

# Staff of the School of Physics

## Professors

Robert Clark

Experimental investigation of quantum physics in low dimensional semiconductors and semiconductor nanostructures and their application to the next generation of electronics and computing.

Warrick Couch

Optical astronomy, observational cosmology, galaxy evolution and formation particularly in rich clusters; large-scale structure and galaxy redshift surveys; supernovae, distant searches, rates in nearby galaxies.

Victor Flambaum

Theoretical Physics: Publications in atomic, nuclear, elementary particle, solid state, astrophysics, quantum chaos and statistical theory.

Michael Gal

Experimental Condensed Matter Physics: the study of the optical properties of semiconductors, semiconductor layer structures and interfaces; optoelectronics; optical instrumentation, particularly modulation spectroscopy and ultra-fast laser spectroscopy.

David Neilson

Condensed Matter Theory: Strongly correlated electron systems in semiconductors; metal-insulator transition in 2D; disordered electron glass; electron bi-layers; quantum wires; superconductor-nanostructure interfaces.

Michelle Simmons

Experimental condensed matter physics: nanofabrication and cryogenic measurement of quantum electronic devices. Understanding how ultra-pure, low dimensional systems conduct electricity. Atomic-scale fabrication of a solid-state silicon-based nuclear spin quantum computer using scanning tunneling microscopy (STM) and molecular beam epitaxy (MBE).

John Storey

Infrared, far-infrared, mm and radio astronomy, HII regions, molecular clouds and star formation; infrared detectors and instrumentation; electronics, imaging, antarctic astronomy.

Oleg Sushkov

Quantum many body theory including work in condensed matter, nuclear and atomic physics.

John Webb

Cosmology, Hubble Space Telescope observations; quasar spectroscopy; light element abundances; variability in the Fundamental Constants.

Joe Wolfe

Musical Acoustics: investigations of musical instruments, of the human vocal tract and of their interaction. Information, coding and processing of sound in the ear and in artificial systems. Thermal physics in biology, especially cryobiology and water relations.

## Associate Professors

Michael Ashley

Astronomical instrumentations; infrared astronomy in Antarctica; optical transients from gamma ray bursts; wide-field photometric surveys.

Michael Box

Radiative transfer in the earth's atmosphere; multiple scattering, perturbation techniques; climate effects of aerosols, remote sensing from satellites; scattering by haze and cloud particles.

Michael Burton

Infrared astronomy, including the interstellar medium, supernova remnants, shock and fluorescent excitation of molecular clouds, star formation and the galactic center; millimeter astronomy, Antarctic astronomy, science communication.

Seán Cadogan

Magnetism and hyperfine interactions in metallic compounds; amorphous metallic alloys; Mossbauer Spectroscopy, neutron scattering, muon spin relaxation.

Paul Curmi

Structure and dynamics of biological macromolecules; x-ray crystallographic studies of protein structure; molecular dynamics simulations; protein folding and stability, understanding the function of enzymes at atomic level.

Chris Hamer  
Lattice gauge theory of the strong interactions;  
critical phenomena in statistical mechanics.

Alex Hamilton  
Quantum transport phenomena in low  
dimensional semiconductor structures (2D  
quantum wells, 1D quantum wires, and 0D  
quantum boxes), and the effects of inter-  
device interactions in multi-component  
semiconductor nanostructures; solid state  
quantum computation.

David Miller  
Foundations of quantum mechanics;  
applications in resonance techniques in  
condensed matter physics.

Gary Morriss  
Equilibrium and nonequilibrium statistical  
mechanics, chaotic dynamical systems,  
molecular hydrodynamics.



*Associate Professor Chris Hamer retired from  
the School of Physics in early 2005. He had  
been undergraduate director for several years,  
and remains a visiting associate professor.*

Richard Newbury  
Experimental condensed matter: low  
dimensional semiconductor systems,  
mesoscopic devices. Studies involving  
very low temperature, high magnetic field.  
High pressure physics. Superfluidity and  
superconductivity.

## Senior Lecturers

Mary Beilby  
Molecular basis of salt tolerance in plants.  
Unusual transport systems in marine algae  
bryopsidophyceae multimedia in research and  
teaching.

Gail Box  
Inversion of multispectral radiometer data  
to obtain information about aerosol size  
distribution; aerosols and the visual air quality  
of Sydney; relationship between physical  
and chemical properties of aerosols and their  
optical properties.

Maria Cunningham  
Molecular line astronomy; millimetre wave  
astronomy; observational interstellar  
chemistry; biomolecules in the interstellar  
medium; chemistry of star formation regions.

Marlene Read  
Surface state band structure, electron and  
positron scattering from solid surfaces,  
surface structure analysis. Electrodynamics;  
relativistic mechanics ("special relativity");  
geometroynamics ("general relativity").  
Physics education.

John Smith  
Electrical characteristics of biological and  
artificial membranes. Electrodifffusion theory.  
Acoustics of musical instruments and the  
vocal tract; optimization of impedance  
measurements.

Marion Stevens-Kalceff  
Condensed matter physics,  
microcharacterisation of the defect structure  
of wideband gap materials, irradiation induced  
defect generation and transformation,  
advanced electron microscope techniques and  
scanning probe microscopy.

Krystyna Wilk

Isolation, characterization and structure determination of algal light harvesting proteins. Research involves crystallization of proteins and analysis of x-ray diffraction data obtained for protein crystals.

### Lecturers

Jacinda Ginges

Theoretical physics

Adam Micolich

Experimental studies of the electron properties of strongly interacting semiconductor nanostructures. Fabrication and measurement of organic electronics and nanodevices.

Louise Ord

Astrophysics

Wilfred Walsh

Radio observations using cm, mm and sub-mm telescopes. Antarctic astronomy. Cosmological studies using QSOs and galaxy clusters.

### Emeritus Professors

Hans Coster

Electrical properties of living cells and the membranes surrounding cells. Impedance spectroscopy and the electro-dynamics of cells in radio frequency electric fields leading to the creation of hybrid cells which have the potential to produce therapeutic materials such as monoclonal antibodies. Related research includes electrodisinfection of water, biosensors and molecular films.

Heinrich Hora

Laser and plasma theory (quantum and relativistic effects) multivalley band theory for semiconductors.

H. Julian Goldsmid

Thermoelectric materials and devices.

Jaan Oitmaa

Solid State Theory: Phase transitions and critical phenomena; magnetism; lattice dynamics; superconductivity.

### Adjunct Professors

Brian Boyle

Cosmology, the large scale structure of the Universe and the properties of quasars.

Neville Fletcher

Music acoustics

Wallace Geldart

Solid state theory

Robert Robinson

Strongly correlated  $f$ -electron systems, magnetism in uranium intermetallics, the dynamics of amorphous materials and neutron-scattering instrumentation.

### Adjunct Associate Professor

Michael James

Membrane

### Adjunct Senior Lecturers

Peter Barnes

Astrophysics

Nigel Freeman

Medical physics

Tohsak Mahaworasilpa

Effects of electric fields on biological cells; Electro-mechanics of biological cells; Electrical cell fusion for the production of human hybridomas; human Monoclonal Antibody Production from hybridomas.

Richard Smart

Development and validation of internal dosimetry techniques with specific application to modalities.

### Adjunct Lecturer

Galina Kaseko

Antibody response of human lymphocytes upon antigenic stimulation in vitro (in vitro immunization of human lymphocytes).

## Research Staff

Soren Andresen

Centre for Quantum Computer Technology

Indra Bains

Astrophysics

Kenji Bekki

Astrophysics; numerical simulations of galaxy processes.

Julian Berengut

First year teaching research

Till Boecking

Optoelectronics

Rolf Brenner

Design, fabrication and low-temperature electrical characterization of phosphorous-in-silicon devices, fabricated both by ion-implantation (top-down) and STM lithography (bottom-up).

Louise Brown

Biophysics

Tilo Buehler

Development of fabrication and measurement technology towards quantum limited detectors of relevance for quantum computing.

Robert Bursill

The theory of excited states in conjugated molecules, computational quantum chemistry, low-dimensional systems in condensed matter, lattice gauge theory.

Matthew Butcher

Use of STM lithography in silicon to fabricate novel quantum electronic devices, and installation of a new four point probe system for the electrical characterization of novel hybrid silicon-organic devices.

Stephen Curran

Astrophysics - observational cosmology

Neil Curson

Fabrication of nanoscale devices and studies into gas/surface reactions, using scanning tunneling microscopy.

Romain Danneau

Experimental condensed matter physics - studies of GaAs nanostructures.

Andrew Ferguson

Application of low temperature measurement of silicon nanostructures to the quantum measurement program.

Jacinda Ginges

Atomic theory

Frederick Green

Theory of non-equilibrium transport and noise in nanostructures and devices.

Steven Harrop

Structure and architecture of proteins by x-ray crystallography.

Fay Hudson

Nanofabrication and infrastructure development for the Integrated Quantum Computer Devices program.

Neil Kemp

Mesoscopic devices

Michael Kuchiev

Multiphoton many-electron processes in atoms in strong laser fields. Atomic collisions which result in the final states with several low-energy charged particles; physics of instantons and its application to quantum gravity.

Jon Lawrence

Astrophysics

John Ludlow

Theoretical physics

Daniel Luong-Van

Antarctic Astronomy

Louise Ord

Astrophysics

Andre Phillips

Airborne remote sensing; infrared instrumentation and satellite communications.

Ali Rashid

Organic Electronic Devices

Thilo Reusch

Using scanning probe microscopy to fabricate novel quantum electronic devices in silicon and scanning tunneling spectroscopy to help identify different adsorbates on the silicon surface and the use of different substrates for gating devices.

Giordano Scappucci

Centre for Quantum Computer Technology

Virginia Shepherd

Plant cell biology; fluorescence microscopy, cytoskeleton, cell-to-cell communication, dynamic vacuoles, action potentials, the ascent of sap, Australian native fish (especially gudgeons) ostracods, life of temporary ponds, history and philosophy of science; life and work of JC Bose.

Alexandre Tarnopolsky

Music Acoustics

Panayiotis Tzanavaris

Astrophysics

Andrew Walsh

Astrophysics

Alexander Weisse

Solid State Theory

Matthew Whiting

Astrophysics

Tony Wong

Astrophysics

David Woods

Astrophysics; galaxy clustering and evolution, gravitational lensing, high redshift galaxy clusters and Virtual Observatory development.

Wei Hong Zheng

Lattice gauge theory, statistical physics and condensed matter theory. Linked cluster expansion techniques; phase transition and critical point phenomena.

## Visiting Professors

Poul Erik Lindelof

Nanostructures

Benno Schoenborn

Biophysics – neutron diffraction and impedance studies of important biomolecules.

Alan Walker

Mechanisms of solute transport in plant cells; models for mycorrhizal infection and root growth in plants and of combined nitrogen movement through ecosystems.

## Visiting Associate Professor

Charles Lineweaver

Cosmology: temperature fluctuations in the cosmic microwave background; cosmological constant; combining constraints from the cosmic microwave background with constraints from other cosmological data; exobiology.

Robert Stening

Electric currents and fields in the ionosphere, winds and tides in the upper atmosphere which drive these currents. Lunar tidal effects on the ionosphere; computer models of the low-latitude ionosphere.

## Visiting Fellows

Arthur Anderson

Use of ultrasonic techniques to study oxygen related structural changes and processes in high temperature superconductors and the relationship of these phenomena to superconductivity.

Sundar Christopher

Atmospheric Physics

Vladimir Dmitriev

Atomic and nuclear theory

Michael Drinkwater

Hidden galaxies in the local universe. Leader of the Fornax Spectroscopic Survey in collaboration with Prof. Warrick Couch (UNSW) and Prof. Rachel Webster (Melbourne).

Madan Kaila  
High temperature superconductor materials and devices; to develop materials/devices for optical/infrared radiation detection; carry out mathematical/computational modelling to design optimum performance detectors for use at 77K.

Jesko Sirker  
Solid state theory

Tooru Taniguchi  
Theoretical physics

Christopher Young  
Photometric surveys of galaxies

### Visiting Research Fellow

Mika Jormakka  
Protein structure

### Research Assistant

Melinda Taylor  
Astrophysics

Kimberley Vincent  
Protein structure

### Administrative Staff

Ranji Balalla  
First Year Office

Joji Conducto  
Administration & Finance

Patricia Furst  
Administration & Teaching

Susan Hagon  
Teaching

Karen Jury  
CQCT

Venus Lim  
CQCT

Stephen Lo  
Administration & Finance

Savita Sardana  
CQCT

Alisha Toft  
CQCT

Robert Walton  
CQCT

### Professional Officers

Gabriel Caus  
First Year Computing Laboratory

Terry Chilcott  
Biophysics

Jeremy Chu  
Atomic Fabrication Facility Laboratory

Jack Cochrane  
Magnetic Materials, Mesoscopics and QED

Vladimir Dzuba  
Theoretical

Jon Everett  
Astrophysics

David Jonas  
Computing

Patrick McMillan  
Third Year Laboratory

Barry Perczuk  
Third Year Laboratory

Bob Starrett  
Semi-Conductors

John Tann  
Optoelectronics & Musical Acoustics

Frank Wright  
SNF

### Computer Systems Officer

Simon Yin  
CQCT

## Technical Consultant UNIX

Kristien Clayton  
Computing

## Cryogenics Manager

David Barber  
CQCT

## Senior Technical Officers

Michael Benton  
Second Year Laboratory

George Hatsidimitris  
Webmaster

Garry Keenan  
Demonstration Unit

Ping Lau  
Electronic Workshop

Andre Skougarvesky  
CMP & SNF

## Technical Assistant

Diana Edler  
First Year Laboratory

Susan Fraser  
First Year Laboratory

## Acting Foreman

Ken Jackson  
Mechanical Workshop

## Laboratory Craftsman

Pritipal Baweja  
Mechanical Workshop

## Store Officer

Dave Ryan  
Administration

## Casual Research Assistants

Andrew Botros  
Musical Acoustics

Jane Cavanagh  
Musical Acoustics

Frank Reuss  
Quantum Electronic Devices

Tamara Reztsova  
Atmospheric Physics

Aileen Woo  
Equity Project

## Casual OHS Coordinator

Michelle Fitzgerald  
Centre for Quantum Computer Technology

## Casual Technical Officer

Dror Ben-Naim  
First Year Teaching

Jamie Kelly  
First Year Teaching

## Casual Technical Assistant

Tamara Reztsova  
Demonstration Unit