

**Number of Successful Proposals for Super Science Fellowships to Commence in 2011
by State and Organisation**

New South Wales

Anglo Australian Observatory	1
Macquarie University	2
The University of Sydney	1

New South Wales **4**

Victoria

Monash University	2
Swinburne University of Technology	1
The University of Melbourne	1

Victoria **4**

Queensland

Australian Institute of Marine Science	1
James Cook University	1
The University of Queensland	1

Queensland **3**

South Australia

The University of Adelaide	2
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South Australia **2**

Western Australia

Curtin University of Technology	1
The University of Western Australia	2

Western Australia **3**

Tasmania

Australian Antarctic Division (AAD)	1
University of Tasmania	2

Tasmania **3**

Australian Capital Territory

The Australian National University	2
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Australian Capital Territory **2**

Total Number of Grants **21**

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

New South Wales

Anglo Australian Observatory

FS110200023 A/Prof Andrew M Hopkins, Prof Matthew Colless, Prof Simon P Driver, Dr Christopher E Lidman, A/Prof Scott M Croom

Approved Project Title **The Galaxy Genome Project 2**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Targeted Area Space Science And Astronomy

SSF 3

Administering Organisation Anglo Australian Observatory

Project Summary

The Galaxy Genome Project builds on the Anglo-Australian Observatory's (AAO) major investments and world-leading strengths in wide-field survey astronomy and multi-object spectrographs. Combining the AAO's ongoing and planned survey programs with data from other new Australian facilities, such as SkyMapper and Australian Square Kilometre Array Pathfinder, will increase the scientific productivity and impact of all of these major Australian investments and leverage access for Australian researchers in other leading international astronomical surveys and facilities. The project will also increase the international profile of Australian astronomy and enhance the prospects of Australian scientific and technical involvement in next-generation astronomical facilities such as Square Kilometre Array and Giant Magellan Telescope.

Macquarie University

FS110200026 Prof Nicolle H Packer, A/Prof Mark P Molloy, Prof Helena K Nevalainen, Prof Ian T Paulsen, A/Prof Paul A Haynes

Approved Project Title **Future Industries Research - Biotechnology and Nanotechnology: Small talk: Communication networks in microbes**

2011 \$92,800.00

2012 \$185,600.00

2013 \$185,600.00

2014 \$92,800.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Targeted Area Future Industries Research
Biotechnology And Nanotechnology

SSF 2

Administering Organisation Macquarie University

Project Summary

We will use the Australian Proteome Analysis Facility to address the multifaceted mechanisms of microbial interactions and produce new knowledge about the pathogen *Pseudomonas aeruginosa*, a common cause of death in cystic fibrosis patients. We will characterise the interactions between *P. aeruginosa* and the emerging fungal pathogen *Scenedesporium aurantiacum* as a proactive step towards better understanding of pathogen communication. Improved understanding of pathogen interactions should facilitate the development of novel anti-adhesives as therapeutics. Our project will train young scientists in a new integrated approach to biology.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

FS110200035 Dr Daniel B Zucker, Prof Kenneth C Freeman, Prof Jonathan Bland-Hawthorn, Prof John C Lattanzio, Dr Samuel C Barden

Approved Project Title **Space Science and Astronomy: Dissecting the Galaxy with High Resolution Multi-Object Echelle Spectrograph (HERMES) II: Decisive Observations**

2011	\$139,200.00
2012	\$278,400.00
2013	\$278,400.00
2014	\$139,200.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES
Targeted Area Space Science And Astronomy

SSF 3

Administering Organisation Macquarie University

Project Summary

Australia has long been a world leader in wide-field astronomical surveys, and the new High Resolution Multi-Object Echelle Spectrograph (HERMES) being built for the Anglo-Australian Telescope (AAT) will enhance that leadership position. Through a combination of Australian technological and scientific advances, the surveys we conduct with HERMES will allow us to study galaxy formation and stellar astrophysics in unprecedented detail. There are powerful synergies between HERMES and Skymapper, another Australian astronomical survey, as well as with Gaia, the billion-dollar European space mission for studying the Galaxy; HERMES will thus promote both national and international research collaboration. In this proposal we lay the observational groundwork for maximising the scientific return from HERMES.

The University of Sydney

FS110200013 Prof Jonathan Bland-Hawthorn, A/Prof Scott M Croom, Prof Geraint F Lewis, Prof Matthew Colless, Prof Joseph Silk

Approved Project Title **Accretion and Feedback in Galaxies with Cosmic Time**

2011	\$92,800.00
2012	\$185,600.00
2013	\$185,600.00
2014	\$92,800.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES
Targeted Area Space Science And Astronomy

SSF 2

Administering Organisation The University of Sydney

Project Summary

Australia is a world leader in both astronomy and photonics. This proposal seeks to exploit a revolutionary device that is the first developed from the new cross-over field of astrophotonics. The Gemini Near-infrared OH Suppression IFU System (GNOSIS) instrument will showcase Australian industry development in optical fibres and will keep Australian astronomers at the forefront of international research. This will lead to major advantages when developing future instrumentation for next generation telescopes such as the Giant Magellan Telescope, enabling Australia to continue to lead astronomy and astronomical instrumentation into the next decade and beyond.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

Victoria

Monash University

FS110200047 Dr Michael J Brown, Dr Kevin A Pimblet, A/Prof Andrew M Hopkins, Prof Raymond P Norris

Approved Project Title **Australia Surveys the Galaxies: The Central Role of Environment**

2011 \$46,400.00

2012 \$92,800.00

2013 \$92,800.00

2014 \$46,400.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Targeted Area Space Science And Astronomy

SSF 1

Administering Organisation Monash University

Project Summary

The success of Australia's premier astronomical facilities is critical to the development of Australian astronomy in the 21st century. Understanding how galaxies grow and evolve (including our Milky Way) is one of the principal goals of these facilities. This program aims to understand galaxy evolution, by exploring the connection between galaxies and their environments. The Super Science Fellows will gain new insights into the longstanding problem of galaxy evolution, and build upon Australia's investment in 21st century astrophysics.

FS110200015 Prof Trevor J Lithgow, Prof Jamie Rossjohn, Prof Rodney J Devenish, A/Prof Lisandra L Martin, Prof Richard A Strugnell

Approved Project Title **Design and Fabrication of Molecular Machines: the Nanomachines of the Future**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 1007 NANOTECHNOLOGY

Targeted Area Future Industries Research
Biotechnology And Nanotechnology

SSF 3

Administering Organisation Monash University

Project Summary

Nanotechnology that incorporates the use of nanomachines and molecular machines is an exciting new area of translational research, with broad potential in biomedical technology and industrial applications. We are developing new molecular machines and optimising their assembly. Recent innovation in the world of nanotechnology concerns the design and manufacture of synthetic and hybrid machines, based on existing biological molecular machines but incorporating synthetic parts. Australia has an opportunity to be at the forefront of these new developments in nanotechnology, with a new generation of Australian scientists being trained across the foundation disciplines of chemistry, physics and molecular biology.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

Swinburne University of Technology

FS110200007 Prof Karl Glazebrook, Dr Michael T Murphy, Dr Emma V Ryan-Weber, Dr Christopher A Blake, Dr Virginia A Kilborn

Approved Project Title **Mass Assembly of Galaxies In the Cosmos: the roles of stars, gas, and metals**

2011 \$92,800.00

2012 \$185,600.00

2013 \$185,600.00

2014 \$92,800.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Targeted Area Space Science And Astronomy

SSF 2

Administering Organisation Swinburne University of Technology

Project Summary

Swinburne's Centre for Astrophysics and Supercomputing is uniquely placed to tackle the outstanding 'super questions' of modern astronomy. We will utilise Australia's investment in current and future telescopes to unlock the process of galaxy assembly across cosmic time. New computing and instrumentation technologies will be developed. A further benefit is the training of young scientists to the highest level. The outcomes of this research will further enhance Australia's international profile in astronomy.

The University of Melbourne

FS110200025 Prof Frank Caruso, Prof Geoff W Stevens, Prof Greg G Qiao, A/Prof Sandra E Kentish

Approved Project Title **Nanoengineered Polymeric Materials for Environmental and Biological Applications**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 1007 NANOTECHNOLOGY

Targeted Area Future Industries Research
Biotechnology And Nanotechnology

SSF 3

Administering Organisation The University of Melbourne

Project Summary

The development of advanced materials with nanoengineered properties promises to revolutionise future industries, including the energy and healthcare sectors. This research program will involve the design, synthesis and assembly of tailored polymers to prepare next-generation, engineered materials. The research will deliver advanced polymeric membranes, tissue engineering scaffolds and vaccine delivery systems. These materials are expected to provide benefits for Australian citizens in the energy and health sectors and contribute to the development of a robust Australian nanotechnology industry. The projects will also provide opportunities for the development of outstanding young scientists and will foster multidisciplinary collaborations.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

Queensland

Australian Institute of Marine Science

FS110200034 Prof Linda L Blackall, Dr Madeleine J van Oppen, Dr Katharina E Fabricius, Dr Curtis Suttle, Dr David G Bourne

Approved Project Title **A Changing Climate on the Great Barrier Reef: Present and Future Implications**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 0605 MICROBIOLOGY

Targeted Area Marine And Climate Science

SSF 3

Administering Organisation Australian Institute of Marine Science

Project Summary

The Great Barrier Reef is fundamental to the economy of Australia. This national and international icon needs to be preserved in the face of a changing world to ensure on-going sustainability of our marine resources. Ocean acidification, warming water temperatures, increased freshwater disrupt the sensitive symbiotic association of corals the major structure building organisms of reefs. Understanding how these environmental stressors result in the decrease in coral health is fundamental to prevent loss of our coral reefs and an important step towards preserving them for future generations.

James Cook University

FS110200046 Prof Terence P Hughes, Prof Bette L Willis, Prof David J Miller, Dr Philip L Munday, Prof Robert L Pressey

Approved Project Title **Resilience of Coral Reef Ecosystems to Climate Change**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Targeted Area Marine And Climate Science

SSF 3

Administering Organisation James Cook University

Project Summary

Science-based management of coral reefs provides enormous environmental, social and economic benefit to Australia and other tropical maritime nations. The proposed research will provide scientific knowledge and research training that underpins the management and long-term sustainability of Australian reef resources. Climate change research is vital for supporting the sustainable use of the ecosystem goods and services provided by reef ecosystems (e.g. to tourism and fishing industries, recreational users and indigenous Australians). This research will place Australia in the forefront of understanding and responding to the regional-scale impacts of climate change on tropical societies and economies.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

The University of Queensland

FS110200005 Prof Hugh P Possingham, Prof Andrew B Griffiths, Prof John C Quiggin, Prof Sarah C Derrington, Dr Tiffany H Morrison

Approved Project Title **Defend or retreat? Adapting to the impacts of sea level rise as a result of rapid climate change.**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 0502 ENVIRONMENTAL SCIENCE AND MANAGEMENT

Targeted Area Marine And Climate Science

SSF 3

Administering Organisation The University of Queensland

Project Summary

Rapid sea level rise has been identified as a major threat to coastal Australia, where most of the Australian population lives. Our understanding and ability to respond to this threat is extremely limited at this point. This project will directly benefit Australian communities and businesses, specifically those in southeast Queensland by bringing together a team of distinguished, multidisciplinary researchers and Super Science Fellows to explore the threats and challenges posed by rapidly rising sea levels. By building capacity and answering many urgent and difficult questions related to the legal, environmental and planning ramifications of sea level rise, this project will prepare communities and policymakers for the difficult times ahead.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

South Australia

The University of Adelaide

FS110200051 Prof Andrew J Lowe, Prof Corey J Bradshaw, Prof Anton J van den Hengel, Prof Barry W Brook, Prof Alan Cooper

Approved Project Title **Multi-model predictions of ecosystem flux under climate change based on novel genetic and image analysis methods**

2011 \$92,800.00

2012 \$185,600.00

2013 \$185,600.00

2014 \$92,800.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Targeted Area Marine And Climate Science

SSF 2

Administering Organisation The University of Adelaide

Project Summary

Improving the forecasts of ecosystem shifts must be a key focus of future ecological research if we are to preserve our unique Australian landscapes. Our proposal is of clear benefit to Australia because of the urgent need for integrated methods to predict the cumulative impact of shifts in climate and land use. We will also contribute innovative tools involving genetic and image analysis, and state-of-the-art modelling. The damage modern human societies are inflicting on global environments has led to a great demand for logistically feasible and cost-effective ways to prevent biodiversity loss.

FS110200009 Prof Tanya M Monro, Prof Alan Cooper, Prof Lois A Salamonsen, Prof Robert J Norman, Adj/Prof Nigel A Spooner

Approved Project Title **Transformational diagnostics**

2011 \$139,200.00

2012 \$278,400.00

2013 \$278,400.00

2014 \$139,200.00

Primary FoR 0205 OPTICAL PHYSICS

Targeted Area Future Industries Research
Biotechnology And Nanotechnology

SSF 3

Administering Organisation The University of Adelaide

Project Summary

Australia has established world-leading capabilities in optical fibres and surface science that, when brought together, have the potential to transform applications that require non-invasive, real-time and/or portable biological detection tools. We propose a novel and ambitious suite of projects that bring together these capabilities with experts in reproductive health, forensics and explosives to solve pressing problems in each of these areas that have the promise to develop into new industries for Australia as well as to explore rich science opportunities at the boundaries of these disciplines.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

Western Australia

Curtin University of Technology

FS110200003 Prof Steven J Tingay, Prof Bryan M Gaensler, Prof Lister G Staveley-Smith, Prof Franklin H Briggs, Prof Iver H Cairns

Approved Project Title **Supporting early science from the Murchison Widefield Array - a Square Kilometre Array (SKA) pathfinder telescope**

2011 \$46,400.00

2012 \$92,800.00

2013 \$92,800.00

2014 \$46,400.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Targeted Area Space Science And Astronomy

SSF 1

Administering Organisation Curtin University of Technology

Project Summary

The Murchison Widefield Array (MWA) is likely to be the first operational pathfinder for the \$2.5 billion Square Kilometre Array (SKA) on one of the two candidate SKA sites - the Murchison Radioastronomy Observatory (MRO) in Western Australia. The MWA will therefore generate large volumes of scientific data before 2012, the expected date of the international decision that will determine whether Australia or South Africa is to host the SKA. The early science results from the MWA will showcase the excellence of the Australian site for radio astronomy and play a significant strategic role in Australia's bid to attract the SKA, as an international mega-science project to Australia, with its benefits to Australian science, industry and society.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

The University of Western Australia

FS110200022 Prof Lorenzo Faraone, Prof John M Dell, Prof Martin Saunders, Prof Chennupati Jagadish, Prof Sanjay Krishna

Approved Project Title **A fundamental study of electronic transport in advanced semiconductor nanostructures**

2011	\$139,200.00
2012	\$278,400.00
2013	\$278,400.00
2014	\$139,200.00

Primary FoR 1007 NANOTECHNOLOGY
Targeted Area Future Industries Research
Biotechnology And Nanotechnology

SSF 3

Administering Organisation The University of Western Australia

Project Summary

The principal aim of this project is to attract and retain very high calibre early career researchers by providing them with the best-available infrastructure and research environment, combined with world-class supervision and mentoring. The project brings together an outstanding team of international collaborators, who will work with the early career researchers to ensure that they are trained and mentored at an international level. The new science, novel characterisation methods, and theoretical models that are outcomes of this project will provide new opportunities and expertise to advance the strategic defence and national security interests of Australia, and the emerging Australian semiconductor device and solar cell industry.

FS110200021 Prof Malcolm T McCulloch, Prof Gregory N Ivey, Asst Prof Ryan J Lowe, Asst Prof James Falter, Dr Ross J Jones

Approved Project Title **Indian Ocean Climate Change: Ningaloo Reef, a litmus test for the survival of coral reefs**

2011	\$92,800.00
2012	\$185,600.00
2013	\$185,600.00
2014	\$92,800.00

Primary FoR 0405 OCEANOGRAPHY
Targeted Area Marine And Climate Science

SSF 2

Administering Organisation The University of Western Australia

Project Summary

Coral reefs are at the frontline from the effects of rapidly rising levels of carbon dioxide that is causing both global warming and oceans to become more acid-like. Our research program will determine how the survival of one of the World's most pristine and best preserved coral reefs, Ningaloo Reef, is linked to the response of Australia's Indian Ocean to climate change. For the first time, we will simulate realistic 'future' conditions and see how actual coral reef systems respond. This will provide a 'yardstick' against which the best-case survival potential of the world's coral reefs can be assessed, critical for underpinning the urgently needed action to reduce greenhouse gas emissions if we are to ensure the survival of coral reefs.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

Tasmania

Australian Antarctic Division (AAD)

FS110200057 Dr Stephen Nicol, Prof Mark A Hindell, Dr Nicholas J Gales, Prof Robert G Harcourt

Approved Project Title **Pelagic ecosystem linkages in a changing Southern Ocean.**

2011 \$92,800.00

2012 \$185,600.00

2013 \$185,600.00

2014 \$92,800.00

Primary FoR 0602 ECOLOGY

Targeted Area Marine And Climate Science

SSF 2

Administering Organisation Australian Antarctic Division (AAD)

Project Summary

Our study, which aims to better describe and understand the ecology of the vast Ocean to the south of Australia, will provide the information that will assist in managing this region in an era of change. Many species are of significant conservation concern, others are recovering from previous harvesting, some are being harvested and all will be affected by a changing climate. Understanding the ecosystem linkages and the way in which the physical environment affects the distribution and abundance of key ecosystem components will allow us to better manage the system and to predict the effects of future climate change.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

University of Tasmania

FS110200045 Prof John M Dickey, Dr James E Lovell, Dr Christopher S Watson, Dr Paul Tregoning, Prof William E Featherstone

Approved Project Title **Establishing the reference frame using astronomical and space-geodetic observations**

2011 \$92,800.00

2012 \$185,600.00

2013 \$185,600.00

2014 \$92,800.00

Primary FoR 0404 GEOPHYSICS

Targeted Area Space Science And Astronomy

SSF 2

Administering Organisation University of Tasmania

Project Summary

Australia is increasingly dependent on spatial positioning and spatial data, yet mostly relies upon international agencies and research organisations to provide regular updates of coordinates and reference frame definition used on Earth. Improving the accuracy of the reference frame definition and our understanding of errors in the space-based measurements will provide new insights for studies of the Earth. The research will yield results in studies of national significance, such as sea level rise, the effects of melting polar regions, and crustal deformation, as well as developing Australia's expertise in exploiting observations of the Earth from space.

FS110200029 Prof Craig R Johnson, A/Prof Neil J Holbrook, Dr Neville Barrett, Prof Peter D Steinberg

Approved Project Title **Effects of climate change on temperate benthic assemblages on the continental shelf in eastern Australia**

2011 \$92,800.00

2012 \$185,600.00

2013 \$185,600.00

2014 \$92,800.00

Primary FoR 0501 ECOLOGICAL APPLICATIONS

Targeted Area Marine And Climate Science

SSF 2

Administering Organisation University of Tasmania

Project Summary

Benthic habitats on the continental shelf in southeast Australia support some of Australia's most productive fisheries and manifest high levels of biodiversity and endemism. However, the region is experiencing rates of ocean warming 3.8 times the global average and nutrient depletion because of increased influence of the East Australian Current. This work will, for the first time, provide a clear indication of the relationship between the physical environment on the shelf and the distribution of benthic assemblages, predict future changes in temperature and nutrients in the area, and predict the effects of these changes on the associated benthic biota. These predictions are critical to an informed adaptation response to climate change.

Summary of Successful Super Science Fellowships Proposals for Funding to Commence in 2011 by State and Organisation

Australian Capital Territory

The Australian National University

FS110200016 Prof Gary S Da Costa, Prof John E Norris, Dr Helmut Jerjen, Dr Chiaki Kobayashi

Approved Project Title Exploiting the discovery of ultra-faint dwarf galaxies in the southern hemisphere sky

2011	\$92,800.00
2012	\$185,600.00
2013	\$185,600.00
2014	\$92,800.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Targeted Area Space Science And Astronomy

SSF 2

Administering Organisation The Australian National University

Project Summary

The scientific exploitation of newly discovered southern hemisphere ultra-faint Milky Way satellite galaxies will make Australia a leader in this rapidly developing research field. It will be enabled by access to national and international telescope facilities such as the Anglo- Australian Telescope (AAT), Gemini and Magellan, and by access to national computing resources for theoretical simulations. National benefit will also flow from collaborations between the team and its Super Science Fellows and researchers at overseas institutions. Results from the project will motivate research programs for the coming era of extremely large telescopes and will position the Fellows as potential future leaders in the exploiting the scientific potential of those facilities.

FS110200033 Prof Chennupati Jagadish, Prof Yuri S Kivshar

Approved Project Title Nanofabrication of Metamaterials for Next Generation Optical Devices

2011	\$139,200.00
2012	\$278,400.00
2013	\$278,400.00
2014	\$139,200.00

Primary FoR 1007 NANOTECHNOLOGY

Targeted Area Future Industries Research
Biotechnology And Nanotechnology

SSF 3

Administering Organisation The Australian National University

Project Summary

The dream of invisibility cloaks dates back to ancient times but recent advances in nanotechnology have made this a reality through the use of metamaterials. Metamaterials are artificially-made materials that have optical properties not found in nature. This field is still in its infancy and significant challenges remain and need to be solved before practical applications can be realised. This project builds on Australia's strategic investment in nanofabrication capabilities to fabricate functional metamaterials and uncover the underlying physical phenomena. It will revolutionise the field of nanophotonics for a variety of novel applications ranging from defence, renewable energy, imaging, sensing to optical communications.