

Summary of Linkage Infrastructure, Equipment and Facilities Proposals by State and Organisation

Australian Capital Territory

The Australian National University

LE100100064 Dr Yuri Amelin, Dr Victoria C Bennett, Dr Richard A Armstrong, Prof Ian Metcalfe, Dr Claudine H Stirling, Dr Michael K Gagan, Dr Marc D Norman, Prof Trevor R Ireland, Dr Anthony I Kemp, Prof Allan R Chivas, Prof Richard G Roberts, Prof Colin V Murray-Wallace, Dr D C "Bear" McPhail, Prof Mark E Barley, Prof Ian H Campbell, A/Prof Paul W Hoskin, Dr Tezer M Esat, Prof Raymond A Cas, Dr Kurt M Knesel, A/Prof Massimo Gasparon, Dr Anthony Dosseto

Approved Project Title **A facility for sensitive and precise isotopic dating of the earth's and extraterrestrial rocks**

2010 \$450,000.00

Primary FoR 0403 GEOLOGY

Partner/Collaborating Organisation(s)

Australian Nuclear Science and Technology Organisation, Australian Scientific Instruments, University of Auckland James Cook University, The University of Queensland, The University of Western Australia, University of Wollongong

Administering Organisation The Australian National University

Project Summary

SPIDE2R will be a new generation mass spectrometer for very precise and sensitive dating and forensics applications in earth and planetary sciences, hydrology, climate studies, and nuclear and archaeological fingerprinting. The unprecedented sensitivity of this unique instrument will provide enhanced capabilities for solving long-standing problems requiring precise geological time resolution, as well as opening new areas of research. It will be the instrument of choice for analysing small, rare samples such as those returned by space missions. The Australian-built high sensitivity source and ion detection systems can be retrofitted onto other mass spectrometers, opening a new area of commercialisation.

LE100100111 Dr Benjamin J Evans, Prof Michael J Drinkwater, Prof Brian P Schmidt, A/Prof Andrew M Hopkins

Approved Project Title **A database for Australian optical astronomy**

2010 \$150,000.00

Primary FoR 0201 ASTRONOMICAL AND SPACE SCIENCES

Partner/Collaborating Organisation(s)

Anglo Australian Observatory, The University of Queensland

Administering Organisation The Australian National University

Project Summary

We will build an astronomy data facility to provide database facilities to analyse data from three major Australian optical astronomy projects, SkyMapper, WiggleZ and GAMA. The facility will provide efficient analysis tools not only for the researchers immediately involved with the projects, but, for the entire national and international astronomical community when the data become public. Long-term maintenance of the facility is vital, so the facility will be standards-compliant and stable to facilitate long-term support. For this reason the facility will be based at the ANU Supercomputer Facility (ANUSF) to leverage substantial expertise in this area and to provide long-term operations support.

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LE100100078 Prof Adrienne R Hardham, Prof Kieran Kirk, Prof Stefan Broer, Prof Susanne Von Caemmerer, Dr Ulrike Mathesius, Dr Peter S Solomon, Dr Josette Masle, Dr Kevin J Saliba, Prof Barry J Pogson, Prof Christopher R Parish, Dr Owen K Atkin, Prof Suresh Mahalingam, Prof Marilyn C Ball, Prof David J Tremethick, A/Prof Michael S Rolph, Dr Michael A Djordjevic, Prof Caryl E Hill

Approved Project Title **Multiphoton confocal microscope**

2010 \$600,000.00

Primary FoR 0601 BIOCHEMISTRY AND CELL BIOLOGY

Partner/Collaborating Organisation(s)

University of Canberra

Administering Organisation The Australian National University

Project Summary

Recent developments in light microscopy have revolutionised modern molecular and cellular biology. Dramatic improvements in microscope hardware and software and in the range of fluorescent markers used to tag selected cellular components now provide new and exciting opportunities to localise and determine the function of ions and molecules not only in preserved samples but also, most excitingly, in living cells. The proposed multiphoton confocal microscope will allow researchers in Canberra to obtain high quality images of static and moving components in living cells and tissues and will facilitate the discovery of new knowledge that contributes to our understanding and control of development and disease in both plants and animals.

LE100100048 Prof Yuri S Kivshar, Dr Dragomir N Neshev, Dr Hark H Tan, Dr Lan Fu, Dr Jodie E Bradby, Prof James S Williams, Dr Haroldo T Hattori, Prof Robert G Elliman, Prof Barry Luther-Davies, Dr Kylie R Catchpole, A/Prof Arnan Mitchell, Dr Matthew J Sellars, A/Prof Grainne M Moran

Approved Project Title **Nanoscale optical microscopy facility**

2010 \$340,000.00

Primary FoR 1007 NANOTECHNOLOGY

Partner/Collaborating Organisation(s)

RMIT University, The University of New South Wales

Administering Organisation The Australian National University

Project Summary

The optical microscope has enabled us to see micro-objects, leading to revolutionary discoveries in medicine and natural sciences. However, the smallest object resolved by a microscope is limited by the wavelength of light. To see nanoscale objects smaller than the wavelength, a new tool for nano-imaging is needed. This project will establish a nanoscale optical microscopy facility that will reveal the topology and true colours of the nano-objects. Such information, achieved through spectroscopic analysis of the light emitted or scattered at the nanoscale, will uncover some of the most fundamental aspects of the nanoworld, leading to cutting-edge scientific discoveries and important industrial applications in photonics and solar energy.

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- LE100100009** Prof Ping Koy Lam, Prof Michael E Tobar, Prof Andre N Luiten, Dr Thomas Symul, Dr Jevon J Longdell, Dr Benjamin C Buchler, Dr Warwick P Bowen, Prof Andrew G White, Prof David E McClelland, Dr Daniel A Shaddock, Prof Hans A Bachor, Dr Matthew J Sellars, Prof Halina Rubinsztein-Dunlop, Dr Kwan H Lee, Prof Dr Gerd Leuchs, Dr Malcolm B Gray, Dr Richard B Warrington
- Approved Project Title** Ultra-precision cutting and polishing machines for fabricating high-Q crystalline resonators
- 2010 \$455,000.00
- Primary FoR 0205 OPTICAL PHYSICS
- Partner/Collaborating Organisation(s)**
Max Planck Institute for the Science of Light, National Measurement Institute, University of Otago
The University of Queensland, The University of Western Australia
- Administering Organisation** The Australian National University
- Project Summary**
The proposed facility will equip Australian researchers with the capability to machine and polish optical crystalline materials down to atomic-level smoothness. The availability of this technology will enable the fabrication of ultra-sensitive metrological sensors, state-of-the-art photonic components, and quantum devices. Precision metrology is an integral component of many industries and it underpins a modern, technically advanced society. With this facility Australian researchers will lead the world in the fabrication of optical crystalline devices for a broad range of industrial and research applications.
- LE100100092** Prof Barry Luther-Davies, Dr Rongping Wang, Dr Douglas A Bulla, Dr Andrei V Rode, Dr Steve Madden, Dr Christelle Monat, Dr David J Moss, Dr Christian Grillet, Dr Duk-Yong Choi, Prof Benjamin J Eggleton, Dr Mark D Pelusi, Dr Stuart D Jackson
- Approved Project Title** A co-thermal evaporation system for the production of chalcogenide thin films for photonics
- 2010 \$270,000.00
- Primary FoR 0912 MATERIALS ENGINEERING
- Partner/Collaborating Organisation(s)**
The University of Sydney
- Administering Organisation** The Australian National University
- Project Summary**
This project will provide important infrastructure underpinning the production of novel photonic materials that will allow the fabrication of devices that will support advances in the optical internet; in sensing of dangerous or illicit materials; in defense science and in astro-physics. The production of high performance photonic materials for such applications can lead to new commercial ventures in Australia.
- LE100100177** A/Prof Ronald J Pace, Prof Thomas Wydrzynski, A/Prof Klaus J Weber, Dr Wayne D Hutchison, Prof Gottfried Otting, Dr Yun Liu, A/Prof Michelle L Coote
- Approved Project Title** Advanced electron paramagnetic resonance (EPR) facilities for chemical, biological and materials sciences
- 2010 \$300,000.00
- Primary FoR 0306 PHYSICAL CHEMISTRY (INCL. STRUCTURAL)
- Partner/Collaborating Organisation(s)**
The University of New South Wales
- Administering Organisation** The Australian National University
- Project Summary**
New instrumentation to advance national research in hydrogen fuel generation from renewable sources, new generation photo-voltaic technologies, novel polymer and other chemical materials and advanced computing systems will be provided by this project. A new high sensitivity electron paramagnetic resonance facility, located at the Australian National University, will serve researchers in the ACT region devoted to the broad range of activities summarised above. A particular focus involves novel, biologically inspired energy systems and high efficiency solar cell technology.

Summary of Linkage Infrastructure, Equipment and Facilities Proposals by State and Organisation

LE100100121 Prof Tim J White, Dr Jodie E Bradby, Prof Ray L Withers, Dr Yun Liu, Prof Robert G Elliman, Dr Mark C Ridgway, Prof Andres Cuevas, Prof James S Williams, Dr Yin-Yin J Wong-Leung, Prof Chennupati Jagadish, Dr Andrei V Rode, Prof Ian Jackson, Dr Daniel H Macdonald, Dr John D Fitz Gerald, Dr Zbigniew H Stachurski

Approved Project Title **An analytical transmission electron microscope for the investigation of functional materials, earth processes and novel condensed matter**

2010 \$1,000,000.00

Primary FoR 1007 NANOTECHNOLOGY

Partner/Collaborating Organisation(s)

Administering Organisation The Australian National University

Project Summary

Sustainability depends on the delivery of clean energy, pristine water and air, and the manufacture of consumer products with small environmental footprints. Modelling long-term impacts requires an understanding of the hydro-geological cycles. The technologies are well known—efficient electronics, fuel cells, lightweight composites, and so on—but delivery is not straightforward. It is clear, however, that novel materials manipulated at fine scales will be key. Transmission electron microscopy (TEM) guides the development of sustainable technologies. The new TEM facility at ANU will accelerate current studies, by enhancing the materials research portfolio, and extending national and international collaborations in materials, geological and earth sciences.