



**Australian Government**

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## Funding Outcomes for the *ARC Centres of Excellence* scheme



### **ARC Centre of Excellence for All Sky Astrophysics in 3 Dimensions**

**Centre Director:** *Professor Lisa Kewley*

**Administering Organisation:** *The Australian National University*

This Centre aims to answer fundamental questions in astrophysics including the origin of matter and the periodic table of elements, and the origin of ionisation in the Universe. It intends to use Australian three-dimensional technology to transform our understanding of the Universe. It will unify world-leading Australian optical and radio surveys with theoretical simulations and new e-Science techniques for Peta-scale data sets. The Centre will also nurture young scientific leaders and make high-school students interested in STEM sciences through education and outreach programmes. It is expected the research will propel Australia to the forefront of astronomical research for the coming decade while capitalising on innovative instrumentation.

**Participating Organisations:** *The University of Melbourne; The University of Sydney; Swinburne University of Technology; The University of Western Australia; Curtin University of Technology; Australian Astronomical Observatory; Commonwealth Scientific and Industrial Research Organisation; California Institute of Technology, USA; University of Oxford, UK; University of Toronto, Canada; University of Washington, Seattle; Netherlands Institute for Radio Astronomy; National Computational Infrastructure; Chinese Academy of Sciences; Heidelberg Institute for Theoretical Studies.*

**ARC funding:** **\$30,300,000**

### **ARC Centre of Excellence in Population Ageing Research**

**Centre Director:** *Professor John Piggott*

**Administering Organisation:** *The University of New South Wales*

This Centre intends to generate crucial knowledge to inform social and economic responses to population ageing, one of the most important issues of the 21st century. Population ageing exerts unprecedented pressures on social norms and policy institutions, both in Australia and around the world. Leading researchers from a range of disciplines will undertake multidisciplinary research to help governments, businesses, and consumers prepare for and make better decisions for an ageing world, with consequent social and economic benefits for families and communities expected to flow to Australia, the Asian region and the world.

**Participating Organisations:** *The Australian National University; The University of Sydney; The University of Melbourne; The University of Western Australia; The University of Manchester, UK; Wharton School; University of Pennsylvania, USA; Medibank Private Limited; Towers Watson; Reserve Bank of Australia; Department of Social Services; Australian Human Rights Commission; World Bank; NSW Treasury; Safe Work Australia; PwC Strategy& (Australia) Pty Ltd; MLC Limited; Department of Foreign Affairs and Trade.*

**ARC funding:** **\$27,250,000**



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### **ARC Centre of Excellence for Quantum Computation and Communication Technology**

**Centre Director:** Professor Michelle Simmons

**Administering Organisation:** The University of New South Wales

This Centre aims to implement quantum processors able to run error corrected algorithms and transfer information across networks with absolute security. Australian researchers have established global leadership in quantum information, an innovative technology which could transform all industries dependent on computational power. This Centre has developed technologies for manipulating matter and light at the level of individual atoms and photons, with the highest fidelity, longest coherence time qubits in the solid state, the world's longest-lived quantum memory, and the ability to run small-scale algorithms on photonic qubits. The new technology is expected to provide a strategic advantage in a world where information and information security are of paramount importance.

**Participating Organisations:** The University of Melbourne; The Australian National University; RMIT University; The University of Sydney; University of Technology, Sydney; The University of Queensland; Griffith University; University of Waterloo, Canada; University of Oxford, UK; National University of Singapore; Max Planck Institute for the Science of Light; National Institute of Informatics; University of Wisconsin, Madison; Massachusetts Institute of Technology; University of Maryland; University of Calgary, Canada; University of Paris 6, Pierre and Marie Curie; University of Tokyo; University of Paderborn, Germany; Free University of Berlin, Germany; University of Kassel; University of Mainz, Germany; University of Cambridge, UK; Purdue University, West Lafayette, USA; University of Bristol, UK; University of Sherbrooke; University of Virginia; IBM Corporation; NASA Ames Research Center; Interuniversitair Micro-Electronica Centrum (IMEC); Scientia Omicron; University of Otago, NZ; Zyvex; National Institute of Standards and Technology; Commonwealth Bank of Australia; Telstra Corporation Limited; Quintessencelabs Pty Ltd; QxBranch, Lockheed Martin Australia Pty Limited; Defence Science and Technology Organisation.

**ARC funding:** \$33,700,000

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## Funding Outcomes for the *ARC Centres of Excellence* scheme



### **Centre title: ARC Centre of Excellence for Climate Extremes**

**Centre Director:** Professor Andrew Pitman

**Administering Organisation:** The University of New South Wales

**Project summary:** This Centre aims to transform understanding of past and present climate extremes and revolutionise Australia's capability to predict them into the future. Climate extremes cost Australia up to \$4 billion a year and will intensify over coming decades. This Centre's blue-sky research will discover processes that explain the behaviour of present and future climate extremes. It will use its researchers, data, modelling, collaboration, graduate programme and early career researcher mentoring to transform Australia's capacity to predict climate extremes. This research is expected to make Australia more resilient to climate extremes and minimise risks from climate extremes to the Australian environment, society and economy.

**Participating Organisations:** *Monash University; University of Tasmania; The University of Melbourne; The Australian National University; Bureau of Meteorology; Commonwealth Scientific and Industrial Research Organisation; National Computational Infrastructure; Risk Frontiers Group Pty Ltd; Office of Environment and Heritage; Met Office, UK; Swiss Federal Institute of Technology, Zurich; Laboratoire Atmosphères, Milieux, Observations Spatiales (LATMOS)/French National Centre for Scientific Research (CNRS)/Institut national des sciences de l'univers (INSU)/Institut Pierre Simon Laplace (IPSL); National Center for Atmospheric Research, University of Arizona, USA; National Oceanic and Atmospheric Administration; NASA Jet Propulsion Laboratory; Max Planck Institute for Meteorology; NASA Goddard Space Flight Center.*

**ARC funding:** \$30,050,000

### **ARC Centre of Excellence of Australian Biodiversity and Heritage**

**Centre Director:** Professor Richard Roberts

**Administering Organisation:** University of Wollongong

The ARC Centre of Excellence of Australian Biodiversity and Heritage will create a world-class interdisciplinary research programme to understand Australia's unique biodiversity and heritage. The Centre will track the changes to Australia's environment to examine the processes responsible for the changes and the lessons that can be used to continue to adapt to Australia's changing environment. The Centre will support connections between the sciences and humanities and train future generations of researchers to deal with future global challenges and inform policy in an interdisciplinary context.

**Participating Organisations:** *The Australian National University; James Cook University; The University of New South Wales; The University of Adelaide; Monash University; University of Tasmania; Queensland Museum; Australian Museum; Scarp Archaeology Pty Ltd; South Australian Museum; State Library of New South Wales; Bioplatforms Australia Ltd; University of Savoy; University of Papua New Guinea; University of Colorado, Boulder; Max Planck Institute for the Science of Human History; Natural History Museum of Denmark; Papua New Guinea National Museum and Art Gallery; Indonesian National Centre for Archaeology.*

**ARC funding:** \$33,750,000



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## Funding Outcomes for the *ARC Centres of Excellence* scheme



### **ARC Centre of Excellence for Engineered Quantum Systems**

**Centre Director:** *Professor Andrew White*

**Administering Organisation:** *The University of Queensland*

This Centre aims to build sophisticated quantum machines to harness the quantum world for the future health, economy, environment and security of Australian society. It intends to pioneer the designer quantum materials, engines and imaging systems at the heart of these machines. It also solves the most challenging research problems at the interface of basic quantum physics and engineering. The Centre will work with industry partners to translate these research discoveries into practical applications and devices. It will train scientists in research, innovation, and entrepreneurship, which is expected to affect Australia's high-tech economy.

**Participating Organisations:** *The University of Sydney; Macquarie University; The University of Western Australia; The Australian National University; Defence Science and Technology Organisation; MOG Laboratories Pty Ltd; National Measurement Institute; University of Vienna, Austria; Institute of Quantum Optics and Quantum Information; Vienna University of Technology; CNRS -Institut Neel, France; CNRS-French National Centre for Scientific Research; Westphalian Wilhelms-University of Muenster; University of Ulm; Swiss Federal Institute of Technology, Zurich; Heriot-Watt University, Edinburgh, UK; University of Oxford, UK; Lockheed Martin Corporation; Microsoft Corporation; Dartmouth College, USA; University of California, Berkeley; Observatoire De Paris-Syrte.*

**ARC funding:** **\$31,900,000**

### **ARC Centre of Excellence in Future Low-Energy Electronics Technologies**

**Centre Director:** *Professor Michael Fuhrer*

**Administering Organisation:** *Monash University*

This Centre aims to develop the scientific foundation and intellectual property for new electronics technologies. Decreasing energy use is a major societal challenge, and this Centre aims to meet that challenge by realising fundamentally new types of electronic conduction without resistance in solid-state systems at room temperature. Novel resistance-free electronic phenomena at room temperature are expected to form the basis of integrated electronics technology with ultra-low energy consumption. This Centre's development of innovative electronics could put Australia at the forefront of the international electronics industry.

**Participating Organisations:** *The University of New South Wales; The Australian National University; RMIT University; Swinburne University of Technology; University of Wollongong; The University of Queensland; National University of Singapore; Max Planck Institute for Quantum Optics, Garching; Australian Nuclear Science and Technology Organisation; California Institute of Technology, USA; University of Maryland; Johannes Gutenberg Universitaet Mainz; Columbia University, New York, USA; Massachusetts Institute of Technology; Argonne National Laboratory; University of Colorado, Boulder; Tsinghua University, Beijing; Synchrotron Light Source Australia Pty*



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## Funding Outcomes for the *ARC Centres of Excellence* scheme



*Ltd; University of Wuerzburg, Germany; IBM Corporation; University of Texas, Austin; Joint Quantum Institute.*

**ARC funding: \$33,400,000**

### **ARC Centre of Excellence for Gravitational Wave Discovery**

**Centre Director:** *Professor Matthew Bailes*

**Administering Organisation:** *Swinburne University of Technology*

This Centre aims to explore the historic first detections of gravitational waves to understand the extreme physics of black holes and warped spacetime, and inspire the next generation of Australian scientists and engineers. The next generation gravity wave detectors will enable a thousandfold increase in detection volume and result in the new gravitational wave discoveries, triggering a new era of gravitational wave astrophysics. Building on decades of Australian investment in gravitational wave and pulsar science, this Centre will coalesce research activities into a focussed national programme whose discoveries are intended to experimentally validate Einstein's General Theory of Relativity and educate the public about the wonders of Einstein's Universe.

**Participating Organisations:** *The University of Adelaide; The Australian National University; The University of Western Australia; The University of Melbourne; Monash University; Australian Astronomical Observatory; Commonwealth Scientific and Industrial Research Organisation; University of Glasgow; California Institute of Technology, USA; Massachusetts Institute of Technology; Max Planck Institute for Gravitational Physics (Hannover) (Albert Einstein Institute); Kavli Institute for Theoretical Physics, China; NASA Goddard Space Flight Center; University of Urbino; University of Warwick, UK; Max Planck Institute for Radio Astronomy; Laser Interferometer Gravitational-Wave Observatory.*

**ARC funding: \$31,300,000**

### **ARC Centre of Excellence in Exciton Science**

**Centre Director:** *Professor Paul Mulvaney*

**Administering Organisation:** *The University of Melbourne*

This Centre aims to manipulate the way light energy is absorbed, transported and transformed in advanced molecular materials. The research programme spans high-throughput computational screening, single molecule photochemistry and ultrafast spectroscopy and embraces innovative outreach and commercial translation activities. The Centre plans to capture the knowledge generated as new intellectual property, materials processing know-how, and through the creation of new employment opportunities. The expected outcomes and benefits include new Australian technologies in solar energy conversion, energy-efficient lighting and displays, security labelling and optical sensor platforms for defence.

**Participating Organisations:** *RMIT University; Monash University; The University of Sydney; The University of New South Wales; Commonwealth Scientific and Industrial Research Organisation; Defence Science and Technology Organisation; Reserve Bank of Australia; Chongqing Institute of Green and Intelligent Technology-Chinese Academy*



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## **Funding Outcomes for the ARC *Centres of Excellence* scheme**



*of Sciences; University of Ulm, Huazhong; University of Science and Technology,  
University of California, Berkeley; University of Bayreuth; Shandong University, China.*

**ARC funding: \$31,850,000**

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