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Biographies of 2008 round of Federation Fellows

PROFESSOR FRANCES BAUM

Project: *Reducing health inequities and social exclusion: Improved theory, understanding and policies*.
Current institution: Flinders University.
Host institution: Flinders University.
Primary research field: Public health and health services.

Professor Baum is Head of the Department for Public Health at Flinders University, Foundation Director of the South Australian Community Health Research Unit, and Program Leader of the Social Determinants of Health Program of the Cooperative Research Centre for Aboriginal Health.

She plans to develop a program to increase the theoretical understanding of the social and economic determinants of social exclusion and health inequities that will help inform and assist in the development, implementation and evaluation of public policies and interventions aiming to improve population health.

Professor Baum completed her PhD in sociology/social demography at University of Nottingham. Her appointments have included Commissioner of the World Health Organisation's Commission on the Social Determinants of Health, and National President and life member of the Public Health Association of Australia.

She is a Fellow of the Australian Academy of Social Sciences, the regional representative for the People's Health Movement in Australia and the Pacific, and a member of its Global Steering Committee.

PROFESSOR MICHAEL BIRD

Project: *Environmental change, carbon cycling and human impact in tropical Australia.*
Current institution: University of St. Andrews (UK).
Host institution: James Cook University.
Primary research field: Biological Sciences.

Professor Bird holds the Chair in Environmental Change in the School of Geography and Geosciences at the University of St Andrews in the UK. He is recognised internationally as an expert in environmental geochemistry and terrestrial carbon cycle science.

Professor Bird plans to develop an integrated process-based understanding of the interactions between biogeochemical cycling, climate change and human activities in the tropics on a range of time scales.

His research will assist to: predict the response of tropical ecosystems to future environmental changes; develop effective methodologies for improved carbon sequestration, verifiable carbon accounting and emissions trading; and achieve sustainability in the use of natural resources.

Professor Bird obtained his PhD in earth sciences at The Australian National University (ANU), completed a postdoctoral fellowship at the University of Western Ontario in Canada, and then returned to the ANU in 1990. In 2000, he became an Associate Professor at Nanyang Technological University in Singapore, before moving to his current position in 2004.

Professor Bird is a Fellow of the Royal Society of Edinburgh. He has been awarded an Australian Research Council Queen Elizabeth II Fellowship and a visiting fellowship from the Max Planck Institute for Biochemistry in Germany.

DR CHRISTOPHER CARILLI

Project: *Exploring the last frontier: Cosmic reionization and the first galaxies.*
Current institution: National Radio Astronomy Observatory (US).
Host institution: CSIRO - Australia Telescope National Facility.
Primary research field: Astronomical sciences.

Dr Carilli is Director of the North American Atamaca Large Millimetre Array Science Centre at the US National Radio Astronomy Observatory and a world leading expert in radio astronomy. His expertise covers extragalactic astronomy, quasi-stellar object absorption lines, clusters of galaxies and (sub)millimetre dust and molecular emissions from high red shift sources.

Dr Carilli intends that his research program will position Australia as a leader in the development of a new radioscope, the Square Kilometre Array (SKA). He plans to take advantage of the uniquely radio quiet environment of Western Australia to achieve unprecedented measurements of the 'first light fossils' in the Universe. This could assist in discovering the sources of the first new light in the Universe and how these sources act to reionize the neutral intergalactic medium.

Dr Carilli obtained his PhD in physics at Massachusetts Institute of Technology (MIT) in the US. He has been awarded several fellowships, including an Alexander von Humboldt Visiting Research Fellowship, a Centre Research Fellowship at the Harvard Smithsonian Centre for Astrophysics, and a Greenlaw Fellowship at MIT.

Dr Carilli is a member of the SKA International Science Group, which he chaired during 2002-04 and he serves on several astronomical committees, including the International Astronomical Union's Division 10 Subcommittee on Radio Astronomy and Cosmology. In 2005, he jointly received the *Max-Planck Research Award* from the Alexander von Humboldt Foundation and the Max Planck Society.

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RESEARCH in the national interest – enabling the future

PROFESSOR JOHN DRYZEK

Project: *Deliberative global governance.*
Current institution: The Australian National University.
Host institution: The Australian National University.
Primary research field: Political science.

Professor Dryzek is one of the world's leading political scientists, whose work has significantly influenced the fields of critical policy analysis, deliberative democracy, and environmental politics.

In a newly-established Centre for Deliberative Global Governance, Professor Dryzek's research program will involve applying the theory of deliberative democracy to the practice of global governance and comparative politics of democratisation. His work will help to advance the understanding of deliberative democracy and its application in new domains—for example, the democratisation of the international system, with special reference to climate change, and the democratisation of authoritarian systems, such as China.

Professor Dryzek obtained his PhD in political science from University of Maryland in the US. He has served as Head of the Department of Political Science at University of Oregon and The University of Melbourne, and as Head of the Department of Social and Political Theory at The Australian National University.

Professor Dryzek is an elected Fellow of the Academy of Social Sciences in Australia. His book *Democracy in Capitalist Times* was awarded the *Spitz Prize* by the American Conference for the Study of Political Thought for the best book in democracy or liberal theory. From 1995 to 1999 he was the editor of *Australian Journal of Political Science*.

PROFESSOR MICHAEL EASTWOOD

Project: *Conformal differential geometry.*
Current institution: The University of Adelaide.
Host institution: The Australian National University.
Primary research field: Mathematics.

Professor Eastwood is one of the world's leading experts in conformal differential geometry. His work on the development of transform methods linking mathematical physics, differential geometry, harmonic analysis and special function theory is internationally acclaimed.

Professor Eastwood's new research will focus on the interaction between geometry, differential equations and symmetry in conformal differential geometry. Advances in this area will provide essential tools in fundamental science and establish novel links between neighbouring fields of mathematics.

Professor Eastwood obtained his PhD in mathematics at Princeton University in the US. He then worked as a Research Fellow at the Mathematical Institute of University of Oxford in the UK, before joining The University of Adelaide in 1985. He has been awarded several ARC Fellowships, including three Senior Research Fellowships and one Australian Professorial Fellowship.

In 1992, Professor Eastwood was awarded the *Australian Mathematical Society Medal* for distinguished research in the mathematical sciences and in 2001 he was elected as a Fellow of the Australian Academy of Science.

ASSOCIATE PROFESSOR TREVOR LITHGOW

Project: *Molecular machines that drive microbial pathogens.*
Current institution: The University of Melbourne.
Host institution: Monash University.
Primary research field: Biochemistry and cell biology.

Associate Professor Lithgow leads an interdisciplinary research program at the Bio21 Molecular Science and Biotechnology Institute. He is an international leader in protein targeting and membrane assembly, and his lab is working towards understanding the molecular machine that transfers proteins into mitochondria.

The main aims of A/Professor Lithgow's research program are to: capitalise on biochemical techniques and bioinformatics developed by his laboratory; apply these techniques to learn more about the structure, function and assembly of the molecular machines in bacteria; and better understand how the human immune system can cope with microbial invaders. The work will involve research in genetics, microbiology, computer science and molecular biology, and will link research groups in Australia with key international laboratories.

A/Professor Lithgow completed his PhD in biochemistry at La Trobe University before undertaking a Research Fellowship in 1993, funded by the international Human Frontiers Science Program, at the University of Basel in Switzerland. His lab at the Bio21 Institute collaborates with about 20 others, locally and internationally.

A/Professor Lithgow was awarded the *Victor Chang Medal* in 2002, and the La Trobe University *David Myers Medal* and The University of Melbourne *David Syme Prize* in 2005.

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PROFESSOR GAOQING (MAX) LU

Project: *Band-gap engineered visible light photocatalysts: Enabling technologies for sustainable energy and the environment.*
Current institution: The University of Queensland.
Host institution: The University of Queensland.
Primary research field: Interdisciplinary engineering.

Professor Lu is Chair of Nanotechnology in Chemical Engineering at The University of Queensland and Research Director of the ARC Centre of Excellence for Functional Nanomaterials.

His research program has the potential to transform Australia's energy and environmental industries and to speed up our transition from a fossil fuel economy to a renewable energy economy. Professor Lu's goal, to develop a new class of photocatalysts with high visible light activity, could lead to cost effective solar energy conversion to electricity or hydrogen, and the development of efficient processes for water purification or carbon dioxide conversion to liquid fuels.

Professor Lu is an elected Fellow of the Australian Academy of Technological Sciences and Engineering and has served as a member of the ARC College of Experts. He has also been a member of two Prime Minister's Science, Engineering and Innovation Council working groups, playing a key role in developing the National Nanotechnology Strategy.

The recipient of several awards, Professor Lu has been honoured most recently with the 2007 *Exxon Mobil Award*, the Royal Australian Chemical Institute *R.K. Murphy Medal* in 2003, the Australian Academy of Science *Le Fevre Prize* in 2002, the *Orica Award for Excellence in Chemical Engineering* in 2001 and the International Union of Materials Research Societies *Young Scientist Award* in 1997.

This is his second *Federation Fellowship*.

PROFESSOR TANYA MONRO

Project: *Light-matter interactions using optical fibres.*
Current institution: The University of Adelaide.
Host institution: The University of Adelaide.
Primary research field: Optical physics.

Professor Monro is the inaugural Chair of Photonics and Director of the Centre of Expertise in Photonics within the School of Chemistry and Physics at The University of Adelaide. She is one of the world's leading experts on optical fibre technology.

The aim of Professor Monro's research program is to develop a new platform for exploring and controlling interactions between light and matter using new classes of optical fibres made from 'soft' glasses that will enable profound investigations into proteins and fundamental cell biology. The platform will lead to innovations in areas like medical research, environmental and defence science.

Professor Monro obtained her PhD in physics from The University of Sydney, for which she was awarded the Bragg Gold Medal and was then awarded an Eleanor Sophia Wood Travelling Fellowship. In 2000, she received a Royal Society University Research Fellowship at the Optoelectronics Research Centre at the University of Southampton in the UK.

Professor Monro is a member of the South Australian Premier's Science & Research Council, a founding steering member of The Royal Institution of Australia, and Chair of The University of Adelaide Defence Committee. In 2007, she was awarded the *Women in Physics Lecture* by the Australian Institute of Physics and in 2006 a *Bright Spark Award* for Australia's Top 10 Scientific Minds under 45 by Cosmos Magazine.

PROFESSOR BRETT NEILAN

Project: *The toxins of water-borne cyanobacteria: Regulation and exploitation of their biosynthesis.*
Current institution: The University of New South Wales.
Host institution: The University of New South Wales.
Primary research field: Biotechnology.

Professor Neilan is an outstanding molecular biologist and a world expert in the study of toxic cyanobacteria, which is increasing in frequency, global distribution and human intoxication.

He plans to fully characterise the genetic and biochemical basis of toxin biosynthesis and its regulation in cyanobacteria to gain a better understanding of the factors that influence the production of its toxins and to better enable the detection of low levels of toxic algal blooms in drinking water. He will look at the mechanism that is responsible for the complex biosynthesis of a range of pharmacologically active compounds to assist in the design and synthesis of novel bioactive products.

Professor Neilan obtained his PhD in microbiology from The University of New South Wales (UNSW). He has been awarded a National Aeronautics and Space Administration (NASA) Planetary Biology Fellowship; an Alexander von Humboldt Fellowship; ARC Postdoctoral, Australian Research and Professorial Fellowships; and the UNSW Anthony Mason Fellowship.

His achievements have been acknowledged with the *Royal Societies of Australia Eureka Prize for Interdisciplinary Scientific Research* in 2005, the Royal Society of New South Wales *Walter Burfitt Prize* in 2005, the Australian Academy of Science *Fenner Medal* and an Australian Institute for Policy and Science *Tall Poppy Science Award,* both in 2004.

Professor Neilan was the Australian representative to the International Committee on Toxic Algal Control and head of its monitoring division, and he has consulted broadly to the federal government regarding biotechnology and the environment.

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PROFESSOR PETER ROBINSON

Project: *Dynamics of multiscale complex systems.*
Current institution: The University of Sydney.
Host institution: The University of Sydney.
Primary research field: Theoretical and condensed matter physics.

Professor Robinson is Director of the Centre for Wave Physics at The University of Sydney and Deputy Director of the Brain Dynamics Centre at Westmead Hospital. An internationally recognised interdisciplinary physicist, he has made ground-breaking contributions to wave and particle physics and quantitative brain analysis.

Professor Robinson will investigate complex plasma and neural systems with the aim of using the results to increase the understanding of multiscale plasma dynamics, especially in space physics, and multiscale neural dynamics of brain function and synchrony.

Professor Robinson obtained his PhD in theoretical physics at The University of Sydney (USyd). He is a Fellow of the Australian Institute of Physics and has been awarded an ARC Queen Elizabeth II Fellowship, the Bede Morris Fellowship of the Australian and French Academies of Sciences, and a USyd Eleanor Sophia Wood Travelling Fellowship.

His outstanding work has been recognised with the *Royal Societies of Australia Eureka Prize for Interdisciplinary Scientific Research* in 2003, the Australian Institute of Physics *Walter Boas Medal* in 2002, the Royal Society of New South Wales *Edgeworth David Medal* in 1996, and the Australian Academy of Sciences *Pawsey Medal* in 1995.

This is his second *Federation Fellowship*.

PROFESSOR MICHELLE SIMMONS

Project: *Atomic electronics: Precompetitive research for the global semiconductor industry.*
Current institution: The University of New South Wales.
Host institution: The University of New South Wales.
Primary research field: Theoretical and condensed matter physics.

Professor Simmons is Director of the Atomic Fabrication Facility at The University of New South Wales (UNSW) and ARC Centre of Excellence for Quantum Computer Technology Program Manager.

The economic pressure to produce smaller, faster transistors has pushed silicon technology to its limits. Professor Simmons has already demonstrated a radical new fabrication strategy of commercially-based silicon transistors at the atomic scale. She now plans to address fundamental impediments to transistor scaling, which are of vital strategic importance for the global semiconductor industry.

Professor Simmons obtained her PhD in physics from University of Durham in the UK, spent six years at Cambridge University's Cavendish Laboratory, and then moved to Australia to take up an ARC Queen Elizabeth II Fellowship at UNSW.

In 2006, Professor Simmons received a Cosmos Magazine *Bright Spark Award* for Australia's Top 10 Scientific Minds under 45, and in 2005 she was awarded the Australian Academy of Science *Pawsey Medal*. She has filed three patents and served on numerous international committees, including the C8 Commission for Semiconductors.

Professor Simmons has been a member of the ARC College of Experts, including as Chair of the Physics, Chemistry and Geoscience panel, and she is a Fellow of the Australian Academy of Science.

This is her second *Federation Fellowship*.

PROFESSOR DR PETER TEUNISSEN

Project: *Theoretical and model strengthening of future Global Navigation Satellite System to yield improved geospatial information for tomorrow's society.*
Current institution: Delft University of Technology (Netherlands).
Host institution: Curtin University of Technology.
Primary research field: Geomatic engineering.

Professor Teunissen is Chair of Mathematical Geodesy and Positioning and Head of the Department of Earth Observation and Space Systems at Delft University of Technology in the Netherlands. He is a world authority on Global Navigation Satellite System (GNSS) positions and navigation and the inventor of the Least-squares AMBiguity Decorrelation Adjustment (LAMBDA) method for GNSS carrier phase ambiguity resolution.

Professor Teunissen intends to address important and pressing theoretical and modelling issues for future GNSS applications to deliver high-precision, high-integrity positioning and navigation solutions. The refinements will feed into much-improved geospatial information for future technology.

Professor Teunissen obtained his PhD in geodesy at the Delft University of Technology. He was awarded the Constantijn en Christaan Huygens Fellowship by the Netherlands Organisation for the Advancement of Pure Research, and an ARC International Fellowship at Curtin University of Technology in 2007. Professor Teunissen was awarded an honorary Professorship from Wuhan University in China in 2000, the *Alexander von Humboldt Research Award* in 1996, and the International Association of Geodesy *Guy Bomford Prize* in 1987.

He is a member of the Royal Netherlands Academy of Arts and Sciences, a foreign Fellow of the Deutschen Geodätischen Kommission Akademie der Wissenschaften, and a Fellow of the International Association of Geodesy. Between 1995 and 2003, he was Editor-in-Chief of *Journal of Geodesy*.

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DR JAMES WHISSTOCK

Project: *Membrane Attack Complex/Perforin-like proteins in defence, attack and developmental biology.*
Current institution: Monash University.
Host institution: Monash University.
Primary research field: Biochemistry and cell biology.

Dr Whisstock is recognised as a world-leading expert on bio-information and structural biology, especially serpins. He is a National Health and Medical Research Council (NHMRC) Principal Research Fellow and Logan Fellow at Monash University, and a Chief Investigator in the ARC Centre of Excellence in Structural and Functional Microbial Genomics.

Membrane Attack Complex/Perforin-like (MACPF) proteins play central roles in vertebrate immunity, embryonic patterning and neural development. Dr Whisstock's research program aims to better understand the links between immunity and development. Data from his research will be crucial for developing approaches to control unwanted MACPF function in transplant rejection and diseases like Type I diabetes.

Dr Whisstock completed his PhD in biochemistry at Cambridge University in the UK and then moved to Australia to take up a Fellowship in the Faculty of Medicine at Monash University. He has since held several other research fellowships in the Department of Biochemistry and Molecular Biology at Monash University, including an NHMRC Principle Research Fellowship, an NHMRC Peter Doherty Fellowship, and a Monash University Logan Fellowship. He was also Scientific Director of the Victorian Bioinformatics Consortium.

Dr Whisstock was awarded the *Science Minister's Prize for Life Scientist of the Year* in 2006, an Australian Institute of Policy and Science's *Young Tall Poppy Award* in 2002, and the *Invitrogen Life Science Award* in 2002.

PROFESSOR AIBING YU

Project: *Multiscale modelling and analysis of complex particulate and multiphase flow.*
Current institution: The University of New South Wales.
Host institution: The University of New South Wales.
Primary research field: Interdisciplinary engineering.

Professor Yu is Scientia Professor in the School of Materials Science and Engineering and Director of the Centre for Simulation and Modelling of Particulate Systems, both at The University of New South Wales (UNSW), and a Chief Investigator of the ARC Centre of Excellence for Functional Nanomaterials. A world-leading scientist in powder and process engineering, his area of research expertise is in the simulation and modelling of particulate systems.

Professor Yu's research program aims to overcome problems in the design capacity of particulate and multiphase processes used widely in Australian industries that provide significant export income, such as minerals, metallurgical, chemical, energy, pharmaceuticals and materials. Using an extensive combined fundamental and applied approach, he plans to improve process design, control and optimisation to enhance Australia's productivity and competitiveness in these industries.

Professor Yu completed his PhD in metallurgy and material engineering at University of Wollongong and has been awarded a CSIRO Postdoctoral Fellowship, an ARC Queen Elizabeth II Fellowship, and an ARC Australian Professorial Fellowship. In 2007, he received a Doctor of Science from UNSW.

Professor Yu has been honoured with an *Outstanding Overseas Chinese Scholar Award* and a *Josef Kapitan Ironmaking Award* from the Iron and Steel Society. He is a member of the ARC College of Experts, a Fellow of the Australian Academy of Technological Sciences and Engineering, and a Fellow of the Institution of Chemical Engineers. In addition, he holds honorary appointments with numerous institutions in China, the UK and Japan.

For more information, visit www.arc.gov.au.
22 April 2008