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Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)			Total ($)	Partner Organisation(s)
(Columns 1 and 2)	(Column 3)	2022-23 (Column 4)	2023-24 (Column 5)	2024-25 (Column 6)	2025-26* (Column 7)	2026-27* (Column 8)	2027-28* (Column 9)	(Column 10)	(Column 11)

Australian Capital Territory

The Australian National University

LE230100024

Liu, Prof Yun

A cryogenic multifunctional multiscale material characterisation facility

909,754.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 909,754.00

This proposal aims to establish a world-class cryogenic characterisation facility for materials science and emerging technologies. This will allow the direct observation and measurement of various material physical characteristics under one or more simultaneous external stimuli (electric, magnetic, optic, mechanic and thermal fields) at different length scales and at or below-room temperature. Outcomes from this project will advance cryogenic materials science and facilitate the discovery of new cryogenic functional materials and technologies in the fields of energy, quantum technology, biomedical engineering and electronics, directly benefiting National Priority Manufacturing areas in resource, energy, national security, defence and space.

National Interest Test Statement

With growing domestic and global security threats, Australia’s defence and intelligence sectors need sophisticated security and communication technology to identify and prevent them, and keep Australians safe. This relies on their use of smart devices which harness the power of materials with unique low temperature properties, such as computers that handle massive amounts of data at high-speeds while protecting information and communication. However, Australia currently lacks the manufacturing capability to exploit these materials. This project fills this gap with a novel, world-class facility that maps the micro properties of materials under a strong magnetic/electric field at low temperature. By generating the scientific breakthroughs in materials science technology that enables manufacturers to design smart devices, this facility will contribute to enhancing Australia’s manufacturing capability and global competitiveness in energy, information and communication sectors, supplying our defence and intelligence sectors with the technology needed for Australia’s future national security.

LE230100044

Rohling, Prof Eelco J

Australian Membership of the International Ocean Discovery Program 2023-24

2,189,103.00 | 2,189,093.00 | 0.00 | 0.00 | 0.00 | 0.00 | 4,378,196.00 | GEOSCIENCE AUSTRALIA

This proposal is for a 2 year membership of the International Ocean Discovery Program (IODP), the world’s largest collaborative research program in Earth and ocean sciences. IODP membership delivers access to global-ranging research infrastructure that provides unique enabling capabilities to explore, sample and monitor geological and biological activity deep beneath the seafloor. The IODP facilitates research into past global environmental change on multiple time scales, the deep biosphere, plate tectonics, formation and distribution of resources, and generation of hazards. This research addresses multiple national science and research priorities, and underpins future societal and economic prosperity.

National Interest Test Statement

Australia's oceans contribute to quality of life and economic prosperity in many ways - tourism, fisheries, resources, and recreation. Our challenge is to sustainably access these benefits into the future despite economic and existential threats linked to warming, rising sea levels, earthquakes, and tsunamis. To develop this capability, Australia needs a deeper understanding of the environmental and geological processes that affect our oceans and seafloor environments, which requires access to samples of sediments, rocks, fluids, and microbes from deep below the seafloor. Our project aims to secure this access through continued membership of the globally unique International Ocean Discovery Program. This will benefit Australia by improving its capacity to mitigate, and adapt to, the impacts of environmental and geological processes on Australia’s coasts and marine resources, and by detailing the formation processes and distribution of critical resources for the present and the future.

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LE230100058 Ratnam, Dr Elizabeth L	**National Facility for Electricity Grid Security and Resilience Research** This project aims to build a National Electricity Grid Security and Resilience Facility to investigate new and emerging security threats in large-scale industrial control systems. The Facility should provide a rich and unique characterisation capability of large-scale industrial control systems operated within electricity grids, generating new innovative and interdisciplinary knowledge across the fields of control, security, and power systems. This strategic facility will give researchers a significant advantage in the development of new methods for the secure operation of industrial control systems and approaches to counteract cyber threats, providing substantial benefits for critical electrical infrastructure and national security.	400,000.00	0.00	0.00	0.00	0.00	0.00	400,000.00	
	National Interest Test Statement The aim of this proposal is to establish a national electricity grid security and resilience facility to enable the development of new robust and secure industrial controllers designed to operate legacy and emerging grid infrastructure arising from the modern power grid. Critical questions on electrical power systems cannot be answered because of limited publicly available datasets and analysis platforms on the interaction of cyber-physical systems. The proposed facility will provide new information on the interaction of advanced cyberattack vectors, information and communication technology, operation technology, electromagnetic transient behaviour, and quasi-steady-state operations, accelerating research programs at the intersection of resilience, cyber, and the physics of the power grid. The proposed facility will enable large-scale industrial control systems to be better engineered for improved robustness and resilience against cybersecurity threats, providing substantial benefits for the economy and society by reducing the risk of power blackouts, thus increasing Australia's national security.								
LE230100063 Lidman, A/Prof Christopher E	**Explosive Astrophysics from Siding Spring Observatory** This project aims to link telescopes at Siding Spring Observatory into a fully automated network that can discover and investigate explosive astronomical events. By linking these telescopes to one another, it will be possible to study these transitory events in great detail soon after they occur and before they fade away forever. The expected outcomes include a deeper understanding into what explodes, the mechanisms that lead to the explosions, and how these explosions shape their surroundings. This project will connect this network into similar networks that are now being assembled in other parts of the world, and allow participation by Australian astronomers in what will be a golden age in the study of explosive astronomical transients.	595,295.00	0.00	0.00	0.00	0.00	0.00	595,295.00	
	National Interest Test Statement Despite Australia’s favourable geographical location and access to advanced astronomical facilities based here, Australia lacks a strategy that will enable it to play a significant role in what will be a golden age of astronomical discovery that will commence when the revolutionary Legacy Survey of Space and Time starts to discover millions of explosive astronomical events in 2024. By uniting astronomers from all over Australia, this project will develop a network of automated telescopes that can both discover and follow-up these explosive events at short notice and without human intervention. The project will lead to a better understanding of what explodes, the physics behind the explosions, and the impact these explosions have on their surroundings, including the potential to impact life on Earth. It may uncover sources that are as yet unknown to science. This project will stimulate the imagination of general public, inspire our brightest minds to take up careers in science and technology, and result in transferable skills that can contribute to key areas such as cybersecurity, health, and manufacturing.								

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LE230100112 Lidman, A/Prof Christopher E	**Expanded Horizons for the Anglo-Australian Telescope** This project aims to expand the capabilities of the Anglo-Australian Telescope's two most demanded instruments: the internationally unique Two-degree-Field fibre positioner, and the recently installed Veloce exoplanet finder. Telescopes thrive or wither on the quality of the instruments that are installed on them, and regular refreshes like these are required for them to stay at the cutting edge. The expected outcomes of this project are more and better quality data from more reliable instruments, and higher scientific productivity. Benefits include new research opportunities for local scientists and students, new international partners for the telescope, enhanced international collaboration, and a secure future for the telescope. **National Interest Test Statement** Located in rural Australia, the Anglo-Australian Telescope has – for almost half a century – produced breakthrough scientific discoveries that have captured the imagination of the Australian public. It has become a mainstay of the local economy, supporting an ever growing astro-tourism industry of which the "tent-pole" is Australia's largest optical telescope. However, it needs regular upgrades to continue doing cutting-edge science. Without regular refreshes, scientific interest in using the telescope will wane, funding will dry up, and the telescope will eventually close. This project will upgrade the telescope's two most sought after instruments: the unique and world-famous Two-degree-Field fibre positioner, and the Veloce exoplanet finder. The outcomes will be more efficient operations, higher productivity, greater demand from paying users, and a secure future for the telescope. With a secure future, the telescope can continue serving as a beacon of inspiration for aspiring scientists, and as a technological marvel for people who travel to the region from across Australia and the world to view it.	431,407.00	163,641.00	163,641.00	0.00	0.00	0.00	758,689.00	
LE230100113 Lu, Prof Yuerui	**Cryogenic Near-Field Imaging and Spectroscopy Facility at the 10-nm-Scale** Cryogenic near-field imaging and spectroscopy impacts a wide range of next-generation technologies including non-invasive medical instruments, wearable devices, communication, quantum information systems and energy storage solutions. This project aims to build a cryogenic near-field imaging and spectroscopy platform at the nanometre scale for characterising nanomaterials and micro/nano-scale devices. The facility expects to provide rich and unique characterisation capabilities for hybrid devices at low temperatures and in a high vacuum environment. Such a platform enables multidisciplinary collaborations alongside local design and construction of hybrid devices, advancing the growth of local high-technology industries. **National Interest Test Statement** Australia competes globally in a range of critical sectors for our economy, from energy conversion and smart sensing to medical diagnosis and communications. However, to ensure they remain competitive in future will require innovation based on research using highly sophisticated imaging and spectroscopy capabilities, which Australia does not currently possess. This project addresses this problem: it will establish the first national facility with nanoscale high-resolution imaging and spectroscopy working from room temperature down to very low temperatures. The facility will allow scientists and engineers to develop superior sensors with high sensitivities, efficiencies and low costs for industry. Through application in new devices, our imaging capability will allow Australian manufacturers and designers to make and exploit novel materials, advanced light sources, and medical technology. This will help Australia lift productivity and economic growth in these sectors, maximising Australia's competitive advantage in smart sensing, information processing, communications, energy conversion, and medical devices.	970,000.00	0.00	0.00	0.00	0.00	0.00	970,000.00	
	The Australian National University	5,495,559.00	2,352,734.00	163,641.00	0.00	0.00	0.00	8,011,934.00	
	Australian Capital Territory	5,495,559.00	2,352,734.00	163,641.00	0.00	0.00	0.00	8,011,934.00	

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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New South Wales									
Macquarie University									
LE230100090	**A multifaceted technology platform to enhance single cell genomics**	682,792.00	0.00	0.00	0.00	0.00	0.00	682,792.00	
Paulsen, Prof Ian T	A major limitation of traditional cellular studies is that they scrutinise DNA or RNA extracted from thousands of cells, resulting in a population average of what is there. This blunt approach misses key differences and interactions between cells in populations. This project aims to build capacity within the Ramaciotti Centre Consortium for single cell genomics by acquiring equipment for enhanced sorting or spatial mapping of single cells. This will enable innovative science across diverse fields including industrial biotechnology, environmental microbiology, neurobiology, and biosecurity and ensure that Australian researchers remain at the forefront of single cell genomics in organisms ranging from bacteria to animals to humans.								
	National Interest Test Statement								
	Access to advanced research infrastructure is a crucial part of ensuring Australia is at the forefront of delivering real-world solutions to real-world problems. This project will innovate our ability to understand cellular genetics by enhancing much-needed capabilities in the ability to separate single cells from complex bacterial communities, mapping of important cells within tissues, and rapid genetic sequencing. This state-of-the-art research equipment will support a wide variety of applications by generating significant advances across multiple sectors, including producing fuels, plastics and industrial biochemicals in microbes, and in identifying agricultural pests and diseases. These outcomes will ultimately benefit Australia's economy (by creating jobs implementing the advances created by this research in manufacturing and other industries), environment (through enhanced management of crops and animal stocks, and production of alternative fuel sources) and society.								
	Macquarie University	682,792.00	0.00	0.00	0.00	0.00	0.00	682,792.00	
The University of New South Wales									
LE230100065	**Facility for growth and characterisation of advanced materials and devices**	1,310,536.00	0.00	0.00	0.00	0.00	0.00	1,310,536.00	
Hamilton, Prof Alexander R	This proposal will create new capabilities for growing and characterising advanced materials used in electronic, magnetic, and optical devices. New crystal growth tools (a pulsed laser deposition system for volatile materials and an alloy deposition chamber) will allow previously incompatible materials to be combined. A cryogenic measurement platform with 20T magnet (the largest in Australia) will enable materials characterisation and device optimisation. The outcomes will underpin future developments in information processing, quantum technologies, sensors, and renewable energy, benefitting research at 3 ARC Centres of Excellence, 2 ARC Industrial Transformation Research Hubs, multiple projects with industry, and emerging research areas.								

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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	National Interest Test Statement The creation of new industries thrives on materials development. This proposal will take advantage of the latest advances in research technologies for growth, characterisation and testing of new materials to fill a major gap in the available facilities in Australia. The new facility will make it possible to combine different materials very precisely at atomic scale, analyse and test what has been made, and make high precision measurements on the resulting devices. This will enable breakthrough science, whose outcomes will have significant economic and environmental benefits for Australia through developments in information processing, quantum technologies, advanced sensors and energy-efficient technologies (faster computers, more efficient electric motors, and longer-lived batteries). The new facility will be made available through multiple Centre of Excellence and Cooperative Research Centres with existing and new high-tech industrial partners, and will be used to train the highly skilled workforce needed by these industries in Australia.								
LE230100157 Poole, A/Prof Kathryn	**Bioprinting and advanced visualisation of novel 3D model systems** This project aims to combine the capabilities of a novel, Australian made, 3D bioprinter with a multimodal optical scope with adaptive imaging correction (MOSAIC) to advance and accelerate 3D model system research in Australia. This project will capitalise on bioprinting and recent advances in fluorescence imaging technology including lattice light-sheet imaging, multiphoton lasers and adaptive optics to enable fundamental research in 3D environments, which closely mimic in vivo conditions. Establishing this infrastructure will provide an acceleration of interdisciplinary research in cell biology, stem cell biology, mechanobiology and nanotechnology.	1,009,078.00	0.00	0.00	0.00	0.00	0.00	1,009,078.00	
	National Interest Test Statement This project will establish equipment to create miniature replicas of organs and tissues and a new microscope to study the cells within these 3D structures. This infrastructure will combine Australian made bioprinting machinery that can precisely pattern cells in 3D to create models of physiological systems, minimising the use of animals in research and enabling study of cell and tissue function under more “life like” conditions. The microscope will be the first of its kind in Australia and will provide unprecedented insight into these 3D biological structures over long periods of time. This research will benefit Australia’s capacity in biological research and ensure students and researchers are trained in cutting edge technologies. The national team of researchers will establish protocols for use of the new microscope and bioprinting technologies so that these can be readily adopted by Australian biotech industry to fast-track their development pipelines.								
	The University of New South Wales	2,319,614.00	0.00	0.00	0.00	0.00	0.00	2,319,614.00	
The University of Newcastle									
LE230100079 Craig, Em/Prof Hugh	**Time Layered Cultural Map of Australia: Advanced Techniques and Big Data** The aim of the project is to understand Australian history and culture better through the perspective afforded by large data sets with spatial and temporal coordinates. To this end the project aims to build open-access infrastructure to create and analyse large spatio-temporal data sets, and to provide new map layers to serve as context for multiple research projects. Users would be able to deal with spatio-temporal data sets as dynamic systems and create multi-layered maps with them. The benefits would be a marked increase in the ease of humanities research using digital mapping and clear pathways to big data, high-end projects combining structured space and time data with traditional humanities insights and approaches.	472,543.00	0.00	0.00	0.00	0.00	0.00	472,543.00	

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	National Interest Test Statement This project provides stronger historical and cultural mapping capabilities for Australian researchers, for staff in galleries, libraries, and museums, and for the public. It adds new computational and AI-driven tools to the existing Time-Layered Cultural Map of Australia platform, to map the movement of people and objects, to automatically detect place names in documents, and to identify clusters of events. The benefits include new and more accessible ways of understanding Australian culture and history for both scholarly and general audiences. Wide adoption of the platform by researchers and target groups, like library and museum staff, would be enabled by providing online training sessions, as well as embedding the platform in existing archives and research projects. The platform will be open for use by all Australians and beneficiaries would be wide-ranging, including for example, local historians who want to make a map from the places mentioned in early documents, and tourist organisations aiming to gather information about an area from various sources and present it in an interactive online map.								
LE230100167 Doroodchi, A/Prof Elham	**4D Tomographic Particle Image Velocimetry for Multiphase Flow Measurement** The overarching aim of this project is to establish a state-of-the-art facility for measurement of multiphase flows that are of significant importance in the extraction and processing of energy and mineral resources, environmental remediation of pollutants, water and health. The proposed facility will offer unique enhanced capabilities in flow field characterisation and dispersed phase visualisation, supporting a diverse range of ARC and industry funded research projects within multiple research centres and, in particular, an ARC Centre of Excellence with a national and global focus. The knowledge gained should lead to technological advances and economic benefits for Australia in the field of resources.	393,481.00	0.00	0.00	0.00	0.00	0.00	393,481.00	FLSMIDTH PTY LTD, HUNTER WATER CORPORATION
	National Interest Test Statement Found throughout industry, multiphase flows are the simultaneous flow of more than one material phase (e.g. gas, liquid, solid). This project will establish a state-of-the-art facility for measuring multiphase flows that can be used in the extraction and processing of energy and mineral resources and, in treating water and environmental pollutants. This, in turn, will enable the development of more efficient, cost effective, and sustainable processing technologies that have direct relevance to the national economy, especially the resources sector worth hundreds of billions of dollars per annum. The proposed facility will significantly enhance Australia's competence in the field of multiphase flows and provide the tools necessary to foster innovative engineering solutions. For example, old tailings dams might be reprocessed to recover minerals for valuable metals and rehabilitate the land. The knowledge generated will improve the energy footprint and environmental impact of our current multiphase process systems, delivering economic and environmental benefit to Australia and globally.								
	The University of Newcastle	866,024.00	0.00	0.00	0.00	0.00	0.00	866,024.00	
The University of Sydney									
LE230100052 Ling, Prof Chris D	**Comprehensive and Versatile In-house X-ray Absorption Spectroscopy Facility** This projects aims to address the growing demand for x-ray absorption spectroscopy (XAS), by installing Australia's first in-house suite of instruments to complement and enhance capabilities at the Australian Synchrotron (AS). This project expects to generate new knowledge across a wide range of science and engineering fields, by using XAS to acquire unique new information about structure and bonding in functional materials and molecules, from which rational strategies can be designed to improve their performance. Expected outcomes of this project include the ability to perform experiments currently unavailable or impractical at the AS. This should provide significant benefits flowing from a bigger and better-trained national XAS user base.	549,859.00	0.00	0.00	0.00	0.00	0.00	549,859.00	

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	National Interest Test Statement This project will make a technique called X-ray absorption spectroscopy (XAS) available to Australian researchers by installing the country's first – and some of the world's first – "in-house" instruments. XAS gives information about how atoms are arranged and bonded together in molecules and materials, which we cannot get from any other technique. Researchers can use that information to design modified molecules and materials with technologically optimised properties. Outcomes will range from more precise drug delivery to more efficient water treatment to more powerful batteries, bringing economic, environmental and ultimately social benefits for Australia. Presently, XAS can only be done at large-scale synchrotron facilities that are very expensive to operate and typically require a 6-month application process for a 1 or 2-day experiment. The instruments from this project will be relatively cheap, robust, flexible and rapidly accessible to all Australian researchers through standard university analytical services, with technical support and expert advice where needed.								
LE230100069 Flew, Prof Terry	**The International Digital Policy Observatory** This project aims to develop an International Digital Policy Observatory, which is the world's first comprehensive database to track developments in digital/Internet regulation internationally. The facility will provide a unique means of fostering collaboration on research into the effectiveness of different approaches to regulation, and allow these researchers to provide insights to the ICT industry, policy-makers, and advocacy groups, through the real-time capturing and sharing of digital and internet policy initiatives across 50 countries. This will provide significant benefits in placing Australian at the forefront of regulatory best practice in the digital economy, by tracking policy initiatives in the global digital economy.	215,000.00	0.00	0.00	0.00	0.00	0.00	215,000.00	AUSTRALIAN INFORMATION INDUSTRY ASSOCIATION LIMITED
	National Interest Test Statement There has in recent years been a growing 'regulatory turn' in different national jurisdictions, responding to issues such as online harms, information monopolies, data privacy, cybersecurity, and ethical concerns about algorithmic decision-making and artificial intelligence. Industry, regulatory agencies and advocacy groups have frequently expressed concern about the often 'ad hoc' nature of such policymaking, and resulting inconsistencies in policy development. This project will make a world-leading contribution to more effective Internet and digital policy formation, by creating a publicly accessible, real-time database (The International Digital Policy Observatory) with enhanced analytical tools that tracks developments in digital/internet regulation across 50 countries, including all 38 OECD countries. This will benefit Australian digital businesses and advance the digital economy agenda, while also providing social benefits by enabling greater participation and knowledge sharing among all digital economy stakeholders, and between researchers, policy makers and the ICT industry.								
LE230100091 Kassiou, Prof Michael	**Radiochemistry Facility for Biomolecule Characterisation in Living Systems** This project will provide a microfluidic radiochemistry facility that fills a critical capability gap in the network of core imaging research laboratories in New South Wales. It will enable the labelling of novel biomolecules with short-lived radioisotopes for their characterisation in living subjects. This platform will enable research as diverse as the development and in-vivo characterisation of new chemical probes and nanoparticles that bind to specific protein targets, development of next generation radiochemistry technologies, investigating mechanisms of brain plasticity in predictive learning, developing novel methods for multi-modal image analysis, and understanding the molecular pathways involved in dysregulated cellular networks.	1,001,827.00	0.00	0.00	0.00	0.00	0.00	1,001,827.00	
	National Interest Test Statement Over the last 15 years, the Australian Government in partnership with the university sector has made substantial investments through the National Research Infrastructure program in the latest, cutting-edge imaging devices for studying the biology of living organisms, including humans. These imaging systems require radioactive labelled molecules to generate the imaging signal. Our project fills a critical gap by establishing a distributed radiochemistry facility based on advanced microfluidic technology. The new facility will provide researchers with the ability to study a wide range of molecular functions in living subjects, thus maximising return on investments in imaging infrastructure. For example, this new technology will provide the advanced manufacturing sector with a competitive edge by creating a powerful tool for accelerating drug discovery. In the long term, it will lead to economic and health benefits for Australians by identifying new treatment targets for the complex physiological systems that go awry in chronic health conditions, such as cancer and neurodegenerative disorders.								

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LE230100121	**High performance chalcogenide processing addressing grand challenges**	500,000.00	0.00	0.00	0.00	0.00	0.00	500,000.00	
Ho-Baillie, Prof Anita W	This project aims to meet the growing need for micro- and nano- scale material processing, device fabrication and characterisation for chalcogenides, 2D transition metal dichalcogenides (TMDs) and van der Waals heterostructures based on allotropes of S, Se, Te etc for addressing the grand challenges of i) next generation data processing devices for increasing volume and speed of modern information and communication technologies; ii) high performance photovoltaics and smart windows for renewable energy generation and sustainable living; iii) rational design of photo-catalysts for clean hydrogen generation; iv) ultrasensitive gas sensors for detecting greenhouse gasses and v) ultra-violet (UV) sensors for preventing skin cancer.								
	National Interest Test Statement								
	This project will provide infrastructure for engineering, and making devices based on, materials that contain sulphides, selenides, and tellurides which are extremely useful because their properties can be engineered to improve the performance of various devices. For example, photonic devices used in high-volume, high-speed data processing which are critical for communications, solar cells that can be integrated into windows to generate renewable energy, and more accurate sensors for detecting greenhouse gasses and ultra-violet radiation to prevent skin cancer. The economic, environmental, and social benefits to Australia across the communication, renewable energy and healthcare sectors are therefore broad. This new infrastructure will co-locate multiple tools in a well-controlled environment to make it easier and more cost effective for researchers and industry to carry out complex experiments. This unique set-up will also make it much easier to prototype new devices, speeding up the commercial adoption of new technologies in these sectors.								
	The University of Sydney	2,266,686.00	0.00	0.00	0.00	0.00	0.00	2,266,686.00	
University of Wollongong									
LE230100039	**Towards a Green and Sustainable Energy-efficient Metaverse**	440,145.00	0.00	0.00	0.00	0.00	0.00	440,145.00	
Susilo, Prof Willy	This project aims to establish a world-class facility for conducting research on green and sustainable energy-efficient metaverse technologies. The metaverse is widely anticipated as the next technological breakthrough that will revolutionise the way we interact, learn, work, shop and entertain in the new digital economy. However, metaverse technologies, including virtual reality, AI, big data, cybersecurity and blockchains, require a tremendous amount of computation and energy to serve millions of concurrent users. The proposed facility is expected to support the development of energy-efficient algorithms and systems for the metaverse, and establish Australia's leadership in this emerging area of major economic and societal impact.								
	National Interest Test Statement								
	The metaverse is a persistent online 3D universe that will revolutionise the way we interact, learn, work, shop and entertain in the new economy. According to a report by Citi, the metaverse market value could exceed US$13 trillion by 2030. It is predicted that by 2026, 25% of people will spend at least an hour per day in the metaverse. However, to provide a realistic, immersive experience to millions of concurrent users, the metaverse relies on highly energy-demanding technologies, including virtual reality, AI, big data, cybersecurity, blockchains and cloud computing. This project aims to establish a state-of-the-art national facility for conducting research on green and sustainable energy-efficient metaverse technologies. The proposed facility will enable the Australian research community to precisely measure and adaptively optimise the energy consumption of metaverse algorithms and systems. The outcomes of this project are expected to position Australia as a leader in adopting sustainable metaverse technologies for manufacturing, education, commerce and entertainment, especially post COVID-19.								
	University of Wollongong	440,145.00	0.00	0.00	0.00	0.00	0.00	440,145.00	

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Western Sydney University									
LE230100034 van Schaik, Prof André	**A Reconfigurable Neuromorphic Compute System for Brain-Scale Simulations** The project aims to construct a world-first reconfigurable neuromorphic compute system. The hardware is designed to run brain-scale simulations efficiently, providing a platform to develop our understanding of the brain and develop brain-scale computing applications. Expected outcomes are to enable the efficient simulation of biological brains for computational neuroscience research and investigation of novel machine learning approaches for practical applications. The Australian and global research community in neuroscience and machine learning would benefit from the infrastructure, as it can be accessed remotely via the internet, unlocking world-wide collaborative research into brain-scale computing.	1,465,519.00	0.00	0.00	0.00	0.00	0.00	1,465,519.00	INTEL CORPORATION, FORSCHUNGSZENTRUM JUELICH GMBH
	National Interest Test Statement Biological brains are much less power hungry than current AI systems and learn from far fewer examples. Up to now, it has been impossible to simulate the electrical signal processing in biological brains at the scale required, even on supercomputers. This has hampered our understanding of biological brains. To solve this problem, we will build the world's first computer dedicated to efficient simulation of bio-inspired neural networks as large as a human brain. We will make the system available online to researchers world-wide so they can all contribute. With a predicted global market of over $50 billion by 2030 for brain inspired computers, our pioneering role will attract high-tech companies to Australia and create hundreds of high-skilled jobs. It will enable the creation of robust, high-performance AI and develop smarter technology for devices that everyone will use, such as mobile phones, or self-driving cars, and for manufacturing, mining, and health-care robots. A better understanding of brains will also lead to better designs for human-computer interface devices such as medical bionics prostheses.								
	Western Sydney University	1,465,519.00	0.00	0.00	0.00	0.00	0.00	1,465,519.00	
	New South Wales	8,040,780.00	0.00	0.00	0.00	0.00	0.00	8,040,780.00	

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)			Total ($)	Partner Organisation(s)
		2022-23	2023-24	2024-25	2025-26*	2026-27*	2027-28*		
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)	(Column 9)	(Column 10)	(Column 11)

Queensland

Griffith University

LE230100128

Andrews, Prof Katherine T

Enhancing Australian biodiscovery molecule generation, storage and access.

1,078,770.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,078,770.00

The project aims to establish the Australian Biodiscovery Network with the following integrated infrastructure: sample processing robotics and storage to enhance national biomolecule curation and access at Compounds Australia and automated LC/MS to increase natural product extraction at NatureBank at Griffith Uni; a robotic colony picker to expand the Uni Queensland Microbes Australia library; a protein purification system to facilitate pathogen biologic discovery at James Cook Uni; live cell imaging to enable biodiscovery for aquaculture at Uni Sunshine Coast. This infrastructure will enhance biodiscovery capacity of QLD universities and benefit hundreds of researchers nationally across health, aquaculture, agriculture and food security.

National Interest Test Statement

Australia is one of only 17 mega-diverse countries in the world and is renowned for the uniqueness of its animals, plants, marine organisms and microorganisms (e.g., 85% of our flowering species are endemic to Australia). Natural products are chemical compounds or substances produced by living organisms and are an important source of products for animal and human health (e.g., 40% of medicines are derived from natural products), agriculture, aquaculture, food and food security. This LIEF project will improve Australia's capacity in natural product research by enhancing infrastructure that allows natural products to be discovered and produced, safely stored, easily distributed to researchers in Australia and globally and investigated for potential use as new drugs, biologics, natural medicines, food additives, native foods and for any other application. The new research infrastructure will provide a step change in our capability in natural product research and enhance significant national assets including Compounds Australia, NatureBank and Microbes Australia.

Griffith University 1,078,770.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1,078,770.00

James Cook University

LE230100180

Miller, Prof David J

Single cell sequencing facility at James Cook University

234,438.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 234,438.00

Single cell sequencing (SCS) is revolutionising the life sciences and is essential in enabling JCU to maintain its leadership position in aquaculture, coral reef studies and tropical health. SCS is a central component of ongoing projects at JCU, a number of which are supported by the ARC. The current state of SCS technology dictates that the cell sorting and library preparation component be done locally. At present, the closest such facility is located in Brisbane (1300 km from Townsville by road), which means that not only is life sciences research at JCU severely handicapped by the lack of access to the equipment requested here, but the same is true of all Australian institutions north of the 27th parallel (Brisbane).

National Interest Test Statement

Single cell sequencing (SCS) is a procedure that helps us understand how each individual cell works within any organism. For example, how skin cells determine the colour of a barramundi. The only equipment capable of undertaking SCS in Queensland is located in Brisbane. Samples for SCS cannot be transported, seriously disadvantaging research projects in northern Australia. The placement of equipment in North Queensland will benefit researchers in aquaculture, coral reef studies and tropical health across various universities, research organisations, hospitals and other agencies. Australian companies will directly benefit from the improved knowledge that SCS can provide. For example, barramundi with the golden skin colour are highly valued but naturally rare, whereas SCS will enable their routine production. SCS will also support the design of treatments effective against common tropical diseases, and conservation and restoration of coral reefs, thereby bringing substantial benefits to the region.

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	James Cook University	234,438.00	0.00	0.00	0.00	0.00	0.00	234,438.00	
Queensland University of Technology									
LE230100008 Miljevic, A/Prof Branka	**Real-time mass spectrometry for advanced aerosol chemical characterisation** Atmospheric aerosols profoundly affect climate and human health. Aerosol chemical composition is a major factor that controls these effects. This project aims to enhance Australian aerosol research capabilities by acquiring for the first time two complementary high-sensitivity field-deployable mass spectrometers for real-time aerosol chemical characterisation. Real-time aerosol mass spectrometry revolutionises studies of dynamics of atmospheric processes, not possible using classic filter sampling and laboratory processing. This new capability will support cutting edge studies on atmospheric processes related to climate, air quality & human health, sustainability, and efficiency enhancement of industrial and energy generation processes.	831,200.00	0.00	0.00	0.00	0.00	0.00	831,200.00	AUSTRALIAN ANTARCTIC DIVISION
	National Interest Test Statement Aerosols are tiny airborne particles that are present in the air we breathe both indoors and outdoors. These aerosols profoundly influence outcomes both for climate and human health, such as recently experienced through the COVID-19 pandemic where airborne particles were shown to be vectors for transmission of disease. In both indoor and outdoor contexts, the chemical composition of aerosols is the major factor dictating outcomes for humanity and the environment. This project will enable real-time measurement of the chemical composition of aerosols using state-of-the-art instruments capable of characterising the particles in air across different environments and contexts. The expert analysis of data collected using these instruments will guide physical (e.g., changes to building design to minimise particle-borne virus transmission) or policy-based (e.g., changes to fuel and vehicular standards to minimise particle emissions and improve air quality) interventions that will improve health, environmental and climate outcomes for all Australians.								
LE230100045 Shahbazi, Dr Mahboobeh	**Versatile Physical Property Measurement System for South-East Queensland** Advanced materials including functional nanomaterials, superconductors and thermoelectrics exhibit exciting behaviours at micro/nano scale that have the potential to revolutionise industry and society through applications ranging from energy generation to transportation and health. Realising this technology-revolution requires rapid and accurate measurements of physical properties of novel materials across the extremes of temperature, pressure, magnetic fields. This project will deliver a state-of-the-art Physical Property Measurement System capable of automated, precision measurement of electron/phonon transport properties across super-low-temperature, high-magnetic field and high-pressures currently unavailable to Queensland researchers.	586,779.00	0.00	0.00	0.00	0.00	0.00	586,779.00	
	National Interest Test Statement Australia’s energy distribution network is among the most challenging in the world due to the huge distances from transmission to utilization. It is estimated that of the energy generated in Australia up to 15% is lost annually through the existing copper network leading to massive impacts on the economy ($4B per year) and the environment through increased greenhouse emissions. Superconductivity is the phenomenon of transferring energy without energy loss but currently requires extremely low temperatures to be effective. Superconductors operating at higher temperatures than currently available (i.e. above 100 degrees Kelvin) will enable reduced capital and operating costs, higher energy-to-weight ratios, and efficient energy transfer in power networks. This project will deliver state-of-the-art instrumentation capable of studying superconductivity at temperatures ranging from -272 and 125 oC. This infrastructure will accelerate the development of next-generation superconducting materials with the potential to minimize energy loss in electrical networks and underpin future energy security for Australia.								
	Queensland University of Technology	1,417,979.00	0.00	0.00	0.00	0.00	0.00	1,417,979.00	

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The University of Queensland									
LE230100048 Harmer, A/Prof Jeffrey R	**High-Resolution Electron Paramagnetic Resonance Imaging and Spectroscopy** This project aims to establish a national network for Electron Paramagnetic Resonance (EPR) Imaging and Spectroscopy, with microscopic and molecular resolution. This new instrumentation, to be integrated into three facilities, will establish high spatial resolution EPR imaging, up-grade critical spectrometer detection sensitivity, provide photo-optic EPR and establish critical capability in Victoria. The equipment impacts a diverse range of fields including next generation photovoltaics and batteries, develops structural biology methods for in-cell characterisation, provides micro-dosimetry imaging of radicals from radionuclei, and provides capability to advance research using metal-based catalysts in synthetic and biological systems	570,702.00	0.00	0.00	0.00	0.00	0.00	570,702.00	
	National Interest Test Statement Radicals are highly reactive molecules critical to chemistry and biology. When they are properly manipulated, radicals can be harnessed for development of advanced technologies. However, a lack of understanding of their identity and behaviour, impedes technology development in key areas of interest to Australia including health, food and energy. We will establish a multi-centre facility with cutting-edge infrastructure to exploit the huge potential of radicals in everyday life. This will enable Australian scientists to gain insight into the role and behaviour of radicals in a diverse range of fields which will lead to the discovery of innovative technologies. A wide range of projects will be supported, including generation of cancer-killing radicals, fungal decontamination of food, development of new drugs, improved solar cell efficiency and better batteries. Our facility will generate new knowledge, accelerating both fundamental and translational research towards their impactful outcomes for Australians.								
LE230100070 Wang, Prof Lianzhou	**Integrated high-throughput material synthesis and characterisation system** The program aims to develop an integrated mobile high-throughput robotic system for rapid screening of synthesis parameters and physicochemical properties of functional nanomaterials. The new system with human-like reach will be designed to operate typical lab material synthesis, integrated with a thermal analyser for rapid structural analysis, a Raman spectrometer and a luminescence spectrometer for property fast screening, an electrochemical atomic force microscope for monitoring material's structure and performance during reactions. The new platform will provide the Australian Advanced Manufacturing sector excellent opportunities on critical materials development that underpin applications in clean energy, environment and health care.	740,700.00	0.00	0.00	0.00	0.00	0.00	740,700.00	
	National Interest Test Statement The design and fabrication of advanced materials with desirable properties and functions underpin important renewable energy, environment, and healthcare technologies. To position Australia at the forefront of developing these technologies, new infrastructure to develop advanced materials in a more efficient way is urgently needed. The proposed infrastructure will use new robotic technologies to guide rapid material selection with desirable functions for the intended applications. The integrated facility will enhance Australia’s advanced manufacturing capability by delivering new commercially viable advanced materials including value-added products from Australia’s abundant critical minerals for high-performing batteries in electric vehicles. The new advanced materials enabled by this program will be shared with Australia’s resources industry that will enable their adoption into the local advanced manufacturing sector. The deployment of new technologies like next generation batteries will accelerate Australia's transition to a low-carbon economy, leading to economic and environmental benefits.								

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LE230100145 Kobe, Prof Bostjan	**Nanocrystal Electron Diffraction Facility** This proposal aims to establish an advanced micro-crystal electron diffraction (MicroED) facility. Accurate determination of molecular structure is of crucial importance for the understanding of biological processes, the design of new materials and drugs and enhancing the efficiency of agriculture. The facility will establish an Australia-first dedicated micro-crystal electron diffractometer. The new equipment will provide new capabilities by enabling structure determination using nanometre-size crystals, and complement the already existing structural chemistry and biology facilities available at the participating institutions and nation-wide.	1,129,423.00	0.00	0.00	0.00	0.00	0.00	1,129,423.00	THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH
	National Interest Test Statement Determination of three-dimensional (3D) structures of molecules is critical for understanding how they work. It is critical for many industry applications, some examples of which include understanding mechanisms behind how vaccines, gas filtration systems and antibiotics work. Micro-crystal electron diffraction (MicroED) is a novel technique for determination of 3D structures of crystalline molecules that can be used with crystals of much smaller size than the existing technologies allow. This project will establish the first dedicated MicroED facility in Australia, that will be available to all researchers. It will allow implementation of this breakthrough methodology and benefit Australia across many industry sectors from pharmaceutical to agrochemical, petrochemical, mining and life-science industries; it will help develop new materials, drugs and improved agriculture and help reduce costs. The project will add new capabilities not yet available in Australia that will complement national facilities such as the Australian Synchrotron.								
	The University of Queensland	2,440,825.00	0.00	0.00	0.00	0.00	0.00	2,440,825.00	
University of Southern Queensland									
LE230100179 Wang, Prof Hao	**Environmental Scanning Electron Microscope for High Temperature Analysis** Through the use of a high temperature stage in an environmental SEM, this project intends to develop a comprehensive capability for in situ high temperature scanning electron microscopy. This will enable analysis of material behaviour as a function of elevated temperature. As a result of the project, we expect to discover rare and anomalous microstructural phenomena in several classes of advanced materials. It is expected that this project will address microstructure-property-performance relationships in multiple multifunctional advanced materials, including polymers, semiconductors, membranes, composites, and energy materials, as well as fostering national collaboration and global stewardship of Australian science and technology.	495,500.00	0.00	0.00	0.00	0.00	0.00	495,500.00	
	National Interest Test Statement The development of innovative and industrially useful materials, such as polymers, composites, metals and semi-conductors, has been the catalyst for improved industrial processes and are vital components of Australia's knowledge-based economy. These advanced materials are used in the manufacture of sensors, fire-resistant coatings, renewable energy materials and batteries. To enable innovation and drive economic growth, it is critical that we thoroughly understand these materials and how to make them. This new state-of-the-art environmental scanning electron microscope (ESEM) is a technological leap in the analysis of complex advanced materials. It will enable researchers to understand how materials are structured and how well they perform under service conditions. The findings will lead to improved manufacturing processes as well as new and innovative advanced materials. Combined with UniSQ's research expertise, our partners and our extensive network of industry collaborators, the ESEM will enable the development and application of advanced materials in a range of industrial settings.								
	University of Southern Queensland	495,500.00	0.00	0.00	0.00	0.00	0.00	495,500.00	
	Queensland	5,667,512.00	0.00	0.00	0.00	0.00	0.00	5,667,512.00	

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South Australia									
Flinders University									
LE230100038 Miot da Silva, Dr Graziela	**Coastal Bathymetry with Advanced Technologies (CoastBAT)** This proposal will fund Coastal Bathymetry with Advanced Technologies (CoastBAT), a facility that will provide high resolution bathymetry in nearshore and inland waters, where information is currently limited due to high cost and/or difficult access by traditional surveying operations. The access to such information (and capability to monitor change) will unlock research opportunities in areas related to coastal sciences, while benefiting industry and training students in the use of the most up-to-date bathymetric surveying methods. This equipment facility represents a low-cost solution not currently available in other academic institutions in Australia and will facilitate collaborations across institutions nationally and internationally.	387,250.00	0.00	0.00	0.00	0.00	0.00	387,250.00	DEPARTMENT FOR ENVIRONMENT AND WATER, DISTRICT COUNCIL OF ROBE, SOUTH AUSTRALIAN WATER CORPORATION
	National Interest Test Statement With Australia's vast coastline and intensifying stresses on nearshore and freshwater systems, there is an urgent need to obtain reliable datasets to inform research and policy. The CoastBAT facility will provide bathymetric information in coastal areas that are normally out of reach to traditional surveying operations given high hydrodynamic energy, difficult access and/or cost of operation, affording Australian researchers access to information that is typically scarce, non-existent or at insufficient resolution. The data obtained will have important economic, social and cultural impacts as it will allow researchers to have a far better understanding of the drivers of coastal change, and provide Councils and State Government with science-based guidelines for adaptation and management response to sea level rise and climate change. This facility will also provide wider, important economic outcomes by providing information at the centimetre scale resolution that can be used to improve navigational safety and protect coastal infrastructure.								
LE230100168 Jia, Dr Zhongfan	**Materials for Sustainability Analysis Facility** This project aims to commission two instruments for characterising materials used in sustainable technologies: a state-of-the art photo-induced force microscopy and infrared spectroscopy system (PiF-IR) and a benchtop electron paramagnetic resonance (EPR) spectrometer. Neither of these critical instruments are currently available in South Australia. This project expects to introduce these capabilities to enhance diverse projects in sustainable materials. Expected outcomes include new discoveries in materials for solar cells, rechargeable batteries, sorbents for pollution control, and recyclable materials. Significant benefits are anticipated for fundamental material science with follow on benefits to industry and the environment.	620,000.00	0.00	0.00	0.00	0.00	0.00	620,000.00	
	National Interest Test Statement The two scientific instruments funded by this grant will enable the study of properties of newly developed materials used in renewable and sustainable technologies and support further refinement and improvement of the materials. The materials will be used in improved solar cells, flexible rechargeable batteries, and improved hydrogen production from renewable energy, impacting directly on renewable power generation and storage. It will also support improved sorbents for pollution control and the development of self-healing and recyclable materials. The applicants have an outstanding record of collaboration with industry partners who, equally, have a record of uptake of their research into their manufacturing activities, so the pathway to adoption of these materials to the benefit of Australia is clear. The resulting improvements in renewable power generation, power storage and sustainable products will contribute directly to addressing two of the biggest issues of our time, environmental sustainability and climate change and, through it, improve the lives of all Australians.								
	Flinders University	1,007,250.00	0.00	0.00	0.00	0.00	0.00	1,007,250.00	

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The University of Adelaide									
LE230100018 Guo, Prof Zaiping	**A customized surface chemistry study system in realistic working condition** This proposal aims to establish a purpose-built X-ray photoelectron spectroscopy (XPS) with a dedicated operando sample station and a contamination-free transfer system, to investigate the chemical signatures of material surfaces with unprecedented accuracy in environments from ultrahigh vacuum to near ambient pressure. The facility will support South Australia's cutting edge XPS capabilities, immensely driving innovative research on a wide range of functional materials. The newly created knowledge and technology will be critical to materials across diverse disciplines from wide-ranging energy storage and conversion devices, to biological systems, electronics, and minerals, all with positive benefits for the wider Australian economy.	2,206,421.00	0.00	0.00	0.00	0.00	0.00	2,206,421.00	
	National Interest Test Statement Surfaces and interfaces define an important boundary between a material and its surrounding environment. These interfacial regions are subject to intensive research efforts as they play an important role in influencing the chemical and biological properties of materials. This project will support the development of an X-ray photoelectron spectroscopy (XPS) facility to investigate the surfaces of materials in real time. This facility will address the knowledge gap between fundamental science of materials and practical manufacturing, and support the design and implementation of a wide range of new materials into the next generation of advanced materials, such as energy storage materials, nanomedicines and aerospace materials. The Intellectual Property generated in this project will bring significant benefits to Australian industries, such as improved energy storage solutions and sustainable mineral processing. These outcomes will not only provide significant benefits to the Australian economy, but also the environment, and will allow Australia to take a leading role in fabrication of advanced materials.								
LE230100085 Jackson, Prof Paul D	**Enabling the future of the Australian collider physics program** The project aims to fund the continuation of Australia's very successful experimental particle physics program to explore how the universe works at its fundamental level. We interrogate subatomic matter at the energy frontier at CERN's Large Hadron Collider and the intensity frontier at Japan's SuperKEKB collider. The basic contributions required for Australian membership of these two key programs will enable scientists to continue capitalising on decades of hard work and accumulated expertise, significant project outcomes and benefits include: access for Australia to advanced instruments and international research facilities; training of the next generation of researchers in detector construction and operation; and a rich science program.	1,439,000.00	1,388,000.00	0.00	0.00	0.00	0.00	2,827,000.00	EUROPEAN ORGANISATION FOR NUCLEAR RESEARCH, ALBERT LUDWIG UNIVERSITY OF FREIBURG, NAGOYA UNIVERSITY, JAPAN, THE UNIVERSITY OF MANCHESTER, UK
	National Interest Test Statement This project will provide access to facilities such as the Large Hadron Collider for Australian researchers working on the instruments, electronics and machine learning methods required to discover new fundamental particles. The key benefits come from the technology; we will construct particle detection devices with applications in telecommunications, financial services, data analytics, and the protection of Australia by securing our national assets through improved cybersecurity which will potentially protect privacy and data of individuals. An additional benefit is cultural, positioning Australian science at the forefront of the international quest for Nobel-worthy physics discoveries. We will disseminate our results to Australian industry through our collaborative networks, including DST. We will inspire and train a new generation of Australian students, enhancing Australia's technology and data science industry that the recent CSIRO artificial intelligence roadmap predicted will require 161,000 new specialised workers by 2030, contributing $315 billion to the Australian economy.								

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LE230100107 Roy, A/Prof Stuart J	**A multi-environment phenotyping site for biotech plants** This project aims to establish two unique facilities that aid evaluation of genetically modified or gene edited crop plants and grain. The first, a state-of-the-art field site, expects to reduce biotech field trial costs by 10–100 times with remote sensors, phenotyping platforms, and capacity for environmental manipulation to reduce risk and simulate a broad range of field conditions. The second aims to provide commercial grain processing to improve nutrition and quality analysis. Expected benefits and outcomes include accelerated translation of fundamental research findings to commercial breeding programs, novel applications for computer vision and machine learning in remote agriculture, and enhanced training opportunities for researchers.	1,042,177.00	0.00	0.00	0.00	0.00	0.00	1,042,177.00	
	National Interest Test Statement Australia’s $66 billion agricultural sector provides food to domestic and international consumers. A changing environment and loss of productive arable land threatens crop productivity, which needs to increase by 50% over the next 30 years to feed a global population of 10 billion. Recent advances in biotechnology (genetic modification and genome editing) provide innovative ways to develop new crop varieties. Evaluation of these new varieties in the field, over a range of environmental conditions, is essential to fully assess their performance and translate their use into industry breeding programs; however, current access to biotech field trial sites is limited and prohibitively expensive due to regulatory requirements. This project aims to establish powerful new tools to facilitate evaluation of biotech plants and grain by creating two unique facilities: a state-of-the-art field site with remote sensors, real-time plant monitoring, and the capacity to simulate different environmental stresses; and a grain processing facility to expedite nutrition and quality analysis for downstream industry applications.								
LE230100122 Ottaway, Prof David J	**Adaptive Optics for Advanced Gravitational Wave Detectors** This project will create a full scale facility for testing optical aberration correction schemes for the world's gravitational wave detectors. The optical surfaces in gravitational wave detectors must be controlled to the atomic level to limit the impact of quantum noise and maximize the sensitivity of these extraordinary instruments. The fine tuning of optical surfaces is done using the so-called thermal compensation systems and currently the performance of these systems can only be evaluated once they are installed on a gravitational wave detector. This is severely limiting the optimization of this critical sub-system and hence there is an urgent need for this facility because it will be the only one of its type anywhere on the globe.	460,000.00	0.00	0.00	0.00	0.00	0.00	460,000.00	UNIVERSITY OF CALIFORNIA, RIVERSIDE, SYRACUSE UNIVERSITY, NY, CALIFORNIA INSTITUTE OF TECHNOLOGY, USA
	National Interest Test Statement Gravitational waves (GWs) are 'ripples' in space-time produced by extreme events in the Universe such as colliding black holes, neutron stars, and supernovae. The 2017 Nobel Prize was awarded for the first direct detection of GW waves by a network of detectors built by a global collaboration. This project aims to maximise the capabilities of current global infrastructure to dramatically improve the quality and rate of astrophysical detections from the early universe. This will be achieved by building the world’s full-scale facility for developing new laser technology for precision control optical surfaces needed to prevent surface errors from limiting the sensitivity of GW detectors. This research will not only expand Australia’s ability to make ground-breaking astrophysical discoveries it will also provide commercialisation opportunities for cutting-edge sensing technologies and measurement systems that can benefit the wider industry, such as improved lasers for measuring atmospheric pollution and thermal management of high-power laser systems.								

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(Columns 1 and 2)	(Column 3)	2022-23 (Column 4)	2023-24 (Column 5)	2024-25 (Column 6)	2025-26* (Column 7)	2026-27* (Column 8)	2027-28* (Column 9)	(Column 10)	(Column 11)
LE230100129 Bedrikovetski, Prof Pavel	**Integrated facility for underground hydrogen storage research** The aim is to establish a state-of-the-art national research facility for hydrogen flow in porous media. Large amounts of underground hydrogen storage (UHS) capacity is available in depleted hydrocarbon reservoirs and saline aquifers. Hydrogen injection into geological formations can trigger geochemical and geomechanical processes that damage reservoirs and breach their integrity and seal capacity. UHS modelling is necessary to understand the governing mechanisms throughout storage–withdrawal cycles. The LIEF facility will enable site-specific experiments on hydrogen flow in porous media. This will enable Australia to make technological breakthroughs in critical areas of the economy, such as clean energy.	1,929,000.00	0.00	0.00	0.00	0.00	0.00	1,929,000.00	BEACH ENERGY LIMITED, DEPARTMENT FOR ENERGY AND MINING
	National Interest Test Statement Australia has excellent potential for hydrogen production from renewable energy, which requires mid- to long-term storage to balance seasonal supply and demand. Underground hydrogen storage (UHS) in geological formations is a proven option for safe, readily available, and cost-effective large-scale storage. Australia has a natural competitive advantage for UHS with a capacity that exceeds the requirements of a developed hydrogen industry. This project aims to overcome our capability gap in UHS by establishing a leading Australian hub for integrated research on hydrogen flow in geological formations. Leveraging contribution of pioneers from universities, government and industry, this unique facility will enable researchers to investigate and model the complex flow of pressurised hydrogen in rocks. Site- specific and long-term performance assessment of UHS will facilitate faster adoption by government and the Australian Hydrogen Industry. The anticipated benefits also include opportunities to train the future workforce that supports establishing Australia as a leader in the hydrogen economy.								
	The University of Adelaide	7,076,598.00	1,388,000.00	0.00	0.00	0.00	0.00	8,464,598.00	
	South Australia	8,083,848.00	1,388,000.00	0.00	0.00	0.00	0.00	9,471,848.00	

* Note - Indicative funding for approved projects will be made available through a funding variation under section 54 of the ARC Act

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Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)			Total ($)	Partner Organisation(s)
(Columns 1 and 2)	(Column 3)	2022-23 (Column 4)	2023-24 (Column 5)	2024-25 (Column 6)	2025-26* (Column 7)	2026-27* (Column 8)	2027-28* (Column 9)	(Column 10)	(Column 11)
Tasmania									
University of Tasmania									
LE230100125	**I can see clearly now: An Ion Mobility Mass Spectrometry Imaging facility**	682,749.00	0.00	0.00	0.00	0.00	0.00	682,749.00	
Foo, A/Prof Eloise	Biology is complex- one plant or animal species can contain thousands of unique molecules. To harness the power of these biological molecules for food, fibre and medicine, we need to know precisely when and where they are produced. This proposal brings this capability to Tasmania and our national and global research network. Ion mobility mass spectrometry uses three dimensions to separate and identify unique molecules and this is now coupled to advanced imaging enabling us to visualise these molecules directly in intact tissues of plants and animals. This infrastructure will help us discover and use biological molecules to address the Australian Government priority areas of Food, Soil, Water and Environmental Change.								
	National Interest Test Statement Until now it has been challenging to separate and identify key molecules from complex biological samples. This project will build the first Ion Mobility Mass Spectrometry Imaging facility in southern Australia, which will allow researchers to identify and measure individual key bio molecules that control plant and animal development with a new level of sensitivity, precision and depth. With this new knowledge, researchers will be able to optimise biological systems, such as optimising plant development for agricultural gains, developing new food and health products, and monitoring the health of marine ecosystems. This facility will fill a major gap in Australian capability, and be used by world leading researchers and research end-users with direct links to national and global industry partners to provide expert training for the next generation of biological researchers. This will drive commercial and environmental advances in plant science, agriculture and aquaculture that will benefit Australia.								
	University of Tasmania	682,749.00	0.00	0.00	0.00	0.00	0.00	682,749.00	
	Tasmania	682,749.00	0.00	0.00	0.00	0.00	0.00	682,749.00	

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Victoria									
Deakin University									
LE230100078 Guijt, Prof Rosanne M	**Ultra-High Resolution 3D Printing of Micron-Sized Structures and Voids** The Ultra-high Resolution 3D printing facility for making micron-sized structures and voids aims to position Australia as a leader in prototyping and manufacturing of microfluidic devices. The facility will support research in material science and microfluidic design and manufacturing and will support applications of microfluidics in analytical chemistry, biomedical microdevices and energy. The proposed facility bridges a critical gap between manufacturing for laboratory research and manufacturing for commercialisation. Expected outcomes include advanced materials and enhanced capacity in microfluidic design and prototyping, providing research training and skills to underpin global leadership in the manufacturing of microfluidic devices.	731,584.00	0.00	0.00	0.00	0.00	0.00	731,584.00	
	National Interest Test Statement The evolution of 3D printing has revolutionised manufacturing as we know it today. Access to next-generation equipment that can both prototype and manufacture new devices will bolster Australia's world leading position in “lab-on-a-chip” design and fabrication. This project will specifically focus on so-called microfluidic devices. These are small (2-5cm) components containing micron-sized channels that can be used to investigate (bio)chemical processing and/or cell cultures in a controlled environment. We will establish Australia's first ultra-high resolution 3D printing facility in this field. This will help eliminate the bottleneck in the translation of research into commercial products and portable devices capable of chemical and environmental analysis. Applications also include medical diagnostics, artificial organ production, and renewable energy generation and storage. The manufacture and use of these technologies has the potential to generate major economic and environmental benefit for Australia, given the global microfluidics device market is expected to exceed $60 billion US dollars by 2028.								
	Deakin University	731,584.00	0.00	0.00	0.00	0.00	0.00	731,584.00	
Monash University									
LE230100153 Voelcker, Prof Nicolas H	**High-Precision Mass Spectrometry Imaging Facility** This proposal aims to build an advanced chemical mapping facility through the acquisition of high-resolution ion mobility mass spectrometry instrumentation capable of 2D/3D spatial analysis using laser desorption/ionisation, from centimetre (whole tissues) to micrometer (sub-cellular) scale. This facility will create a concentration of world leading expertise in spatial chemical phenotyping from diverse fields including nanofabrication, chemical engineering, systems-biology, drug discovery, environmental ecology, agricultural biosciences and diagnostic sciences. The facility will enable translational research by applying breakthroughs in chemical synthesis, nanofabrication, bioconjugation, proteomics and metabolomics to spatial systems.	984,000.00	0.00	0.00	0.00	0.00	0.00	984,000.00	COMMONWEALTH SCIENTIFIC AND INDUSTRIAL RESEARCH ORGANISATION, HUDSON INSTITUTE OF MEDICAL RESEARCH, MELBOURNE CENTRE FOR NANOFABRICATION

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	National Interest Test Statement This project will build a new mass spectrometry tool for biochemical analysis. The proposed equipment brings a key advance to spatial analytical techniques with integrated ion mobility. These aspects will allow highly specific identification of novel chemical species in complex mixtures, tissues and environmental devices. This new analytical capability will benefit research in chemical synthesis, nanomaterials, advanced engineering, biosciences and environmental sciences. It will for example be used to understand the biology of climate-change resistant coral and gain important insights into the composition of bioengineered 3D tissue cultures. The new equipment will allow for increased translation of research and the creation of valuable intellectual property. Existing related projects that are being commercialised include a highly sensitive method for illicit drug detection. The location of the equipment in an open-format NCRIS facility (ANFF, Melbourne Centre for Nanofabrication) enables ready access for the national research community.								
	Monash University	984,000.00	0.00	0.00	0.00	0.00	0.00	984,000.00	
RMIT University									
LE230100005 Mitchell, Prof Arnan D	**Dual-comb Hyperspectral Imaging Facility** This project will create a Dual-comb Hyperspectral Imaging Facility responding to newly emerging global trends towards video rate imaging with precision spectral analysis. Current spectral analysis systems require serial scanning of samples to create an image, which is too slow for dynamic systems such as biological specimens. This facility will harness optical frequency combs from visible to the mid-infrared, to rapidly image and spectrally analyse specimens. The diverse variety of applications supported by this facility will make it a unique nexus point between multiple disciplines, enabling research in health and life science, characterisation of functional nanomaterials, precision photonic metrology and sensing.	852,787.00	0.00	0.00	0.00	0.00	0.00	852,787.00	
	National Interest Test Statement This facility will establish a new form of microscope that uses thousands of beams of laser light to simultaneously record both the three dimensional shape and precise colour of an object being imaged. Using this information, it is possible to determine both the physical form of an object and its chemical composition. The facility will have two nodes. The equipment at the University of Adelaide will use infrared light to enable breakthrough insights into nanomaterials. The equipment at RMIT University will use visible light and will be particularly valuable for imaging of living organisms. This facility will be at the leading edge of international research into new methods of imaging and will be offered as an accessible service to the Australian and international research community. The new imaging approaches created could be licensed to existing Australian medical imaging companies and form the basis for new technology start-ups. Use of the facility could yield new knowledge across diverse fields from materials for renewable energy generation and storage to in-vitro fertilisation.								
LE230100147 Ma, Prof Qian	**Free Float or support free: a new generation metal 3D printing facility** This project aims to establish a new generation metal 3D printing research facility that allows faster, more cost-effective, and greener 3D printing of complex metal parts, while offering greater design freedom than current metal 3D printing processes. This is important for cutting-edge research into this emerging technology and accelerating its adoption by Australian manufacturing. Expected outcomes include a state-of-the-art laser metal 3D printer, highly innovative metal 3D printing research and development capabilities, closer integration with industrial needs, and training of future metal 3D printing researchers. This should benefit the defence, space, aerospace, biomedical, clean energy, chemical processing and other industries.	450,294.00	0.00	0.00	0.00	0.00	0.00	450,294.00	

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(Columns 1 and 2)	(Column 3)	2022-23 (Column 4)	2023-24 (Column 5)	2024-25 (Column 6)	2025-26* (Column 7)	2026-27* (Column 8)	2027-28* (Column 9)	(Column 10)	(Column 11)
	National Interest Test Statement Metal 3D printing is playing an increasingly important role in the manufacture of high value-added metal parts and in enabling new metal product development across virtually all manufacturing sectors. This project aims to establish a new generation metal 3D printing research facility in Australia, which allows faster, more cost-effective (30-50% reduction), and greener 3D printing of complex metal parts than current printing processes. This new metal 3D printing technology will significantly enhance the design freedom while substantially reducing the use of resources. The outcomes include a state-of-the-art laser metal 3D printer, highly innovative metal 3D printing research and development capabilities, and closer integration with industrial needs. Intellectual property arising from the design and production methods of metal products will be communicated and licensed to companies in the Australian defence, space, aerospace, biomedical and clean energy industries to enable the production of cost-effective, low carbon emission products, supporting the Australian Government's Modern Manufacturing Initiative.								
	RMIT University	1,303,081.00	0.00	0.00	0.00	0.00	0.00	1,303,081.00	
The University of Melbourne									
LE230100051 Lim, Prof Christina	**Photonic Computing Architecture Validator** Photonic Computing Architecture Validator will be the first Australian facility - a testbed for accelerated development and validation of photonic implementation of machine learning architectures. This will enable rapid testing of ultrafast machine learning algorithms and applications to solve challenging problems with high-speed spatio-temporal data streams. This photonic computing architecture validator will be a critical enabler for many innovative and diverse research activities including protection of high-speed internet links against cyber-attacks, photonic radars with cognitive processing, biomedical imaging and sensing with parallel data streams, and analysis of high frequency trading in financial markets.	295,000.00	250,000.00	0.00	0.00	0.00	0.00	545,000.00	DEFENCE SCIENCE AND TECHNOLOGY GROUP
	National Interest Test Statement This project will build the world's first facility that uses optical communications photonic (light) techniques to test advanced machine learning algorithms. Such ultrafast computing technology is needed to process the huge streams of spatial and real-time data that are now available. Applications of the new capability include testing of algorithms to protect high speed internet links against cyber attacks and fraud analysis of high frequency trading in financial markets. The facility will be widely accessible as a platform for machine learning researchers to test and validate their algorithms. Use of this novel technology will accelerate the translation of Australia's world class expertise in machine learning to practical and measurable outcomes.								
LE230100099 Hanssen, Prof Eric	**Cryo correlative Focused Ion Beam, a new frontier in structural biology** This project aims to establish the first fully integrated cryogenic correlative focused ion beam instrument in Australia. Focused ion beam microscopes are rapidly evolving instruments that harness the properties of ions to remove unwanted material from specimens. Integration of a fluorescent optical microscope within the same instrument will allow the targeted imaging of bio/material interfaces, cell and protein structure in their native environment. The potential innovations, applications and benefits to society are far reaching, with the facility expected to impact the development of atomic-scale imaging of protein structures for future drug development, biological processes and materials for advanced technology and manufacturing	685,000.00	0.00	0.00	0.00	0.00	0.00	685,000.00	THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH

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(Columns 1 and 2)	(Column 3)	2022-23 (Column 4)	2023-24 (Column 5)	2024-25 (Column 6)	2025-26* (Column 7)	2026-27* (Column 8)	2027-28* (Column 9)	(Column 10)	(Column 11)
	National Interest Test Statement This project will establish a state-of-the-art microscope that gives researchers unparalleled access to the interior structure and functioning of cells and biologically important molecules such as proteins. It will allow atomic-scale imaging of proteins in their native environment rather than in isolation. The new instrument will enable biotechnology research that can improve our understanding of the biology of pathogens that cause malaria, inform the design of new drugs and help design biomedical surfaces that kill bacteria. It will be widely accessible as it will be part of the suite of high-resolution imaging technologies located at the Bio21 Institute in Victoria, that hosts users from Australia and internationally. This advanced microscope will extend the impact of multi-million dollar investments in high-resolution imaging and strengthen Australia's leading position in a rapidly evolving technological area. The enhancement of Australian research outcomes and capacity for translation of research will be significant.								
LE230100150 Garrido, A/Prof Marta I	**Whole-head optically-pumped room-temperature magnetoencephalography** This project aims to set up the first whole-head room-temperature Magnetoencephalography (OP-MEG) imaging facility in the southern hemisphere. This will introduce new capabilities to the Australian human brain imaging community by enabling 1) more ecologically-valid experimentation where participants can freely move, and 2) unprecedented spatio-temporal resolution of non-invasive recordings from deeper brain regions involved in critical brain functions such as learning and memory. This project adds to the already excellent existing capabilities in human brain imaging in Australia bringing novel imaging approaches across interdisciplinary research programs in neuroscience, bioengineering, physics and psychology.	930,213.00	0.00	0.00	0.00	0.00	0.00	930,213.00	
	National Interest Test Statement We propose to build the first Australian Optically-Pumped Magneto-encephalographic (OP-MEG) facility. OP-MEG is a novel brain imaging technique that allows mapping of the human brain at unprecedented temporal and spatial resolution. OP-MEG is safe, fast, and non-invasive. This novel brain imaging technique will allow us to understand a wide range of human brain functions whilst also supporting safe brain mapping in children and pregnant women, who due to movement interference and imaging safety concerns remain largely understudied. OP-MEG will also promote new industry collaborations in the fields of engineering, materials manufacturing, and the biomedical sector through future clinical applications in epilepsy, dementia, and stroke. Establishing this facility will keep Australia at the forefront of breakthrough imaging technologies, support neuroscience research, and foster applications in health, artificial intelligence and brain-inspired technologies. The facility will be available to all investigators in Australia.								
	The University of Melbourne	1,910,213.00	250,000.00	0.00	0.00	0.00	0.00	2,160,213.00	
	Victoria	4,928,878.00	250,000.00	0.00	0.00	0.00	0.00	5,178,878.00	

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		2022-23	2023-24	2024-25	2025-26*	2026-27*	2027-28*		
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)	(Column 9)	(Column 10)	(Column 11)
Western Australia									
Curtin University									
LE230100057 Buckley, Prof Craig B	**Hot Properties: Thermal Analysis Equipment for Western Australia** This project aims to create the first controlled-atmosphere thermal analysis suite in Western Australia. The suite will consist of a high-pressure thermogravimetric analyser and thermal conductivity instrument housed within an argon-filled glovebox, along with a differential scanning calorimetry-thermogravimetric analysis-mass spectrometer. The facility will enable the thermal properties of materials to be accurately determined in an air-free environment of which includes energy materials, batteries, porous materials, organometallics, and catalysts. Overall, this will create a Western Australian research hub for thermal analysis to enhance the network of institutional collaborations across Australia, resulting in high impact outputs.	783,000.00	0.00	0.00	0.00	0.00	0.00	783,000.00	
	National Interest Test Statement The development of new materials for efficient energy transport and storage is important to enable a transition to a clean energy future for Australia and the world. Teams at Curtin University and the University of Western Australia are involved in the research and development of new hydrogen technologies, next generation batteries, and other materials for energy applications. The thermal analysis facility enables the research teams to safely make new energy materials and understand the way they behave at different temperatures. This is important in understanding their properties and using them in real-world applications. Several research projects will benefit from this facility, including existing collaborative projects with government and industry partners, along with future planned projects. By allowing the development of new materials for energy application, the thermal analysis facility will have a defining benefit to the hydrogen export industry and will offer a competitive advantage to Australia in developing next-generation batteries.								
	Curtin University	783,000.00	0.00	0.00	0.00	0.00	0.00	783,000.00	
The University of Western Australia									
LE230100019 Faraone, Prof Lorenzo	**National Facility for Performance Characterisation of Infrared Technologies** This project aims to establish a National Facility for noise performance characterisation of state-of-the-art and emerging infrared (IR) technologies. The facility will include state-of-the-art capabilities to measure electronic and eletro-optic noise phenomena, at both device and system levels, that challenge the progress of Australian developed IR imaging arrays and novel IR sensing modalities beyond the laboratory prototypes. The capabilities proposed will enable robust benchmarking and performance validation as essential tools for enabling "beyond state-of-the-art" sovereign IR technologies deployable in defence and in diverse fields of economic activity, such as environmental monitoring and earth observation, among many others.	690,000.00	0.00	0.00	0.00	0.00	0.00	690,000.00	

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	National Interest Test Statement This project will establish a national facility for testing the performance of infrared imagers and sensors and measuring unwanted electronic disturbance in these sensing systems. The state-of-the art capabilities, which are currently not available to the Australian research community, will support and enable progress in moving Australian-developed infrared sensing systems from universities to industry applications. In addition to supporting the development of Australian-based defence and security capabilities, the proposed national facility will enable rapid improvement to infrared sensing and imaging for many industrial, agricultural and scientific uses, including remote sensing for mineral exploration, environmental monitoring, on-farm plant assessment, and food security; as such, the proposed facility will significantly contribute to the Australian Advanced Manufacturing Sector.								
LE230100066 Gendre, Dr Bruce	**Transforming the Zadko Observatory into a Space Surveillance Hub** This project aims to transform the Zadko Observatory to a Space Surveillance Hub in Western Australia that will be used by major national and international users and commercial partners. It would replace the current infrastructure of the Observatory, and its instrumentation with modern equipment. This project would achieve the transformation of the existing facility to a space surveillance hub for a fraction of the nominal cost of a new hub, by leveraging on previous financial investments. Expected outcomes of this project is an improvement of the contribution of the facility to Australia's strategic Space Programme specifically for space situational awareness and deep space imaging.	280,000.00	0.00	0.00	0.00	0.00	0.00	280,000.00	6ROADS
	National Interest Test Statement Most of the Australia's space observation and surveillance related activities are performed on the eastern seaboard, which limits their overall efficiency; specific areas of the sky at the end of the night can be observed only from Western Australia. This proposal aims to modernise critical space infrastructure within the Zadko Observatory located in Western Australia. This will be achieved by installing new instrumentation, improved robotic automation, and modern control systems, enabling a world-class versatile space hub at this unique longitude. This state-of-the-art facility will compliment those in the East and ensure a more complete coverage of the sky for astronomical observation and space surveillance. It will enable proactive investigations to identified threats to both space and ground-based assets on or around Earth, such as collisions with space debris plus meteor and asteroid paths. This proposal will improve collaboration between universities on both sides of the country and will be used in immediate applications by academic, commercial, civil and government organizations nationwide.								
LE230100156 Bond, Prof Charles S	**Integrated Crystallisation Facility** This project will provide Western Australia with cutting-edge crystallisation facilities for determination of the structures of biological and chemical materials, increasing throughput and miniaturising experiments to obtain more structures more rapidly. The project will generate new knowledge in the areas of structure-based drug and herbicide design, synthetic biology, and materials science. Expected outcomes include new therapeutic routes, candidate pharmaceuticals for global diseases, smart and safe herbicides to increase food production, and new gas storage materials. In addition to these tangible outputs, the facility will facilitate collaboration within Western Australia, Australia and globally, with academic and industry partners.	390,195.00	0.00	0.00	0.00	0.00	0.00	390,195.00	HAUPTMAN-WOODWARD MEDICAL RESEARCH INSTITUTE
	National Interest Test Statement Understanding the precise atomic structures of large biological molecules and chemical materials is an essential step in explaining how these materials function and how they interact with other substances. The proposed infrastructure will help us produce crystals of these materials which will in turn let us map their atomic structures. Ultimately, information from these atomic structures can help solve critical global problems in the areas of food security, life sciences, and energy and resources. For example, in partnership with industry the project will reveal the shape of proteins that have been identified as novel targets for weedkillers. This information will allow us to design new weedkiller molecules that work better and are less toxic, to improve food production. Similar approaches will facilitate the design of new materials to trap greenhouse gases, and new drugs. By connecting to industry and global research leaders we will translate benefits to the Australian community.								

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LE230100159 Wesson, Dr Murray R	**Digitising the Drafting of the Australian Constitution** This collaborative project aims to simplify the task of understanding the Australian Constitution and its drafting process. It will provide an accessible means to decipher the proposals, drafts and votes by which the Constitution was formed. The expected outcomes of the project are an open access, online archive that consolidates, corrects and enhances the digital record of the Constitutional Conventions and the processes associated with them. This will provide significant benefits not only to constitutional law scholars and historians but also school teachers and students seeking to reconstruct the process by which our Constitution was formed. **National Interest Test Statement** The Australian Constitution structures and informs many of our most pressing issues as a federation. However, to fully understand our Constitution, one needs to unravel the complex process through which the constitution was developed. Presently, this is a daunting task: the historical records are scattered across Australia, difficult to locate, and where available online, contain errors and omissions. This project will contribute to Australia's cultural heritage by creating Australia's first open-access, online resource that consolidates, corrects and enhances the digital record of the drafting of the Constitution. Because it will be open-access and online, the platform will be accessible to national and international researchers, lawyers and judges, and students and educators at schools and universities. The resource will also enhance public understanding of the Constitution, including during referendum debates about constitutional change. The project will create a one-stop entry point for all Australians seeking to better understand our founding document.	155,259.00	163,787.00	0.00	0.00	0.00	0.00	319,046.00	UNIVERSITY OF OXFORD, UK
	The University of Western Australia	1,515,454.00	163,787.00	0.00	0.00	0.00	0.00	1,679,241.00	
	Western Australia	2,298,454.00	163,787.00	0.00	0.00	0.00	0.00	2,462,241.00	
		35,197,780.00	**4,154,521.00**	**163,641.00**	**0.00**	**0.00**	**0.00**	**39,515,942.00**	

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