Examples of *Future Fellowships* projects commencing in 2014

**New South Wales**

New South Wales (NSW) research organisations will receive more than $36.1 million through the Australian Research Council *Future Fellowships* scheme for 48 new research projects commencing in 2014.

Some examples of the NSW projects are provided below.

To view the summaries of all successful projects, visit the [ARC announcements page](#).

**The University of Newcastle**

*Future Fellow: Associate Professor David Lubans (FT140100399)*

**Summary:** Lack of physical activity and the time that young people spend sedentary and alone staring into television and computer screens, are major public health issues. This project aims to explore how changes in physical activity and sedentary behaviour might influence health and wellbeing in young Australians. It will also involve the evaluation of an innovative school-based intervention targeting these outcomes. This project has the potential to bring physical and mental health benefits to current and future Australians.

**ARC funding:** $800,280 over four years

**The University of Sydney**

*Future Fellow: Dr Dennis Stello (FT140100147)*

**Summary:** This project aims to use a completely new approach to investigate how our Galaxy formed and evolved, by merging two fields within astrophysics—galactic archaeology and the study of stellar oscillations. This will dramatically improve understandings of the fundamental physics that governs the evolution of all cool stars, such as the Sun. This project aims to go beyond classical astronomy, which examines only the surface of stars. For the first time, the interior structure of thousands of stars across the Galaxy will be probed to reveal intricate details of its evolution from the imprint of each star’s oscillations. This will be possible through access to data of extremely high precision from one European and two National Aeronautics and Space Administration (NASA) space telescopes.

**ARC funding:** $706,790 over four years

**The University of Sydney**

*Future Fellow: Dr Myfany Turpin (FT140100783)*

**Summary:** Indigenous ceremonies are a fundamental aspect of Indigenous identity and they play a role in Indigenous health and wellbeing. This project aims to develop a typology of Australian Aboriginal ceremonies by classifying them according to their structural features. By mapping their distribution and comparing these with linguistic and anthropological evidence it seeks to provide insights into Indigenous prehistory and cultural diffusion across arid Australia. This project aims to lead to a greater understanding of the ecological knowledge contained in songs and increased Indigenous knowledge of, and engagement in, ceremonial life.

**ARC funding:** $767,373 over four years
University of Technology, Sydney
Future Fellow: Dr Min-Hsiu Hsieh (FT140100574)
Summary: Quantum cryptographic systems have the advantage of mathematically provable security and privacy, addressing security threats to communications as information and communications technologies proliferate. This project aims to quantify a quantum channel's capability for secure communications. This quantity provides the ultimate limit to benchmark practical quantum key distribution protocols for their performance. This will significantly advance the theory of quantum cryptography and knowledge of the fundamental resource of secret keys. It is expected to have immediate application for the classical security of existing (non-quantum) communication devices, and benefit security, military, government, industry, individuals, and the community.
ARC funding: $678 502 over four years

Macquarie University
Future Fellow: Dr Andrew Barron (FT140100452)
Summary: Truly understanding how the brain operates is a grand challenge of 21st century neuroscience. Progress toward this goal can be made through studying small-brained animals, like the honey bee. This project aims to use microscopy and pharmacology to analyse the neural mechanisms by which bees learn and classify complex things. This will enable the construction of a computational model of decision making in the bee brain. Analysing this model will test what is understood about the operation of the animal brain, and what simulates it. This project aims to reveal how neural circuits make complex decisions; establish key principles and foundational studies for comprehending larger more complex brains, and yield new approaches to machine learning.
ARC funding: $690 204 over four years

The University of New South Wales
Future Fellow: Dr Paul Gribben (FT140100322)
Summary: Worldwide, management of invasive species is limited by the understandings of processes that allow invasive species to establish and proliferate in a new environment. It is believed that marine microbes play a critical, but untested, role in the establishment of invasive marine macrophytes. This project aims to test the theory by integrating cutting edge microbial ecology with eukaryote ecology, two largely disparate research areas. Invasive species are a serious threat to biodiversity globally and cost more than $4 billion annually. This project aims to create new knowledge essential for safeguarding Australia’s marine ecosystems from invasive pests, and will place Australia at the forefront of invasion ecology.
ARC funding: $762 812 over four years

University of Wollongong
Future Fellow: Dr Katherine Szabo (FT140100504)
Summary: Shell valuables are fundamentally important in many Melanesian societies, linking people to each other, the land and their ancestors. Although shell artefacts are frequent in Melanesian archaeological sites, presently it is not possible to discriminate between types and levels of value. Through ethnoarchaeological enquiry in the Solomon Islands and intensive studies of museum ethnographic collections, this project aims to develop tools to allow archaeologists to better interpret the nature of different shell artefacts and the social contexts of their production, use and discard. In doing so, it will enhance understandings of Melanesian societies and their transformations through time.
ARC funding: $812 966 over four years