferences on Photonic, Electronic and Atomic Collisions

Member, Will Allis Prize Committee of the American Physical Society

Professor L.T. Chadderton

Founding Editor, International Journal of Radiation Effects and Defects in Solids

Member, Editorial Advisory Board, Nuclear Tracks and Radiation Measurement

Member, Editorial Advisory Board, International Materials Science Forum

Member, Steering Committee, Bilateral Science & Technology Agreement, Mexico and the Federal Government of Australia

Member, United Nations Committee on Photovoltaic Applications in Less-Developed Countries, UN Centre for Science & Technology for Development

Member, International Committee, Biennial Conference Series on Radiation Effects in Insulators

Honorary Life Member, International Nuclear Track Society, and International Committee, Biennial Conference Series on Particle Tracks in Solids

Member, International Committee, Biennial Conference Series on Quantum Electrodynamics and Statistical Physics

Professor R.W. Crompton

Vice-President, Australian Fulbright Association, ACT Chapter Convenor

Member, International Advisory Board, International Conferences on Atomic and Molecular Data and their Applications

Chair of Board, Rio Tinto Australian Science Olympiads (until June)

Dr S.T. Gibson

Council and Web Membership Database Administrator, Australian Optical Society

Professor B.R. Lewis

Chairman, 14<sup>th</sup> International Conference on Vacuum Ultraviolet Physics, Cairns, Australia, July 2004

Associate Editor, Journal of Quantitative Spectroscopy and Radiative Transfer

Dr J. Lower

Joint Program Coordinator, Atomic, Molecular Physics and Quantum Chemistry (AMPQC) Meeting, AIP 15<sup>th</sup> Biennial Congress, Sydney, Australia, July 2002

Professor E. Weigold

Member, Board, Australian Photonics CRC

Member, Board, CRC for Functional Communication Surfaces

Member, International Scientific Committee, International Conferences on X-Ray and Inner Shell Processes

Member, International Scientific Advisory Committee, International Symposium on (e,2e) Double Photoionization and Related Topics, Frankfurt, Germany, July 2003

Member, International Organizing Committee, Sagamore (International Conference on Charge, Spin and Momentum Densities)

Member, Nominating Committee, American Physical Society Few-Body Topical Group

Member, Australian Academy of Science Committee, Major National Research Facilities

Director, Acton Lasers

Chair, Innovation Access Program – International Science and Technology Competitive Grants Assessment Panel

Chair, Australian Academy of Science 50<sup>th</sup> Anniversary Committee

## Electronic Materials Engineering

Dr Y. Chen

Member, Editorial Board, International Journal of Indian Nanotechnology

Dr R.G. Elliman

Member, Editorial Advisory Board, Nuclear Instruments and Methods B

Member, Editorial Advisory Board, Vacuum

Vice President and President-Elect, Australian Institute of Physics

Member, International Committee, International Conference on Ion Beam Modification of Materials

Member, International Committee, International Conference on Ion Beam Analysis

Member, International Committee, International Conference on Atomic Collisions in Solids

Member, ACT Branch Committee, Australian Institute of Physics

Member, Specialist Committee for Accelerator Science Program, Australian Institute of Nuclear Science and Engineering

Member, Specialist Committee for Environmental Science, Australian Institute of Nuclear Science and Engineering

Member, Program Review Committee, Accelerator Applications Program, Australian Nuclear Science and Technology Organisation

Member, External Advisory Board, Microanalytical Research Centre, University of Melbourne

Member, Divisional Committee, Electronic Materials and Processing Division, International Union of Vacuum Science Techniques and Applications

Professor N. Fletcher

Editor, Acoustics Australia

Associate Editor, Journal of the Acoustical Society of America

Member, Editorial Board, Journal of Sound and Vibration  
 Member, Editorial Board, Applied Acoustics  
 Member, Board, Australian Foundation for Science, Australian Academy of Science  
 Member, Executive Board of FEAST (The Forum for European-Australian Science and Technology Collaboration) representing the Academy of Science, the Academy of Technological Sciences and Engineering, CSIRO and the CRC Association  
 Member, Australian Library Collections Task Force (National Library of Australia)  
 Member, Scientific Advisory Committee, National Acoustic Laboratories  
 Member, Academy of Science Selection Committee for Europe-Australia Science Exchange Awards  
 Member, Building Committee, Australian Academy of Science

#### Professor C. Jagadish

Associate Editor, Journal of Nanoscience and Nanotechnology  
 Member, Steering Committee, IEEE Journal of Lightwave Technology  
 Member, Editorial Board, Journal of Materials Sciences, Materials for Electronics  
 Chair, IEEE Australian Chapter of Electron Devices and Lasers & Electro-Optics Societies  
 Member, Publications Committee, IEEE Electron Devices Society, USA  
 Member, Meetings Committee, IEEE Electron Devices Society, USA  
 Chair, Optoelectronic Devices Technical Committee, IEEE Electron Devices Society, USA  
 Elected Member, Administrative Committee, IEEE Electron Devices Society, USA  
 Member, IEEE Compound Semiconductor Devices and Circuits Technical Committee, The Electron Devices Society  
 Member, IEEE Nanotechnology Technical Committee, The Electron Devices Society  
 Member, IEEE Electron Devices Society Graduate Student Fellowship Selection Committee  
 Member, IEEE Lasers and Electro-Optics Society Aron Kressel Award Selection Committee  
 Member, Administrative Committee, IEEE Nanotechnology Council  
 Chair, IEEE Nano-Optoelectronics and Nano-Photonics Technical Committee, The Nanotechnology Council  
 Professional Advisor, LEDEX Corporation, Taiwan  
 Director, Acton Semiconductors Pty Ltd  
 Member, Program Committee, Symposium on Quantum Dot Sources and Detectors, SPIE's International Symposium on Optoelectronics 2002, San Jose, USA, January 2002  
 Member, Steering Committee, The 23<sup>rd</sup> International Conference on Microelectronics, Nis, Yugoslavia, May 2002  
 Member, Program Committee, The 8<sup>th</sup> International Conference on Electronic Materials, Xian, China, June 2002  
 Co-Chair, Symposium on Materials and Technologies for Electronic and Optoelectronic Devices, The 8<sup>th</sup> International Conference on Electronic Materials, Xian, China, June 2002  
 Chair, International Advisory Committee, 12<sup>th</sup> International Semiconducting and Insulating Materials Conference, Bratislava, Slovakia, July 2002  
 Member, Program Sub-Committee, Active and Compound Semiconductor Devices, OSA Integrated Photonics Research Conference (IPRC 2002), Vancouver, Canada, July 2002  
 Member, Scientific Advisory Committee, 2002 Conference on Optoelectronic and Microelectronic Materials and Devices, Sydney, December 2002  
 Member, Program Committee, 12<sup>th</sup> International Semiconducting and Insulating Materials Conference, Bratislava, Slovakia, July 2002  
 Member, International Advisory Committee, Photonics 2002, 6<sup>th</sup> International Conference on Optoelectronics, Fibre Optics and Photonics, Mumbai, India, December 2002  
 Member, Asia-Australia Program Sub-Committee, IEEE International Semiconductor Laser Conference, Garmisch, Germany, September 2002  
 Member, Optoelectronic Materials and Processing Program Committee, IEEE Lasers and Electro-Optics Society Annual Meeting, Glasgow, UK, November 2002  
 Co-Organizer, 2002 Fall Materials Research Society Meeting, Symposium M, Progress in Compound Semiconductor Materials for Electronics and Optoelectronics Applications, Boston, USA, December 2002

Member, Program Committee, Second IEEE Conference on Nanotechnology, Washington DC, USA, August 2002  
 Chair, Technical Program Committee, 3<sup>rd</sup> IEEE Conference on Nanotechnology, San Francisco, USA, August 2003  
 External Member, Promotions Committee, University of Technology, Sydney  
 Member, International Advisory Committee, Inter University Research Institute for communications Technology, Eindhoven University of Technology, The Netherlands  
 Member, International Advisory Board, MacDiarmid Institute of Advanced Materials and Nanotechnology, New Zealand

#### Dr M.C. Ridgway

Member, Organising Committee, 14<sup>th</sup> International Conference on Vacuum Ultraviolet Radiation Physics, Cairns, Australia, July 2004  
 Member, Organising Committee/Program Committee, Australian Synchrotron Users Workshop, Melbourne, Australia, January 2003  
 Chair, Photon Factory Specialist Committee, Australian Synchrotron Research Program  
 Member, Executive Committee, Australian Synchrotron Research Program  
 Chair, EXAFS Beamline Development Committee, Australian Synchrotron Project  
 Member, National Scientific Advisory Committee, Australian Synchrotron Project

#### Dr H.H. Tan

Treasurer, IEEE ACT Section  
 Member, Scientific Advisory Committee, 2002 Conference on Optoelectronic and Microelectronic Materials and Devices

#### Professor J.S. Williams

Member, Editorial Board, Radiation Effects and Defects in Solids  
 President, Australian Materials Research Society  
 Member, Board, Australian Materials Research Institute (from October)  
 Member, Board, CRC for Functional Communication Services (from October)  
 Member, Board, Australian Photonics CRC (from October)  
 Member, International Advisory Committee, International Conference on Ion Implantation Technology  
 Member, Adhering Body Commission, International Union of the Materials Research Society  
 Professional Advisor, LEDEX Corp, Taiwan  
 Director, Acton Semiconductors Pty Ltd

#### Ms T.D.M. Weijers

Tutor and demonstrator, School of Physics, Australian Defence Force Academy

## Laser Physics Centre

#### Dr K.G.H. Baldwin

Member, Australian Research Council Expert Advisory Committee: Mathematics, Information and Communication Sciences  
 Member, International Council on Quantum Electronics  
 Member, General Organising Committee, International Conference on Laser Spectroscopy, Palm Cove, Australia, July 2003  
 Chair, Lasers and Spectroscopy Liaison Committee, Australian Conference on Optics, Melbourne, Australia, December 2003  
 Member, National Committee for Spectroscopy, Australian Academy of Science  
 Member, National Committee for Physics, Australian Academy of Science  
 Chair, Science Policy Committee, Federation of Australian Scientific and Technological Societies  
 Member, ACT Branch Committee, Australian Institute of Physics  
 Member, Science Policy Committee, Australian Institute of Physics  
 Member, Australasian Council on Quantum Electronics

#### Dr W. Krolikowski

Member, Technical Committee, International Workshop on Nonlinear Optics Applications NOA2002, Lukecin, Poland, September 2002

#### Professor N. B. Manson

Member, International Advisory Committee, International Conference on Luminescence  
 Member, International Advisory Committee, International Conference on Dynamical Processes in Excited State of Solids

#### Dr M. Samoc

Member, Editorial Board, Materials Science

#### Dr M. Sellars

Member, International Advisory Committee, International Conference on Spectral Hole Burning

## Nuclear Physics

#### Dr A.P. Byrne

Member, Committee, ACT Branch of the Australian Institute of Physics  
 Member, Committee (Sec/Treasurer), Nuclear and Particle Physics Group, Australian Institute of Physics  
 Member, Organising Committee, 19<sup>th</sup> ANISE Nuclear and Particle Physics Conference, Sydney, Australia, July 2002  
 Referee, Engineering and Physical Sciences Research Council, UK

#### Dr M. Dasgupta

Member, Committee, Nuclear and Particle Physics Group, Australian Institute of Physics  
 Supervisor, CSIRO Student Research Scheme

#### Professor G.D. Dracoullis

Member, Committee, Nuclear and Particle Physics Group, Australian Institute of Physics  
 Member, North America Committee, Australian Academy of Science, International Program of Scientific visits  
 Member, Program Advisory Committee of the 88-inch Cyclotron (including Gammasphere), Lawrence Berkeley National Laboratory, USA  
 Member, Reactor Working Group, Australian Academy of Science  
 Member, Program Committee, 19<sup>th</sup> ANISE Nuclear and Particle Physics, Sydney, Australia, July 2002  
 Member, International Advisory Committee, Conference on Nuclear Structure, Crete, July 2003  
 Member, International Advisory Committee, Conference on Frontiers of Nuclear Structure, Berkeley, USA, July 2002  
 ANU Representative, ANU-EPSC Agreement: Beam time allocation, Engineering and Physical Sciences Research Council (UK)  
 Referee, Senior Research Fellowship Scheme, Engineering and Physical Sciences Research Council (UK)  
 Expert Referee, Research Grants; Nuclear Physics Programme, Engineering and Physical Sciences Research Council (UK)  
 Evaluator, Evaluation of Research Outputs of Principal Grant Holders, Foundation for Research Development (South Africa)

#### Dr L.K. Fifield

Member, Scientific Advisory Committee, 9<sup>th</sup> International Conference on Accelerator Mass Spectrometry, Nagoya, Japan, September 2002  
 Member, Scientific Advisory Committee, 17<sup>th</sup> International Radiocarbon Conference, Wellington, New Zealand, September 2003  
 External Reviewer, Accelerator Mass Spectrometry Project at ANSTO, December 2002  
 Expert Adviser, Consultant, AMS program at the Tandem Laboratory, Buenos Aires, Argentina  
 Major Grant Proposal Referee, United States NSF major facilities proposal, November 2002  
 ANU nominee, ACT Radiation Council

#### Dr D.J. Hinde

Member, International Advisory Committee, 8<sup>th</sup> International Conference on Nucleus-Nucleus Collisions, Moscow, Russia, June 2003  
 Member, International Advisory Committee, FUSION03 International Conference, Sendai, Japan, November 2003



Dr A.E. Stuchbery

Member, Committee, ACT Branch, Australian Institute of Physics

Chair, Nuclear and Particle Physics Group, Australian Institute of Physics

Member, Program Committee, 19<sup>th</sup> AINSE Nuclear and Particle Physics, Sydney, Australia, July 2002

Expert Referee, Research Grants; Nuclear Physics Program, Engineering and Physical Sciences Research Council (UK)

Expert Referee, Concerted Action Program of the Ministry of Education of Flanders (Belgium), Katholieke Universiteit Leuven

Dr A.N. Wilson

Member, Committee, ACT Branch of Australian Institute of Physics

Member, Sub-Committee for awarding prizes and travel grants, ACT Branch of Australian Institute of Physics

## Plasma Research Laboratory

Dr B.D. Blackwell

Service to Stellarator Physics Advisory Committee, Princeton Plasma Physics Laboratory, Princeton, USA

Dr G.G. Borg

Editor, Czech Journal of Physics

Draft Report Preparation for the Standing Committee on Communications, Information Technology and the Arts. Inquiry into Wireless Broadband Technologies. Parliament of Australia, tabled 11 November 2002

Professor R.W. Boswell

Vice-President, Committee, 12<sup>th</sup> Gaseous Electronics Meeting, Batemans Bay, Australia, February 2002

Member, Asia Pacific Conference on Plasma Science and Technology

Member, Forum for Europe and Australian Science and Technology

Professor J.H. Harris

Member, Stellarator Physics Advisory Committee, Princeton Plasma Physics Laboratory, Princeton, USA

Member, Plasma Specialist Committee, Australian Institute of Nuclear Science and Engineering

Member, Executive Committee, International Energy Agency Implementing Agreement for Research on Stellarators

Chairman, 13<sup>th</sup> International Stellarator Workshop, Canberra, Australia, February 2002

Draft Report Preparation for the Standing Committee on Communications, Information Technology and the Arts. Inquiry into Wireless Broadband Technologies, Parliament of Australia, tabled 11 November

Dr J. Howard

Member, Editorial Board, Plasma Physics and Controlled Fusion

Organizer, 6<sup>th</sup> Japan-Australia Plasma Diagnostics Workshop, University of Sydney, December 2002

Dr M.G. Shats

Member, Program Committee, 11<sup>th</sup> International Congress on Plasma Physics, Sydney, Australia, July 2002

## Theory Cluster

### Applied Photonics Group & Nonlinear Physics Group

Professor J.D. Love

Advisory Member for Far East & Australia, European Conference on Optical Communications, Italy, September 2003

Chair, Program Reference Group, Canberra Institute of Technology

Co-Chair, International Advisory Committee, OptoElectronics & Communications Conference

Co-Convenor, Korea-Australia Photonics School, Seoul, Korea, September 2002

Co-Convenor, Singapore-Australia Photonics School, Singapore, September 2003

Co-Convenor, Education & Training Workshop, CRC Association Conference, Canberra, Australia, May 2003

Convenor, Symposium on Waveguides, International Congress on Industrial & Applied Mathematics, Sydney, Australia, July 2003

Deputy Chair, Organising Committee, Australian Institute of Physics Congress, Sydney, Australia, July 2002

Director, ACT Siemens Science & Engineering Experience

Director, Education & Training, Australian Photonics CRC

Director, Photonics Institute, Bruce, ACT

Honorary Ambassador for Canberra

International Advisor, Network Technology Research Centre, Nanyang Technological University, Singapore

Member, Knowledge Based Economy Board, ACT Government

Member, Knowledge Fund Panel, ACT Government

Member, Korea-Australia Photonics Association Committee

Member, Council of the Australian Optical Society

Member, Executive Committee, Australian Photonics CRC

Member, Executive Committee, Photonics Institute

Member, Organising Committee, Australian Conference on Optical Fibre Technology/Conference on the Optical Internet, Melbourne, Australia, July 2003

Member, Organising Committee, Australian Institute of Physics Congress, Canberra, Australia, 2005

Member, Steering Committee, Australian Conference on Optical Fibre Technology

Member, Technical Subcommittee, 5<sup>th</sup> Pacific Rim Conference on Lasers & Electro-Optics, Taiwan, July 2003

Postgraduate Research Student Supervisor: La Trobe University

Postgraduate Research Student Supervisor: University of Melbourne

Postgraduate Research Student Supervisor: University of Sydney

Program Manager, Photonic Integrated Circuits, Australian Photonics CRC

Senior Vice-President Education, Photonics Institute, Bruce, ACT

Professor Yu.S. Kivshar

Associate Editor, Physical Review E

Member, Advisory Board, CHAOS: An Interdisciplinary Journal of Nonlinear Science

Guest Editor, Special Issue of CHAOS: Nonlinear Localized Modes: Fundamental Concepts and Applications

Guest Editor,

IEEE Journal of Selected Topics in Quantum Electronics on Nonlinear Optics

Member, Advisory Board, Fitzroy Dearborn Encyclopedia of Nonlinear Science

Member, Program Committee, International Workshop on Optical Solitons: Theory and Experiment, Chennai, India, January 2002

General Co-chair, OSA Topical Meeting on Nonlinear Guided Waves and Applications, Stresa, Italy, September 2002

Chair and Organiser, International Workshop and Winter School: Photonic Crystal Down Under, Canberra, August 2002

## Optical Sciences Centre

Professor N.N. Akhmediev

Member, Scientific Program Committee, 3<sup>rd</sup> IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena, Georgia, USA, April 2003

Member, Program Committee, 15<sup>th</sup> International Physics Summer School: Dynamic Summer, Topics in Nonlinear Dynamics, Collective Phenomena and Complexity, Canberra, Australia, January 2002

Member, Technical Program Committee, Nonlinear Guided Waves and Their Applications Conference, Stresa, Italy, September 2002

## Theoretical Physics

Dr R. Ball

Member, Committee, Minutes Secretary, ACT Branch of the Australian Institute of Physics

Liaison Officer, Forum for European-Australian Science and Technology Cooperations (FEAST-France)

Member, Women in Science Enquiry Network Inc.

Member, Australian and New Zealand Industrial and Applied Mathematics, Australian Mathematical Society

Professor M.T. Batchelor

Member, Advisory Board, Journal of Physics A

Member, Medal Committee, Australian Mathematical Society

Professor R.J. Baxter

Member, Editorial Board, Journal of Physics A, Mathematical and General

Member, Editorial Board, Journal of Geometric and Functional Analysis

Member, Editorial Board, Journal of Statistical Physics

Member, Advisory Board, Physica A

Member, Editorial Committee, Philosophical Transactions of the Royal Society, Series A

Member, Editorial Board, Annals of Combinatorics

Member, Editorial Board, Theoretical Physics and Related Mathematics

Dr M. P. Das

Member, Editorial Board, Condensed Matter and Materials Communications

Co-Convenor, Annual Gordon-Godfrey Research Workshops on Condensed Matter Physics

Member, International Advisory Committee, International Workshops on Condensed Matter Theories

Member, International Advisory Committee, International Conference on Physics at Surfaces and Interfaces, Puri, India, March 2002

Member, International Advisory Committee, International Conference on Phonons in Condensed Materials, Bhopal, India, January 2003

Member, Local Organising Committee, 5<sup>th</sup> International Conference on Excitonic Processes in Condensed Matter, Darwin, Australia, July 2002

Professor R.L. Dewar

Member, Commission 16, International Union of Pure and Applied Physics

Member, National Committee for Physics

Chair, ACT Branch Committee, Australian Institute of Physics

Chair, International Congress on Plasma Physics, Sydney, Australia, July 2002

Member, Local Organising Committee, WSEF2002-World Space Environment Forum, Adelaide, Australia, July 2002

Alternate, Executive Committee, IEA Implementing Agreement on the Development of the Stellarator Concept

Member, Board of CSIRO Complex Systems Science Centre

Dr M. Gulacsi

Associate Editor, Philosophical Magazine

Deputy Director General, International Biographical Center, UK

Dr K. Kumar

Member, Editorial Board, Transport Theory and Statistical Mechanics

Dr B.A. Robson

Member, Program Committee, 19<sup>th</sup> AINSE Nuclear and Particle Physics, Sydney, Australia, July 2002

Dr S. Sen

Associate Editor, Journal of Fusion Energy

Organiser and Chair, Fusion Meeting, SCI-2003, Orlando, USA, July 2003

Consultant, Fusion Research Centre, Hampton University, USA

## Outreach Activities



The School's Founder's Day was held on 4<sup>th</sup> October with invited guests from the ANU, government organisations, industry and the media, as well as former employees. It is a day of celebration of our Founder, Sir Mark Oliphant. The following members of staff were Founder's Day speakers:

**Professor Stephen Hyde, Applied Mathematics**

*Ancient Life Recreated!*

**Dr Anna Wilson, Nuclear Physics**

*The Search for the Missing Links*

**Professor Barry Luther-Davies, Laser Physics Centre**

*Spitting out Photonic Chips*

**Dr Andrew Truscott, Atomic and Molecular Physics Laboratories**

*The Coldest Thing in the Universe or How to make the World's Best Beer Chiller*

**Professor John Love, Director's Unit**

*The School's Contribution to Teaching and Outreach*

**Dr Michael Shats, Plasma Research Laboratory**

*Turbulence in the Helic: A View from Jupiter*

**Ms Penelope Lever, Electronic Materials Engineering**

*Going Dotty in EME*

**Professor Murray Batchelor, Theoretical Physics**

*Living Rocks*

**Mr Michael Blacksell, Electronics Unit**

*The RSPHysSE Supporters' Web*

The Research School of Physical Sciences and Engineering was a major contributor to the National Institute of Physical Sciences (NIPS) outreach activities during 2002. Some of the NIPS programs and activities, in which the School was involved, were the 'Adopt a Physicist' Outreach Program, the National Youth Science Forum, the National Science Teachers Summer School, the Student Research Scheme, the Australian Science Festival (involving exhibitions, workshops and seminars) and the ACT Careers Market.

The School was also involved in the NIPS Public Lectures. Professors Jim Williams and John Love presented these lectures, which were held at the Questacon National Science and Technology Centre during the Australian Science Festival.

The School was a major contributor to the ANU technology tour: 'The Machines that Ate Acton' – a combined event between NIPS, the Centre for Science and Engineering of Materials (CSEM) and the National Institute of Engineering and Information Sciences (NIEIS). This activity involved public tours of some of the ANU's largest research facilities, which included the School's Particle Accelerator, the H1 Helic, and the Big Dish.



*Dr Andrew Truscott demonstrates atomic cooling with ping pong balls and a gas cylinder during his Founders Day talk*



*Professor Stephen Hyde debates the merit of some primitive fossils on Founder's Day*

Part of the 2002 NIPS sponsorship within the School included a CPAS workshop for students and various seminars and lectures by both internal and external visitors including Professor David Green, Complex Systems Group, Charles Sturt University; Professor Stan Whitcomb, Detector Group Leader from the US LIGO project; Professor Lawrence Cram, ARC Photon Science and Technology Centre of Excellence; and the School's own Professor Rod Boswell who was among the ANU and NASA panellists featuring Apollo 17 astronaut, Dr Harrison Schmitt.

### The National Institute of Physical Sciences' 'Adopt a Physicist' Outreach Program'

The National Institute of Physical Sciences took over the organisation of the 'Adopt-a-Physicist' program in 2002. The program, previously organised by the ACT Branch of the Australian Institute of Physics (AIP) and now in its fifth year of operation with continuing support by the ACT AIP, is designed to bring cutting edge physics to year-11 and -12 students in ACT secondary colleges. Students from the School participating in the program included Vicky Au (DU/PRL), Elliot Fraval (LPC), Joanne Harrison (LPC), Peter Linardakis (PRL), Jevon Longdell (LPC), Glen McCarthy (LPC), Ben McMillan (TP), David Pretty (PRL), Gerd Schroeder (AM), Nat Smith (EME) and Elena Wilson (LPC).

### National Youth Science Forum

The Forum provides a unique experience for year-11 students to visit the School and meet with leading scientists and tour the laboratories and major national research facilities. This year 160 students visited the School in two one-weekly sessions in January. The help of staff members and students from various departments was very much appreciated. For example, Aidan Byrne and Nanda Dasgupta (both from NP) ran workshops and conducted tours of the School's Heavy-Ion Facility and Dr Dasgupta attended as guest expert in panel discussions at the forum. Sanju Deenapanry from EME was also involved with the forum.

### Fourth National Science Teachers' Summer School

The Summer School was held at the ANU from 13-19 January with 42 science teachers participating from schools throughout Australia. Neil Manson coordinated the visit of the physics group to the School with specialist activities provided by Scott Collis (plasma physics), Nanda Dasgupta and Aidan Byrne (nuclear physics), Stephen Gibson (atomic and molecular physics), Vince Craig (surfaces), Robert Elliman (electronic materials) and Neil Manson (lasers).

### Australian Science Festival

Jim Williams and John Love presented the NIPS Public Lectures, which were held at the Questacon National Science and Technology Centre during the Australian Science Festival. Lehoa Scruton (AMPL), Scott Collis, Fenton Glass, David Pretty, Hua Xia and John Wach (all from PRL) were involved with the award winning ANU stand at the Amazing World of Science exhibition during the Festival. Mark Knackstedt and Ray Roberts (from AM) were also involved in the Australian Science Festival. All ANU's activities for the Festival were coordinated by Christine Denny.

### National Science Week: 'The Machines that Ate Acton'

This activity involved visits by 18 groups of science teachers, students and members of the general public from 20-23 August to give the participants an insiders view of the technology of the big machines at the ANU that most people never get to see. Nanda Dasgupta, Aidan Byrne and Greg Lane (all from NP) conducted the tour of the 14 UD accelerator, Boyd Blackwell (PRL) the tour of the H1 heliac and Tim Wetherell, David Salt(CSEM) and Heather Slater(NIEIS) acted as overall 'tour guides'.

The virtual reality theatre called the WEDGE, initially developed in the Plasma Research Laboratory, has been moved to the eScience course in the Faculty of Engineering and Information Technology and is being used by Henry Gardner of that Department for student programs.

### Applied Mathematics

Stephen Hyde and Andy Christy took part in the ABC documentary, "Alien Underworld", screened nationally for Science Week, in August.

Stephen Hyde and Gerd Schröder, together with Gilbert Riedelbauch (ITA, ANU) designed and manufactured a sculptural piece "Saddle Polyhedra", exhibited at the Institute of the Arts "Factor of Ten" exhibition in October.

Mark Knackstedt presented the Physics and Engineering of Underground Reservoirs: Oil and Gas Fields and Groundwater Aquifers, "five-day course on flow in porous media" at the Institute of Advanced Studies in Basic Sciences, Zanjan, Iran (27 December 2001 - 2 January 2002).

Stuart Ramsden presented a talk entitled 'Computation and Visualization of Hyperbolic Tilings on Minimal Surfaces' to the OzViz 2 Visualization Conference in Sydney, 2–3 December.

## Electronic Materials Engineering

Rob Elliman presented the ACT Branch of the Australian Institute of Physics Lecture: "Ion Implantation Technology"

Professor C. Jagadish visited IEEE Electron Devices Society Chapters in Sweden, Singapore, West Ukraine, Central Ukraine and Yugoslavia and gave Distinguished Lectures on "Quantum Well Intermixing for Integration of Optoelectronic Devices". He also gave an overview of the Research School and National Institute of Physical Sciences.

## Laser Physics Centre

Glen McCarthy presented talks on Photonics at Calwell High School, Radford College, Dickson College and St Clare's College.

Matt Sellars organised a three-hour tour of the Laser Physics Centre for a class of 15 Electronic Engineers from the University of Canberra.

## Nuclear Physics

Keith Fifield gave a talk entitled Nuclear Issues In Australia to the ANZAAS Youth Forum on 30 July. He also taught a three-hour laboratory session for the ADFA Environmental Physics course (2nd year) on 25 September. Vladimir Levchenko and Tim Barrows assisted with the practical part of the session. The topic was The Global Carbon Cycle And The Role Played By AMS Radiocarbon Dating. This is closely linked to one of the principal topics of the course, which is the physics of the Greenhouse Effect and the role played by  $\text{CO}_2$ . The session consisted of an introductory lecture, a tour of the accelerator facility, and a laboratory component where the students followed the entire

process of converting a charcoal sample to graphite ready for the ion source.

Nanda Dasgupta was guest speaker at the Launch of the CSIRO Student Research Scheme.

Aidan Byrne and Nanda Dasgupta co-supervised two students from the CSIRO Student Research Program during the year.

Greg Lane gave two lectures on "What It Is To Be A Scientist?" to the year-9 science students at St Francis Xavier High School in February and a lecture on the subjects of "Nuclear Physics and What Scientists Do" to the year-12 physics class at Copland College in September.

Two 3<sup>rd</sup> year BSc Computing, Software Engineering students from the University of Canberra, Jonathan Stefaniak and Scott Rees visited the Department of Nuclear Physics from March to December for an average of sixteen hours per week, to undertake a LINAC cryogenics control project to develop a graphical user interface program, supervised by Tibor Kibédi.

Anna Wilson was closely involved in arranging the Women in Physics Lecture in Canberra, which is primarily aimed at high school students, in the hope of encouraging them to study physics at a higher level.

## Theory Cluster

Andrew Stevenson gave several presentations on photonics. These were talks and short courses given as part of his outreach and professional development roles in the Photonics Institute, and included short courses for organisations and TAFE teachers, orations and presentations at school teachers conferences and workshops, information sessions for school careers advisors, high school students, the general public and visiting overseas delegations. These presentations were primarily of an informative, outreach or educative nature.



Professor Jim Williams delivers a NIPS Public Lecture at the Questacon National Science and Technology Centre during the Australian Science Festival

## Workshops and Conferences

### Applied Mathematics

Applied Mathematics Kioloa Workshop, 19–22 November. Three days of talks by Department staff and students, including invited guests from Germany and Canberra.

### Atomic and Molecular Physics Laboratories

12th Gaseous Electronics Meeting, Murramarang Resort, Batemans Bay, NSW, 3–6 February. The 12th GEC was jointly organised by the Plasma Research Laboratory and the Atomic and Molecular Physics Laboratories with Professors Boswell and Buckman as co-Chairs. Despite (or perhaps because of) the 250 mm of rain that fell during the entire duration of the meeting, it was a great success. Traditionally a small, focussed meeting, more than 50 delegates attended and about 30% of these were from overseas. The meeting is intended to cover topics from the fundamental to the very applied aspects of gaseous electronics and a broad range of topics were canvassed in a series of invited talks and posters sessions.

### Nuclear Physics

The inaugural ACT Teachers' Summer School – 'New Developments in Physics' was held from 21–25 January in the Department of Nuclear Physics. Teachers from sixteen ACT schools participated. The School was designed, after consultation with teachers, to provide a fascinating and practical tour of new developments in three areas of physics that have experienced significant advances in recent years: photonics, nuclear physics and astrophysics, using lectures, experiments and visits to laboratory facilities. The Department of Physics, Faculty of Science, Department of Nuclear Physics, Research School of Physical Sciences and Engineering and the Research School of Astronomy and Astrophysics all participated.

The second annual Workshop on Nuclear Techniques, organised by Dr Aidan Byrne, was held from 23–27 September in the Department of Nuclear Physics for undergraduate students from the University of Wollongong and graduate students from the Department of Physics, Faculty of Science and the School of Physics, ADFA.

### Plasma Research Laboratory

The 13<sup>th</sup> International Stellarator Workshop was held at the ANU from 25 February – 1 March. The Workshop, chaired by Professor Jeffrey Harris, attracted over 100 participants from a wide range of overseas institutions, as well as a number of national



*Participants in the ACT Teachers' Summer School – 'New Developments in Physics'*





Participants in the second annual Workshop on Nuclear Techniques

delegates. Topics covered by the Conference included recent experimental projects; transport and confinement improvement; MHD equilibrium and stability; turbulence and plasma heating; diagnostics; configuration optimisation, and new devices and reactor studies. The proceedings are available at [www.rphysse.anu.edu.au/admin/stellarator](http://www.rphysse.anu.edu.au/admin/stellarator) or in CD-format.

The 6<sup>th</sup> Biannual Japan-Australia Plasma Diagnostics Workshop was held at the University of Sydney from 9–11 December. The Workshop was organised by Dr J. Howard and Associate Professor B.W. James (USyd) and attracted over 25 participants, including 10 from Japan.

## Theory Cluster

### Applied Photonics Group & Nonlinear Physics Group

Photonic Crystals Down Under, ANU, 18–23 August. Professor Yuri Kivshar was the Chair and Organiser of the first conference, part of the Sir Mark Oliphant Conference Series. The conference was attended by 100 delegates.

### Theoretical Physics

The 15<sup>th</sup> Canberra International Physics Summer School - Dynamic Summer: *Topics in Nonlinear Dynamics, Collective Phenomena and Complexity* was held from 21 January – 12 February and convened by Dr Rowena Ball.



Participants in the 13<sup>th</sup> International Stellarator Workshop

The Summer School was held under the auspices of the Centre for Complex Systems with principal funding and administrative support from the Department of Theoretical Physics. It was also supported by the Asia Pacific Center for Theoretical Physics as an external activity.

The purpose of the School was to present an interdisciplinary perspective on modern approaches to understanding nonlinear processes and the emergence of structure, including chaotic structures and turbulence. Dynamic Summer was targeted towards third and fourth year and graduate students, and also researchers, in physical sciences or mathematics from Australian and foreign universities. Sixty-two participants, including a number from overseas, heard from nine excellent lecturers over two weeks.

The 11<sup>th</sup> International Congress on Plasma Physics was held in Manly, NSW from 15–19 July and was chaired by Professor Robert Dewar.

The biennial International Congresses on Plasma Physics (ICPPs) are the most international of the full-spectrum plasma physics conferences. The 2002 Congress incorporated the 6<sup>th</sup> Asia Pacific Plasma Theory Conference, the 24<sup>th</sup> Australian Institute for Nuclear Science and Engineering (AINSE) Plasma Science and Technology Conference, and the 6<sup>th</sup> Japan-Australia Plasma Theory and Computation Workshop. It was attended by 292 delegates from around the world. The Congress was underwritten by the Australian Institute of Physics, The Research School of Physical Sciences and Engineering's Department of Theoretical Physics and Plasma Research Laboratory, and the University of Sydney. The organisation of the Congress was predominantly done by the School of Physics, University of Sydney, and the Research School of Physical Sciences and Engineering, the latter being primarily responsible for the production of the Proceedings.

The 12<sup>th</sup> Gordon-Godfrey Workshop on Condensed Matter Physics: Condensed Matter at Meso- and Nano-scales, was held on 19 December at the Coogee Bay Hotel, Sydney, and was organised by Dr M.P. Das and Dr W. Xu.

## Visitors

### Applied Mathematics

Dr C. Fretigny, ESPCI, France  
Mr T. Hiester, Max-Planck-Institut für Metallforschung, Germany  
Dr D. Hutmacher, National University of Singapore, Singapore  
Mr D. Kaneko, Hokkaido University, Japan  
Dr T. Kaneko, Kagoshima University, Japan  
Dr J. Ketoja, KCL Science and Consulting, Finland  
Dr K. Mecke, Max-Planck-Institut für Metallforschung, Germany  
Professor B. Milthorpe, University of New South Wales  
Dr K. Niskanen, KCL Science and Consulting, Finland  
Professor W.V. Pinczewski, University of New South Wales  
Dr E. Wanless, Newcastle University

### Atomic and Molecular Physics Laboratories

Professor C. Brion, University of British Columbia, Canada  
Dr A. Dorn, Max-Planck-Institute for Nuclear Physics, Germany  
Professor M. Ginter, University of Maryland, USA  
Dr M. Jacka, York University, UK  
Dr F. Mills, Jet Propulsion Laboratory, USA  
Professor M.A. Morrison, University of Oklahoma, USA  
Professor R. Newell, University College, UK  
Mr A. Pratt, York University, UK  
Professor G. Rempe, Max-Planck-Institut für Quantenoptik, Germany  
Professor A.D. Stauffer, York University, Canada

### Electronic Materials Engineering

Professor D. Cockayne, Oxford University, UK  
Professor D. Deppe, University of Texas at Austin, USA  
Professor G. Dohler, University of Erlangen, Germany  
Dr D.P. Fichtner, University Federal do Rio Grande do Sol, Brasil  
Professor M. Gal, University of New South Wales  
Dr A. Li, LEDEX Corporation, Taiwan  
Dr R. Mari'anne, University of Bonn, Germany  
Professor J. Poate, Axcelis Technologies, USA  
Professor D. Pulfrey, University of British Columbia, Canada  
Dr B.Q. Sun, University of New South Wales  
Professor R. Vianden (jointly with NP), University of Bonn, Germany  
Professor W. Wesch, Friedrich-Schiller University Germany  
Dr M. Zhang, University of New South Wales  
Dr J. Zou, University of Sydney

### Laser Physics Centre

Dr O. Bang, Technical University, Denmark  
Dr T. Bauer, Laser Zentrum Hannover e.V., Germany  
Dr A. Boiko, Electro Optic Systems, Canberra  
Mrs M. Brauers, BSC Hogeschool Limburg, Belgium



Ms M. Brennan, Trinity College, Dublin, Ireland  
Professor O.N. Krokhin, Russian Academy of Sciences, Russia  
Dr T.V. Marinina, Russian Academy of Sciences, Russia  
Professor P.N. Prasad, State University of New York at Buffalo, USA  
Professor P. Reineker, University Ulm, Germany  
Professor M. Sentis, CNRS, Universite Aix-Marseille II, France  
Dr A.N. Starodub, Russian Academy of Sciences, Russia  
Dr O. Uteza, CNRS, Universite Aix-Marseille II, France  
Dr .A. Zakery, Shiraz University, Iran  
Dr I.N. Zavestovskaya, Russian Academy of Sciences, Russia

## Nuclear Physics

Professor P. Barker, University of Auckland, New Zealand  
Dr B. Barrett, University of Arizona, USA  
Dr N. Curtis, University of Birmingham, UK  
Dr W. Catford, University of Surrey, UK  
Dr D. Cullen, University of Manchester, UK  
Dr N. Clarke, University of Birmingham, UK  
Dr P. Day, University of Manchester, UK  
Dr S. Fox, University of York, UK  
Dr M. Freer, University of Birmingham, UK  
Professor B. Fulton, University of York, UK  
Professor H. Gaeggler, University of Berne, Switzerland  
Dr B. Giraud (jointly with TP), CEA Saclay, France  
Dr B. Greenhalgh, University of York, UK  
Dr K. Hagino, Kyoto University, Japan  
Dr D. Hahn, Brookhaven National Laboratory, USA  
Dr S. Karataglidis, University of Melbourne  
Professor J. Lisle, University of Manchester, UK  
Dr D. Mahboub, University of Surrey, UK  
Professor D. Oughton, Agricultural University of Norway, Norway  
Professor A. Poletti, University of Auckland, New Zealand  
Professor P. Povinic, IAEA Marine Laboratory, Monaco  
Professor A. Rozenfeld, University of Wollongong  
Dr N. Soic, University of Birmingham, UK  
Professor R. Vianden (jointly with EME), University of Bonn, Germany  
Dr R. Ward, Keele University, UK  
Dr C. Wheldon, University of Surrey, UK  
Dr V. Ziman, University of Birmingham, UK

## Plasma Research Laboratory

Mr A. Danielsson, Chalmers University of Technology, Sweden  
Professor P. Diamond, University of California at San Diego, USA  
Associate Professor A. Fredriksen, University of Tromso, Norway  
Professor I. Hutchinson, Massachusetts Institute of Technology, USA  
Dr J. Johnson, Princeton University, USA  
Dr D.L. Rudakov, University of California at San Diego, USA  
Dr M. Yokoyama, National Institute for Fusion Science, Japan

## Theory Cluster

### Applied Photonics Group & Nonlinear Physics Group

Dr H. Benner, Technische Universität Darmstadt, Germany  
Mr S. Brown, Business ACT, Canberra  
Dr A. Champneys, University of Bristol, UK  
Dr D. Gramotneev, Queensland University of Technology  
Professor B-Y. Gu, Chinese Academy of Sciences, China  
Professor M. Gu, Swinburne University of Technology  
Mr R. Holgate, Business ACT, Canberra  
Dr G. Kalbermann, Department of Soil and Water, Israel  
Dr D-H. Kim, Korean Photonics Technology Institute, Korea  
Dr N. Krause, Bandwidth Foundry, Sydney  
Dr F. Ladouceur, Bandwidth Foundry, Sydney  
Dr D. Lilley, Swinburne University of Technology  
Professor M. Midrio, University of Udine, Italy  
Dr L. Nguyen, Defence, Science and Technology Organisation, Salisbury  
Professor T. O'Neil, University of California at San Diego, USA  
Dr L. Pismen, Technion, Israel  
Professor P.N. Prasad, State University of New York at Buffalo, USA  
Dr T. Priest, Defence, Science and Technology Organisation, Salisbury  
Ms C. Rayner, Questacon, Canberra  
Mr S. Saunders, ACT Industry Training Advisory Body, Canberra  
Dr M. Straub, Swinburne University of Technology  
Mr D. Thorncraft, Bishop Innovation Ltd, Sydney  
Professor A. Slavin, Oakland University, USA

### Optical Science Centre

Dr I. Gabitov, Los Alamos National Laboratory, USA

### Theoretical Physics

Professor F. Alcaraz, Instituto de Fisica de Sao Carlos, Brazil  
Dr F. Cheng, Princeton University, USA  
Professor H. Friedrich, Technische Universität München, Germany  
Dr B. Giraud, (jointly with NP), CEA Saclay, France  
Professor H. Jie, Natural Science Foundation of China, China  
Professor N. Joshi, University of Sydney  
Dr A. Kendl, Max Planck Institute for Plasma Physics, Germany  
Professor S. Khoroshkin, Institute for Theoretical and Experimental Physics, Russia  
Professor D. Li, University of Science and Technology at Hefei, China  
Dr D. Liley, Swinburne University of Technology  
Professor L.B. Lin, Sichuan University, China  
Mr J. McCloughan, Sydney University  
Professor B. McCoy, State University of New York at Stony Brook, USA  
Professor J. McGuire, Florida Atlantic University, USA  
Professor L. Morowska, Queensland University of Technology  
A/Professor P. Pearce, University of Melbourne  
Dr A. Prentice, Monash University  
Professor P. Reineker, University of Ulm, Germany



Professor V. Rittenberg, University of Bonn, Germany  
 Dr M. Rodriguez-Plaza, University of Madrid, Spain  
 Dr K. Sakai, University of Tokyo, Japan  
 Professor V. Tsytovich, General Physics Institute, Russia  
 Dr S. Vladimirov, University of Sydney  
 Professor C. Wiede, Chinese Academy of Science, China

## Delegations

The Hon Peter McGauran, Minister for Science, Dr Joe Baker, the Chief Scientist of Queensland and ACT Commissioner for the Environment, and the ANU Vice-Chancellor, Professor Ian Chubb visited the Plasma Research Laboratory on Tuesday, 26 November. The official party was taken on a tour of the H-1 National Facility, and shown the work that is being carried out by the Laboratory both in the fundamental long term research and the medium term innovation areas. During his visit, the Minister took the opportunity to turn the "first sod" to mark the commencement of the new Cockcroft East extension, which will house new laboratories for departments within the Research School, including the Plasma Research Laboratory.

## Colloquium Speakers

Convenor: Professor Yuri Kivshar

Professor R.L. Hahn, Brookhaven National Laboratory, USA  
*The Current Status of Solar Neutrino Research, including Results from the Sudbury Neutrino Observatory*

Professor A. Newell, University of Arizona, USA  
*Natural Patterns, their Defects and their Global Description*

Dr A. Truscott, AMPL  
*Experiments with Quantum Degenerate Gases*

Professor K. Nugent, University of Melbourne  
*A Phase Odyssey: What Is Phase and How Can We Measure It?*

Dr G. Rempe, Max-Planck-Institut für Quantenoptik, Germany  
*Cavity QED with Individual Atoms and Photons*

Professor A. Boardman, University of Salford, UK  
*Soliton-driven Photonics: A New Dawn*

Professor S. Kawata, Osaka University, Japan  
*Single and Two-photon Photopolymerization for Micro-nano Fabrication*

Dr P.K. Lam, Department of Physics, Faculty of Science, ANU  
*Quantum Teleportation of a Laser Beam*

## National and International Links



## Postdoctoral Fellowship Completions and Destinations

### Electronic Materials Engineering

Dr Gustavo Azevedo completed his Postdoctoral Fellowship in synchrotron-radiation-based characterisation and took up a position at the Laboratorio Nacional de Luz Sincrotron, Brazil.

Dr Heiko Timmers completed his Postdoctoral Fellowship in ion-beam analysis and took up a position at the Australian Defence Force Academy, University of New South Wales.

### Nuclear Physics

Dr Anjali Mukherjee completed her Postdoctoral Fellowship in the Fission and Fusion Group in September and has commenced an appointment with the Variable Energy Cyclotron Centre of the Department of Atomic Energy, Calcutta, India.

Dr Lucas Wacker completed his Postdoctoral Fellowship in the Accelerator Mass Spectrometry Group in December and will commence an appointment in the AMS Laboratory at ETH Zurich (Swiss Federal Institute of Technology), Switzerland.