Minister's Approval for ARC Future Fellowships for Funding Commencing in 2023 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)	Indicative Funding ($)			Total ($)
(Columns 1 and 2)	(Column 3)	2023-24 (Column 4)	2024-25* (Column 5)	2025-26* (Column 6)	2026-27* (Column 7)	(Column 8)
Australian Capital Territory						
The Australian National University						
FT230100058	**Topological wave manipulation in hybrid integrated platforms**	209,920.00	208,440.00	200,020.00	208,640.00	827,020.00
Smirnova, Dr Daria	This project aims to establish a powerful toolkit for topological wave manipulation in photonic systems interfaced with layered 2D materials. This research will address a significant problem of miniaturising photonic components for reliable and compact signal processing. The reduction in size will be achieved by engineering coupling of topological photonic states with matter in judiciously structured materials at subwavelength scales. The expected outcomes will include new methods of controlling light-matter waves on a chip via pattern distortions or twists of the 2D materials, without the use of strong magnetic and electric fields. These outcomes will benefit future development of high performance and energy-efficient integrated devices.					
	National Interest Test Statement					
	We live in the information era that launched the quest to replace electronic circuit elements in our computers and gadgets with faster and more energy-efficient photon-based components. The need for bringing new ideas to light-based technology development is driven by the growth of the photonics industries and emerging quantum businesses in Australia, including the context of manufacturing. It's targeted to generate over A$10b revenue by 2040. This project aims to find ways to control wave behaviour in the topological structures of ultrathin hybrid materials that are small enough to be integrated onto microchips in everyday devices. These structures are useful since they are typically unaffected by local disturbances, making photonic properties easier to manipulate. The outcomes will deliver prototype designs of small-footprint topological devices that could offer better performance, extended service, and reduced maintenance cost. This hybrid photonic platform will have the potential to trigger technological breakthroughs that could benefit Australians in high-speed next-generation communication networks.					
FT230100059	**Next-generation reaction-environments tunable catalysts for CO2 reduction**	258,573.00	254,573.00	258,573.00	251,573.00	1,023,292.00
Yin, A/Prof Zongyou	This project aims to design and develop next-generation reaction-environments tunable catalysts for active, selective and stable CO2 conversion to higher-value fuels/chemicals. Fundamentally new materials design in combination with modern computational methods and advanced in/ex-situ instrumental techniques will be advanced to develop a series of functional catalysts for customisable CO2 conversion. Expected outcomes include new understandings of heterogenous catalysis tailorable with reaction environments and innovations in energy conversion and CO2 utilisation applications. These will provide educational and technological benefits for Australia, spanning material sciences, advanced manufacturing, carbon utilisation and renewable energy.					
	National Interest Test Statement					
	Addressing the urgent and critical challenge of climate change requires innovative and sustainable strategies to significantly reduce carbon dioxide (CO2) in our atmosphere. Yet such solutions will need to overcome known challenges for CO2 conversion and utilisation, including cost-effectiveness, product selectivity, and operational stability. This project tackles this issue by using solar energy to convert CO2 into higher-value products. The project uses a transformative approach to develop new kinds of environmentally-friendly, cost-effective, and highly-efficient tiny functional materials (called nano-catalysts). Effectively transforming CO2 into valuable fuels and industrial materials not only mitigates greenhouse gases in the atmosphere, but it also paves the way for greener alternatives to essential goods that will reduce consumer costs and promote sustainability. Through active engagement with industry partners and researchers, we will share our findings and contribute to the development of new energy-conversion technologies. These research outcomes have great potential for Australian industries, particularly in Advanced Manufacturing and Energy: by using innovative technologies, the project is expected to create job opportunities for Australian workers and boost economic growth in a high-value market.					
FT230100115	**The Elephant in the Study: Working Latin Literature for the Enslaved**	214,529.00	211,091.00	204,581.00	206,421.00	836,622.00
Geue, Dr Tom A	Roman histories, speeches, and plays are conventionally regarded as the works of individual elite male authors such as Cicero, Vergil, and Livy. This project aims to transform our understanding of Roman literature by showing that it was actually written in collaboration with enslaved workers, generating new insights into the creative processes that shaped the Classical literary canon. Expected outcomes include a new approach for understanding how authors work and the discovery of untold stories about the enslaved population of Rome. This should lead to significant benefits for					

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	communities, including improved education outcomes and better-informed public debate. **National Interest Test Statement** Marginalised people often disappear from history. In the case of Latin literature, the contributions of slaves to key works that have shaped European and Australian history have been largely overlooked. Using a new method of reading ancient texts called 'working literature', this project will help recover the creative contributions of slaves to human history. By sharing knowledge of the lives and work of enslaved ancient people through a large-scale exhibition at the ANU Classics Museum and a series of public talks, Australians will benefit culturally by gaining access to new and more collaborative understandings of authorship, which will challenge prevailing beliefs about what it means to be an author of creative ideas. It will further help to inform and encourage continued recognition of the role of marginalised communities in shaping Australia's own written histories, and in turn, support national aspirations for racial equality and community cohesion in Australian cultural life and industry.					
FT230100126 Preston, Dr Daniel	**Complementary pairs for next generation self-assembled systems** This project will employ a set of complementary pairings where separate sites fit together at metal ions in a specific fashion orthogonal to other pairings, like two jigsaw pieces, while forming a poor fit with other pairings. These pairings will allow retention and transfer of structural information. In this way, the bulk combination of relatively simple precursors will lead to self-assembled structures with well-defined sequence identity. This program will make and use complex abiotic molecules, enhancing outcomes in molecular information storage and transfer, molecular recognition and sensing, chemical transformations, and energy transport events, leading to economic and environmental benefits for Australia in industry and manufacturing. **National Interest Test Statement** Methods of chemical purification and separation for industry currently incur substantial financial and environmental costs for Australia. It is critical that Australia develop more economically efficient and environmentally sustainable processes while maintaining current manufacturing capacity. This project will address these challenges with an innovative approach inspired by complex natural molecules. By creating artificial systems that replicate the recognition and interaction abilities of DNA, this project will facilitate the construction of highly complex functional structures with remarkable ease, well beyond the current scope in the laboratory. The anticipated outcomes of this proposal encompass enhanced efficiencies within the chemical industry, greater control over chemical processes and lower environmental impact for Australian industry. These advancements aim to reduce costs and environmental impact while promoting sustainable practices in Australian industries. Additionally, the project strives to enable renewable energy integration, fostering a cleaner and more sustainable future for Australia.	205,070.00	210,070.00	210,070.00	210,070.00	835,280.00
FT230100193 Way, A/Prof Danielle A	**Identifying climate-resilient wheat for a warmer, high CO2 world** This project aims to reveal which plant traits help maintain or increase crop yield under the CO2 and temperature conditions predicted for the next few decades, thus providing early insights for generating climate-resilient wheat. Wheat production is vital to global food security, but its yield decreases 5-6% per 1 degree Celsius of warming. Elevated CO2 may offset yield losses, but reduces grain protein and nutrients. As the first study to evaluate Australian wheat performance under the dual pressures of elevated CO2 and temperature, the project will deliver important fundamental knowledge on wheat productivity and quality resilience traits, novel inputs for future breeding programs, and help enable food security in a changing climate. **National Interest Test Statement** Wheat is a major contributor to Australia's economy, with an export value of $11.4 billion in 2021/22. Climate change, including rising CO2 and temperature, is predicted to decrease national wheat production by 7.4-15.5% in the next 60 years (translating to grain industry losses of $843M-$1.767B). Elevated CO2 concentrations also reduce grain protein, iron and zinc levels, affecting the crop's nutritional value. This novel project aims to identify the plant traits that promote wheat yield and nutritional quality in a warmer, high-CO2 world. As well as generating breakthrough knowledge on the combined effects of these two climate factors on wheat, the research will benefit Australian breeding programs via early insights of which plant traits and wheat lines will promote high productivity and quality resilience when grown under changing climates. The project's basic research is a platform for future Australian work to identify the genetic basis of these traits and a transferrable resource for wheat breeders. Outcomes would help protect national wheat production and export income, and enhance food security.	270,413.00	270,413.00	276,748.00	279,748.00	1,097,322.00
FT230100237 Hendriks, Prof Carolyn M	**Strengthening political representation in an era of democratic change** This project aims to understand and strengthen how politicians represent their constituents. As trust in politics declines, there is more pressure on politicians to engage with citizens. Understanding	272,161.00	288,089.00	285,209.00	260,648.00	1,106,107.00

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	how these demands are reshaping the representative work of politicians is crucial to building trust and legitimacy in modern democracies. By interviewing and observing Australian politicians, this research will build important knowledge about the dynamics, demands and practices of contemporary representation. A national and international audit of novel ways to engage constituents will lead to valuable resources that politicians and citizens can use to assess and improve representative relationships, enabling stronger democratic institutions. **National Interest Test Statement** Effective and informed political representation is crucial in modern democracy, but links between politicians and citizens are under strain as trust in politics declines. Using interviews and observations, this project will examine how newly elected Australian federal politicians learn and practise representation. Furthermore, a national and international audit will identify innovative ways politicians can engage with citizens, and inform programs and resources that support the representative work of politicians. Through stakeholder interaction and global collaboration, the project will develop significant knowledge on effective strategies to strengthen political representation, which will feed into initiatives to boost diversity and trust in democratic institutions. In addition to transforming our understanding of representation, findings will be used to develop new online resources for politicians and citizens to understand and strengthen connections between each other, and 'classroom-ready' tools for Australian students to demonstrate the diverse ways politicians and citizens can positively work together.					
FT230100537 McIlvenna, Dr Una	**Singing the News: Ballads as News Media in Europe and Australia, 1550-1920** This project aims to take advantage of new digitisation projects to reveal how songs in premodern Europe and later in Australia were used for disseminating news to the public. By analysing ballads across four centuries and five languages, the project expects to show how news-songs not only informed the public but also helped to forge national identities by exploiting the emotive and communal nature of song. Expected outcomes include an innovative digital platform offering licensed recordings of ballads, a public exhibition of song treasures in Australian collections, and a re-written history of the news media industry. Benefits may include new insights into how the modern notion of Australian national identity emerged through song. **National Interest Test Statement** Australian identity is subject to much debate. News media has played a critical role in shaping understandings of our national identity, but until now we have only understood this in terms of prose newsprint. This project will demonstrate how songs in early modern Europe and later in colonial Australia were widely used to disseminate news to the public. Exploring 'news ballads' in five languages across four centuries, it will reveal how songs informed the public by exploiting the emotive and communal nature of singing. A digital platform of news songs, a public exhibition of song treasures in Australian collections, and public lectures will provide significant cultural benefits to Australians by revealing new insights into how songs were deployed in colonial Australia to create powerful narratives of national identity. The digital platform's recordings will provide Australian musicians, museum curators and radio and TV producers with new and accessible ways to understand this part of our nation's history, as well as provide teachers, students and the Australian public with a new awareness of the role of song in shaping colonial-era history, and shared knowledge of our heritage.	243,792.00	246,603.00	244,125.00	246,389.00	980,909.00
FT230100563 Xie, Prof Lexing	**Computational Mechanisms of Online Attention Markets** The internet has operated as an major exchange of information and attention for the past few decades, yet surprisingly little is known about how individual choices and collective attention interact, let alone about how different parties can influence or control it. This project aims to uncover the mathematical underpinnings between individual actions and collective trends in online attention market, design computational methods for estimating and influencing attention allocation, and enable applications where content consumers, producers, hosting platforms and regulatory bodies are each empowered with their share of influence in the attention market. **National Interest Test Statement** While the internet offers access to a world of information, it has been increasingly used against consumers and citizens to spread falsehoods and harmful messages. Mass harm and misinformation has been possible because while we know how to predict individual behaviour to take action with online content (e.g. to 'like', 'share', 'retweet'), we do not have that predictive capability on a mass scale, making it impossible to control content from going viral. This project will establish mathematical foundations for the dynamics of online attention and create new algorithms that enable online-content producers, consumers, platforms and regulators to influence and control online action with content. Through demonstrations and dialogues with regulators, the software tools we develop will help them predict attention trends and inform their future online regulatory policy settings. The new knowledge will enable government to foster safer and more trustworthy online spaces for all Australians who consume online content – and benefit Australians through the minimisation of harm and misinformation when they are online.	271,138.00	279,573.00	277,573.00	285,573.00	1,113,857.00

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FT230100612	**Overcoming Violence and Building Peace in Conditions of Complexity in PNG**	288,353.00	294,456.00	287,541.00	291,053.00	1,161,403.00
Forsyth, Prof Miranda R	The project is an investigation of the drivers and inhibitors of three inter-related forms of violence in Papua New Guinea - tribal fighting, sorcery accusation related violence and family and sexual violence. The harm caused by these forms of violence is systemic and ongoing, with widespread negative impacts for women, men and children across multiple dimensions of social and economic development. The project will produce new knowledge about how violence and peace-making initiatives emerge, connect, spread and disperse, and generate new conceptual models to better analyse the dynamics of violence and peace across time and space. These theoretical insights will inform better violence prevention initiatives for Papua New Guinea and beyond.					
	National Interest Test Statement Violence in Papua New Guinea (PNG) is an ongoing and widespread threat to the security of its citizens, particularly women and children, and the nation's development. As a close neighbour and ally, Australia is keen to prevent violence in all forms in PNG to ensure its future economic and political development. This project will develop new frameworks to better identify what causes and prevents violence, to help inform the development of key interventions. Focusing on the most common types of violence - sorcery accusation related violence, tribal fighting, and family and sexual violence - the project will help Australia's aid programs to gain a deeper understanding of violence and in turn, design more effective violence prevention programs and build peace among at-risk communities. Australia can also learn lessons about violence prevention and peace-building from PNG. Doing so will benefit current and future generations of PNG citizens, advance Australia's national interest in PNG's economic, political and social development, and improve our own violence prevention strategies for a safer Australia for all.					
	The Australian National University	2,233,949.00	2,263,308.00	2,244,440.00	2,240,115.00	8,981,812.00
	Australian Capital Territory	2,233,949.00	2,263,308.00	2,244,440.00	2,240,115.00	8,981,812.00

* 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						
Australian Catholic University						
FT230100423	**Uncovering a novel energy-sensing mechanism in the brain**	192,702.00	190,422.00	195,857.00	191,357.00	770,338.00
Loh, Dr Kim	This project aims to investigate a novel regulator of energy homeostasis in the brain, a protein kinase called SIK3. Energy homeostasis is essential for life as it ensures an adequate supply of fuel to cells of the body. This project intends to generate new knowledge about molecular switches to regulate energy homeostasis by using innovative gene technologies and transgenic animal models. The expected outcomes include generating fundamental insights into how SIK3 in the hypothalamic neurons regulates energy homeostasis. Benefits include improving population health and wellbeing, informing the development of new bio-medical technologies, and expanding the capabilities of Australia's next generation of researchers.					
	National Interest Test Statement					
	This project aims to uncover a new energy-sensing mechanism in the brain, thus shedding light on complex regulatory processes that maintain energy balance for survival. Dysfunction in this mechanism reduces health and lifespan and underpins metabolic disorders like obesity. While not an immediate goal of this project, applying this knowledge to human health holds promise for innovative approaches to prevent and treat obesity, which affects 30% of Australian adults and costs >AUD11 billion/year to treat, thereby enhancing the well-being of Australia's population while alleviating burdens on the healthcare system. Importantly, the generated intellectual property presents opportunities for economic growth in the Australian biotechnology industry, paving the way for the development of potential therapeutics. Moreover, this research strengthens Australia's expertise in neurobiology and metabolism, fostering and developing a skilled workforce in cutting-edge science and training the next generation of scientists.					
	Australian Catholic University	192,702.00	190,422.00	195,857.00	191,357.00	770,338.00
Macquarie University						
FT230100067	**Rescuing Pharaoh's Gold Mines: Archaeological conservation in Eastern Sudan**	221,057.00	217,513.00	219,649.00	221,409.00	879,628.00
Cooper, Dr Julien C	Building on pioneering pilot surveys, this project will document the unexplored archaeology of the remote Atbai Desert of Eastern Sudan, a region whose unique heritage is being destroyed by unregulated mining. Employing satellite surveying and local fieldwork, this project will document new archaeological sites before they are destroyed, while engaging with the local Beja nomads to form culturally sensitive conservation strategies. Uncovering the history of ancient miners and indigenous nomads with new scientific techniques, the project will transform our narratives of the ancient Nile Basin, inform Sudanese heritage policy, empower local stakeholders, and propel Australia as a leader in world heritage conservation and rescue documentation.					
	National Interest Test Statement					
	This project will document the threatened archaeological heritage of Eastern Sudan while it still exists. Due to the activities of modern gold-mining, this unexplored landscape is under threat. From ancient Egyptian goldmines to nomadic camps and prehistoric rock art, this project will document and record this truly unique archaeological heritage before it is too late. Largely ignored in scholarship due to its remote terrain and difficulty of access, analysis of this desert will reshape our knowledge of ancient civilizations. The project will establish Australia as a champion of world heritage conservation and the transferable methods will allow heritage managers in Australia to conserve important sites and promote cultural tourism. The project will produce significant community engagement and promote Australia on an international stage by driving strategic collaborations across 9 countries. Sudanese immigration to Australia represents one of the fastest growing communities in the country and our international collaborations will boost Australia's cultural relations and public diplomacy in North Africa.					
FT230100119	**Dealing with distraction: understanding recovery after interruption**	278,430.00	289,746.00	281,189.00	275,218.00	1,124,583.00
Rich, Prof Anina N	Interruptions impair cognitive performance but modern environments have normalised distractions in our workplaces, homes, schools and cars. Daily tragedies occur because people are unaware of their attentional capacity limits. This Fellowship explores the consequences of interruption in moving					

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	displays using cutting-edge methods to determine how the brain holds information over an interruption and the process of attentional recovery. It includes translational work determining effective ways to raise awareness of attention limits and guide policy. The outcomes will advance knowledge of the mechanisms of recovery from interruption, raise awareness of capacity limits beyond academia, and guide policy to improve safety. **National Interest Test Statement** Modern environments are filled with interruptions (e.g. phone notifications) and encouragement to multi-task (e.g. bluetooth in cars). Unfortunately humans have limited attentional capacity and interruptions severely impact performance of our primary task. This Fellowship explores the consequences of interruptions in dynamic tasks that mimic driving and uses cutting-edge brain imaging methods to examine how interruptions affect the information our brains hold about a task. Showing how information in the brain is affected by an interruption and how long it takes to recover full focus can be used to guide individuals, businesses and schools to improve safety and productivity. Linking this use-inspired research with translation, the project will identify effective methods to raise awareness of the impact of attention capacity limits, improving public safety. Together with Educational Neuroscience company Rethinking the Brain, the outcomes will be used to influence driver behaviour and change phone-use policy to remove distractions while driving. This will reduce accident risk and save lives on Australian roads.					
FT230100207 Barclay, A/Prof Katie E	**How to Feel Safe at the End of the World** This project aims to provide the first history of how early modern families created conditions to feel safe in times of crisis, revealing how ideas of safety, security and hope for the future were conceived and put into practice. Its innovative research focus explores how histories, personal and national, inform psychosocial conditions of safety and security for families and build resilience within the next generation. Expected outcomes highlight the role of families as agents of historical change and help parents, teachers, children and youth to manage anxiety, build hope and improve life opportunities. This historical perspective on a contemporary problem has the benefit of supporting families struggling with today's changing world. **National Interest Test Statement** Many children and youth in Australia are experiencing a lack of hope about their futures, with a knock-on impact on mental health and well-being. Early modern European communities lived through environmental disasters, war, pandemics and other significant events and found ways to persist and move forward. This project explores and analyses this history as an example of how people have survived, sometimes flourished, during challenging events, and connects it with parents and children today through educational resources. In 2021, UNESCO argued that history was central to ‘projecting future possibility’, while the capacity to imagine a future for oneself is critical to mental health and wellbeing. The historical insights of this project offer different dimensions, examples and resources to equip people to think about a rapidly changing world and how people might build a future within challenging environments. In supporting a conversation about possible futures after crisis amongst young people, their parents and teachers, it contributes to the National Children’s Mental Health and Wellbeing Strategy (2021).	290,910.00	290,910.00	286,479.00	259,993.00	1,128,292.00
FT230100478 Dudaniec, Dr Rachael Y	**Untangling environmental effects on bee health in the face of Varroa** This project aims to assess bee health, disease and evolution in European honeybees and bumblebees. Bee viruses transmitted by the destructive Varroa mite cause worldwide pollinator declines. Factors determining bee health will be identified across Australia, New Zealand and the United Kingdom, which differ in Varroa impact and bee introduction histories. Harnessing Australia’s currently threatened Varroa-free status, the bumblebee invasion in Tasmania, and cutting-edge multi-omics techniques (for microbiomes, viruses and genomes), predictors of disease dynamics will be identified for two globally important bee pollinators. The project outcomes will boost Australia's capacity to manage threats to pollination services at landscape scales. **National Interest Test Statement** This project has economic and environmental benefits for Australia by helping to protect pollination services for agriculture and biodiversity, with implications for biosecurity, food security and human welfare. In Australia, bees have an economic value exceeding $14.2 billion annually, yet this is threatened by the world-renown Varroa mite which transmits bee viruses that lead to worldwide bee declines. Recent invasions on the east coast of Australia challenge the world’s only Varroa free continent. This project will help to safeguard Australia from Varroa by examining pathogen impacts on introduced honeybees and in native and invasive bumblebees. Understanding the environmental factors driving bee health in locations with and without Varroa is key to this goal. Tracing bee health and genetics across original source locations in New Zealand and the United Kingdom will uncover disease threats and dynamics across landscapes. With genetic data providing viral, microbial, immunological, and nutritional insights, this project increases Australia's disease surveillance capacity for managed and invasive bees.	245,304.00	244,142.00	259,728.00	203,024.00	952,198.00

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FT230100595	**Back to our roots: Re-activating Indigenous biocultural conservation**	242,724.00	244,724.00	243,724.00	246,124.00	977,296.00
Ens, Dr Emilie-Jane	This project addresses global demand for documented evidence of Indigenous-led biocultural conservation of declining species and cultures. Through a unique cross-cultural collaboration with Dharug and Yolngu women, this project will generate new methods and monitoring tools for restoring the biological and cultural values of native edible root species in urban and remote Australia. The environmental, social, cultural and economic outcomes will be amplified through regional education packages and online knowledge sharing platforms. This multiscale, multicultural and multidisciplinary approach will inform local to global policy and action against biocultural diversity loss and contribute to the decolonisation of conservation.					
	National Interest Test Statement					
	This project will develop new ways of simultaneously addressing Australia's poor record of species and cultural decline, with a focus on native edible roots species. Across Australia, edible root species are threatened by feral pigs, development and wildfire. Meanwhile, Aboriginal communities aspire to maintain traditional cultural practices, including of traditional staple foods such as edible roots. This project aligns with current Australian policies for Indigenous-led conservation, Indigenous health, empowering women and the emerging bush food market. It strategically combines multidisciplinary tools to restore and monitor outcomes of Indigenous women-led biological and cultural restoration of edible root grounds in Sydney and Arnhem Land. The project will address gaps in documented evidence and show how biocultural restoration can deliver protection for threatened species and financial security for communities from commercial harvesting of traditional food resources. A national communication strategy will encourage broad engagement with conservation science that will preserve Indigenous culture.					
FT230100710	**Designing a spectrometer to search for life on extrasolar planets**	259,541.00	259,602.00	259,664.00	199,824.00	978,631.00
Schwab, Dr Christian	Finding indicators of life on extrasolar planets is one of the greatest science questions of our time. Astronomers have found rocky, earth-like exoplanets; now we need powerful spectrometers to search for biomarkers in their atmospheres, detecting the faint imprints from molecules associated with life in the colour spectrum of stars. This project will develop the instruments and technologies required to enable spectroscopy with massively multiplexed telescopes. A spectrometer design with large spectral bandwidth and high resolution, optimised for a facility consisting of thousands of small telescopes, and novel optical fibres to link them, will open the door for breakthrough science requiring an entirely new class of telescope.					
	National Interest Test Statement					
	This project will develop new instrument technologies needed for the next generation of precision spectroscopy instruments under development worldwide to discover planets orbiting distant stars. This will ensure that Australia is an integral part of the global quest to discover planets with signatures of life, and ultimately a new Earth, an Earth-like planet orbiting a sun-like star. Such a discovery will have a profound effect on our understanding of our own place in the universe. The technologies developed in this project will help position Australian Astronomical Optics (AAO) to bid for multimillion dollar telescope instrumentation contracts worldwide. Australian Astronomical Optics is a world leader in providing advanced spectroscopic systems for leading telescopes worldwide, and relies on innovations that will be developed in this project to maintain Australia's global leadership and competitiveness. The optical fibre technologies and spectrometer designs developed will bring economic benefits by supporting a nascent Australian industry in optical spectroscopy, a billion dollar global industry.					
	Macquarie University	1,537,966.00	1,546,637.00	1,550,433.00	1,405,592.00	6,040,628.00
The University of New South Wales						
FT230100002	**Characterising and Manipulating Triplet Interactions**	257,564.00	257,564.00	257,564.00	228,694.00	1,001,386.00
Tayebjee, Dr Murad J	Organic optoelectronic devices are based on organic semiconductors and are found throughout modern life. They underpin technologies such as phone and television displays, low-energy lighting, and solar cells. The project Aims to use spectroscopy to comprehensively understand the underlying physics of organic optoelectronic device materials. This is Significant enabling science that will accelerate development of light-emitting diodes, solar cells, and new quantum information technologies. Expected outcomes include new knowledge about organic semiconductors, enhanced Australian research capacity, and international collaboration. Benefits include device innovations and the training of researchers in synthesis, fabrication, and spectroscopy.					

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	National Interest Test Statement					
	Electronic components can be made from organic materials that conduct electricity and absorb and emit light. Referred to as “organic optoelectronics”, these components can be found throughout our homes, including in mobile phone and television displays, low-energy lighting, and solar panels. Attempts to build more efficient materials and devices are held back by a poor understanding of the physics of optoelectronics, particularly how internal particles move and interact. Using innovative and novel approaches, this project will examine the mechanisms underlying these particles’ dynamics and facilitate the design of more efficient components of commercial interest to manufacturers across a range of industry sectors. Through licensing of newly created IP to future industry partners—such as solar cell and consumer electronics manufacturers— outcomes of this research will enable the development of more sustainable energy generation and energy efficient devices that could, in the longer term, contribute to national and international efforts to reduce carbon emissions.					
FT230100116	**High-Performance and Evaporative Triboelectric Nanogenerators**	233,944.00	247,504.00	235,194.00	222,759.00	939,401.00
Zhang, Dr Jin	This project aims to create high performance triboelectric nanogenerators (TENGs) with outstanding moisture wicking and thermal-moisture stability, while providing a comfortable platform for biomechanical energy harvesting and self-powered sensing. The project expects to generate new knowledge on simultaneous enhancement of output power and moisture management capability of tribo-textiles using interdisciplinary approaches. This should overcome the bottleneck of output deterioration of TENGs under humid conditions and provide significant benefits by offering an attractive renewable energy source for driving low power sensors in the era of IoT and opening new opportunities in healthcare, sports, virtual reality and smart homes.					
	National Interest Test Statement					
	Wearable electronics are widely used in the healthcare, sport, security and entertainment sectors. Battery-driven sensors have several drawbacks, including limited lifespan, high replacement cost, and environmental pollution. Devices also need to be comfortable and resistant to sweat and environmental humidity. This project aims to develop next-generation, battery-free, ‘smart’ eco-friendly textiles with in-built sensors that are more efficient, comfortable, and hard-wearing than predecessors. Licensing of IP and established collaborations with industry partners will enable the design and manufacture of industry-leading, flexible and breathable self-powered sensing systems, with a wide range of applications in health monitoring, athlete training, heavy-load monitoring, virtual reality, and smart homes. This new technology will increase our national competitiveness in advanced manufacturing, and enable Australia to play a leading role in the global wearable electronics market, estimated to reach over US$459 billion by 2030.					
FT230100209	**Multi-variable based vegetation monitoring and prediction during droughts**	232,694.00	232,694.00	236,694.00	217,824.00	919,906.00
Liu, Dr Yi	This project aims to reduce the uncertainties in characterizing and predicting drought impacts on Australian ecosystems. This project is expected to better understand how vegetation responded to hydro-meteorological conditions from the onset to termination stages during Australian droughts in the past 40 years, by investigating the newly developed first global long-term vegetation water content record from satellites. Expected outcomes of this project will be the enhanced capacity to better identify early warning signals and more accurately predict vegetation responses to future droughts. This should provide significant benefits in developing drought mitigation strategies for national agricultural production and water resource allocation.					
	National Interest Test Statement					
	In the past decades, we have witnessed the devastating impacts of droughts on ecosystems, and future droughts are projected to be more regular, longer and broader. Tools to better monitor and predict these impacts are urgently required. This project will develop a novel solution to directly monitor vegetation water content from space for Australia on a daily basis. This will overcome many limitations of the traditional observations of vegetation greenness. Its success will provide technological breakthroughs in drought management, particularly more accurate monitoring of how the impacts of drought on ecosystems evolve in time and space, and better identification of early warning signals. The information will allow more timely drought mitigation strategies for agricultural production and water resource allocation to minimize the impacts of potential food shortage on the Australian public, and increase our national security ultimately.					
FT230100396	**High productivity of hybrid plasma electrocatalytic fertiliser production**	205,920.00	214,920.00	207,820.00	213,420.00	842,080.00
Jalili, Dr Rouhollah A	Non-thermal plasma-driven electrocatalytic production of nitrogen fertilisers. The project aims to develop scalable technology for ambient production of fertilisers using renewable energy, air, water, and captured CO2. This project is anticipated to generate new knowledge in plasma catalysis and electrochemical coupling through designing and fine-tuning catalyst-loaded 3D scaffolds. Expected outcomes of this project include increasing the capacity to adopt low-cost and decentralised					

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	methods for renewable energy utilisation. This should provide substantial technological capacity that can be applied to other sectors of Australia's developing hydrogen economy and expand the use of renewable energy Power-to-X for zero-emissions energy vectors. **National Interest Test Statement** Australia is experiencing a major fertiliser shortage, impacting our food costs and security. Current fertiliser production relies on natural gas and a complex reaction between ammonia and carbon dioxide, requiring large, centralised infrastructure, which has resulted in a few factories based in countries where natural gas is cheap, controlling the global supply. Furthermore, the current global energy crisis is exacerbating the shortage and production cost. This project will explore directly coupling air, water and captured carbon dioxide to produce nitrogen fertiliser, drawing on our recent breakthrough in synthesising ammonia. My approach offers renewable electricity-driven, decentralised production along with a more sustainable manufacturing pathway. Project outcomes will be shared with leading Australian manufacturers of fertiliser, urea and ammonia, as well as associations representing end users in the agricultural sector. These collaborations will identify opportunities for Australian industries to adopt this new, sustainable manufacturing technology, securing our supply of a critical product.					
FT230100436 Li, Dr Wenxian	**Functional-unit-based hierarchical nanocomposites for sustainable future** This project aims to address the limitation of current water electrolysis technologies through the development of functional-unit-based hierarchical nanocomposites for renewable energy generation with high efficiency. This project expects to generate new knowledge in next-generation catalyst design based on the deconvolution of energy loss in water electrolysis. The expected outcomes include the design and fabrication of novel catalysts with low overpotentials for green hydrogen production. This should provide significant benefits, such as low energy consumption and low carbon dioxide emissions in hydrogen production and advanced manufacturing, to the progress of renewable energy technology and the sustainable development of modern society. **National Interest Test Statement** ‘Green’ hydrogen is a clean burning fuel which is generated using renewable energy to split water molecules (‘electrolysis’). It is at the centre of Australia's sustainable energy strategy and net-zero emission plan. The current methods of producing green hydrogen require large amounts of energy and are not cost-effective. This project will develop new ‘catalysts’ which will speed up the electrolysis process, producing hydrogen more efficiently and reducing costs. Through industrial partnerships and licensing of new IP, the outcomes of this project will be used to develop water electrolyser prototypes. These prototypes will use solar energy to turn water into green hydrogen to power Australia’s iron-steel making, transport, power generation, and fuel cells while reducing our carbon footprint and greenhouse gas emissions. This innovative research will give Australia world-leading capabilities in catalyst design and production to build the green hydrogen economy, strengthening our energy and environmental security, and contributing to our economic growth.	210,070.00	213,070.00	213,070.00	192,200.00	828,410.00
FT230100504 Brown, A/Prof Julie	**Towards equity in crash protection** Women are at increased relative risk for death and serious injury in motor vehicle crashes compared to men and the reasons for this are not clear. This Fellowship aims to build a new model that describes the mechanistic pathways for this inequity to identify where and how intervention could reduce this relative risk. This will establish what population groups have good and poor access to the best vehicle safety technologies, the differences, and what might cause these differences in the benefits of vehicle safety technology between women and men. The outcomes will be of use to academics, policy makers and industry designing to new ways to protect women in crashes and close this gender gap. **National Interest Test Statement** Road traffic crashes continue to claim a significant number of lives and result in an increasing number of cases of serious injury each year in Australia. There is an urgent need for new ways to tackle road safety problem, particularly for female drivers where the relative risk of dying is up to 20% higher and the relative risk of being seriously injured is more than 40% higher than for men. This fellowship will determine the mechanisms underpinning the increased relative risk for women and define a new framework describing the pathways to inequitable outcomes in crashes. This will identify where and how intervention could close this gender gap. This work will be undertaken in close partnership with government and industry with the power and authority to implement these types of interventions. Ultimately this work will have significant economic benefit as every life saved in a crash saves the community >$2 million and every serious injury prevented saves the community >$250,000.	294,295.00	294,320.00	250,653.00	250,653.00	1,089,921.00
FT230100545 Sedlacek, Prof Petr	**Understanding Business Dynamism: Drivers and Macroeconomic Implications** Business dynamism – the process of firm entry, growth and exit – is key for productivity as it moves	280,867.00	282,617.00	286,117.00	258,997.00	1,108,598.00

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	jobs and capital from less to more efficient uses. But, business dynamism (and with it growth in productivity and living standards) has slowed in many countries, including Australia. Grasping the reasons and economic effects of this is a challenge. This Project aims to reshape our thinking about business dynamism, its drivers, and how it impacts the economy – from sources of long-run productivity growth and the cleansing effect of firm exit, to how climate risks impact business dynamism. The delivered empirical facts and models will aid policy design for reviving business dynamism, underpinning potentially large societal and economic gains.					
	National Interest Test Statement					
	According to the Treasury's 2021 Intergenerational Report, 80% of increases in our living standards were driven by productivity growth. A key driver of productivity is 'business dynamism' - as new innovative startups grow, competition forces less productive firms to close. Alarmingly, business dynamism has slowed in Australia and globally, but the reasons for this are poorly understood. Using Australian and US data, this project will develop new models to measure and understand how business dynamism impacts the economy and why it has slowed. These analyses will: determine if rising market power of large firms hinders innovation; develop new methods to measure "survival of the fittest" among firms and how policies (e.g. JobKeeper) affect it; and estimate the impact of rising climate risks. These novel results will be disseminated to key stakeholders through new and established partnerships (e.g. with the RBA and Treasury), enabling Australian policymakers to design more effective industrial policies (such as R&D tax offsets), thereby helping raise Australia's productivity, earnings and living standards.					
FT230100697	**Economic Sanctions after the Cold War**	274,671.00	283,153.00	252,569.00	258,154.00	1,068,547.00
Whyte, A/Prof Jessica S	This project investigates the post-Cold War proliferation of economic sanctions. Advocates of sanctions see them as peaceful alternatives to armed conflict that uphold international norms without resort to force. Yet sanctions have significant and unpredictable effects and their use remains deeply contested. This project draws on detailed archival research to understand how liberal polities have come to view economic sanctions as non-violent tools of diplomacy and how this view has been contested by those subjected to them. By analysing the moral, political and economic theories that inform the imposition of sanctions, the research will throw new light on a crucial dimension of international politics.					
	National Interest Test Statement					
	Since the 1990s, economic sanctions have become central tools of foreign policy and are commonly viewed as non-violent alternatives to armed conflict. Policymakers are increasingly aware that disrupting economic relationships can have negative humanitarian, political and economic consequences, but our understanding of these consequences remains incomplete. By combining archival research into the post-Cold War history of economic sanctions with conceptual analysis, this research will develop a new theoretical account of how sanctions impact civilian populations. This will enhance understanding of the complex, unintended effects of sanctions on our economic relationships and geopolitical alliances. The research will inform key stakeholders, policymakers, media and humanitarian NGOs, about sanctions programs through briefings, workshops and reports. Understanding how sanctions affect civilians will inform public debate about Australia's sanctions programs and support policymakers to better assess Australia's sanctions programs and respond more effectively to attempted economic coercion by other states.					
	The University of New South Wales	1,990,025.00	2,025,842.00	1,939,681.00	1,842,701.00	7,798,249.00
The University of Sydney						
FT230100154	**Organic Bionics: Soft Materials to Solve Hard Problems in Neuroengineering**	212,940.00	212,940.00	212,940.00	204,505.00	843,325.00
Griffith, Dr Matthew J	This project aims to combine innovations in organic conductors, nanotechnology, 3D biofabrication and neuroengineering to develop a bioelectronic system capable of wireless neuromodulation with unprecedented stability and precision. This project expects to generate new knowledge regarding the properties of materials that promote optical neuromodulation and new strategies to obtain long-term material stability in biological environments. The expected outcome is to generate new material design rules to facilitate wireless neuromodulation technologies in biomedical engineering. The project will position Australia as a leader in bionic devices by creating a new 3D bioprinting hub for low-cost fabrication of bioelectronic systems.					

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	National Interest Test Statement Neural electrodes that can stimulate cells in the human body are a new frontier in biomedical engineering. Current devices are made from hard and stiff materials that suffer problems with long-term stability. This project will develop new organic materials that solves this problem. By systematically studying the links between electrical performance and material nanoscale structure, this project will develop new design rules to enable wireless communication with neurons and develop new strategies to obtain long-term material stability in biological environments. The project will deliver major benefits for the $21B bioelectronics industry by creating a competitive advantage over international companies, whilst the new ability to print electronic devices will generate high-tech manufacturing sovereign capability and is anticipated to create several new highly skilled jobs. This discovery and its subsequent commercial development with Australian stakeholders in health and manufacturing will give Australians access to new low-cost technologies for prosthetic organs and treatment of neurological disorders.					
FT230100240 Senior, Dr Alistair M	**A Varied Diet, Ageing, and the Evolution of Life Histories** This research aims to understand how nutritional environments affect lifespan and its evolution. The expected outcomes are improved knowledge around the biology of ageing including the identification of diet-responsive genes and biological pathways. These elements will comprise targets for future applied studies on ageing, metabolic dysfunction and personalised nutrition. This study will also inform as to how lifespans evolve. Because lifespan is a fundamental demographic trait, this knowledge will improve ability to predict how populations adapt to environmental change. Lastly, through methodological innovation this project will also provide new statistical tools for studying how treatments affect the risk of death age specifically.	242,694.00	240,694.00	233,194.00	227,467.00	944,049.00
	National Interest Test Statement Currently 1 in 6 Australians are aged 65+, and this demographic is expected to increase. Ageing brings reduced function and is the major risk factor for most non-communicable diseases. Improvements in diet can slow ageing, improve health, and maintain function into late life, offsetting the societal and economic costs of an ageing population by delaying the onset of increased care requirements. This project will identify how nutrition interacts with genes to determine lifespan and generate new knowledge about the diet-responsive pathways that underpin the ageing process itself. The outcomes of this research will form the basis for pre-clinical nutritional trials on ageing and age-related diseases, and targeted epidemiological studies on late-life health and lifespan in Australians. As well as biological knowledge, this research will develop new statistical tools that can be used to better study the effects of many anti-ageing interventions. Declining health with age is a burden faced by all Australians, which the results of this program will help to alleviate by improving quality of life in old age.					
FT230100249 Lim, Dr Khoon S	**Programming physical and biological cues to promote vessel growth** This project aims to engineer new hydrogel-based biomaterials that allow spatio-temporal modulation of physical and biological cues to direct blood vessels growth, as well as compatible with advanced bioprinting platforms. It will generate new knowledge in biomaterials, biofabrication and advanced material processing. Expected outcomes include new knowledge in biomaterial-vascular interaction, novel vascular bioinks, cross-disciplinary, international collaboration and research training. This project will provide significant benefit to Australia's scholarly output and reputation, as well as long term benefits to biomedical, veterinary and cosmetic through new materials and cutting-edge manufacturing platforms.	223,354.00	244,824.00	251,694.00	250,694.00	970,566.00
	National Interest Test Statement The performance of implantable biomaterials is currently limited by their poor integration with the host, mainly due to ineffective blood vessel growth which hinders their long-term function. This project will engineer biomaterials to direct blood vessel growth, by designing materials with specific properties to control how cells react to them, in order to address this unmet challenge. The project outcomes will catalyse the development of next generation biomaterials that are not limited to blood vessels, but also have other applications including tissue engineering, regenerative medicine, tissue models, disease modelling and drug discovery. As the demand for biomaterials usage has increased globally, with a market size poised to reach $249 billion by 2028, this is a key area of investment for Australian research and materials industries. This project is expected to lead to future commercial benefits in economic priority areas of high-value advanced manufacturing and high-performance materials, through technology licensing and transfer to existing and new industry partners.					
FT230100401 MacCann, A/Prof Carolyn E	**Identifying the goals and strategies people use to make others feel worse** This project aims to identify the goals and strategies people use to make others feel worse, the situation factors affecting goal formation, and the relative impact of different strategies. The project will develop a novel theoretical framework by applying emotion regulation theory a new area (worsening others' emotions), testing predictions through intensive longitudinal methods, experimental studies and a cross-national comparison of 15+ countries. Expected outcomes include	289,447.00	289,571.00	294,573.00	265,703.00	1,139,294.00

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	new knowledge of the universal psychological processes that underpin aversive interactions, enhanced capacity for international collaboration, and policy guidance. Benefits include the potential to improve programs to decrease workplace bullying and domestic violence. **National Interest Test Statement** This project aims to understand why and how people try to make others feel negative emotions such as anxiety, sadness, or irritation. The basic processes people use to regulate their own and others' emotions for the better are well known, and this knowledge forms the evidence base for many mental health interventions, leadership programs, and group/family therapies. But there is no equivalent knowledge base for attempts to regulate others' emotions for the worse. By closing this knowledge gap, the project will inform the improvement of programs targeted at reducing the social and financial cost of pressing issues such as workplace bullying and domestic violence. The research will produce an online repository of multi-language resources, offering accessible information and tools that will enable organisations and individuals to apply the findings. A stakeholder advisory group will also facilitate evidence-based interventions and an ongoing dialogue for positive change based on the research findings, leading to safer environments and stronger relationships in the Australian community.					
FT230100489 Tubbenhauer, Dr Daniel	**Categorical representation theory and applications** Symmetry is everywhere, and nature is designed symmetrically: Snails make their shells, spiders design their webs, and bees build hexagonal honeycombs, all based on the concept of symmetry. Symmetry is a general principle which plays an important role in various areas of knowledge and perception, ranging from arts to natural sciences and mathematics. The 21th century way of the study of symmetries is categorical representation theory. The project aims are to strengthen this young field by advancing the theory and by finding applications from where its significance arises. The outcome will be new results on categorical representations and this will have benefits within mathematics, cryptography and also in physics/chemistry in the long run. **National Interest Test Statement** Representation theory is one of the most applicable fields of mathematics, and widely used in the finance, business, health and defence sectors. The aim of this project is to advance categorical representation theory by addressing the two most crucial problems: strengthening the abstract framework and finding sought-after applications in key technologies. It will lay the theoretical foundations for the next generation of applications, such as in cybersecurity, by developing a better understanding of the limitations of traditional cryptography and improving on it. Firms will be able to utilise this enhanced cybersecurity capability to ensure the security of the critical systems that support Australia's financial, health, transport and defence industries. This project will place Australia at the forefront of the global race in key technology sectors including cybersecurity, increasing our capacity to train researchers in the leading mathematical methods needed to solve the technical problems of tomorrow's pivotal industries.	193,570.00	207,440.00	207,440.00	207,440.00	815,890.00
FT230100519 Verstraete, Dr Dries D	**Energy Source Durability for Electric Vertical TakeOff and Landing Aircraft** This project aims to address energy source durability for electric Vertical Take Off and Landing (eVTOL) aircraft by optimising a fuel cell/battery/ultracapacitor triple hybrid energy system. The project expects to generate new knowledge in the area of energy source durability using interdisciplinary approaches that combine energy source degradation models, hardware-in-the-loop simulations, aero-propulsive flight mechanics models, and accelerated degradation testing. This should provide significant benefits, allowing to fast-track the improved longevity needed for cost-competitive long-range rapid response air ambulance eVTOL operations. **National Interest Test Statement** Electric Vertical Take Off and Landing (eVTOL) aircraft could provide cost-effective rapid response air ambulance, passenger transport, and medical delivery services to rural Australia. However, battery-powered eVTOL aircraft have a limited range, and the fuel cells that enable long-distance flights break down too quickly to be cost-competitive. This research program seeks to improve energy source durability for eVTOL operations by optimising a fuel cell-based triple hybrid system. The triple hybrid system aims to reduce fuel cell degradation to enable cost-competitive long-distance eVTOL flights. This research will benefit the Australian economy by giving our aerospace industry a competitive advantage in a market predicted to reach USD 115 billion by 2035 in the USA alone. A long-range, cost-effective eVTOL aircraft will furthermore help unlock the economic potential of regional and rural Australia and make health care more affordable for Australians living in remote regions.	234,573.00	294,573.00	294,573.00	294,573.00	1,118,292.00
FT230100549 Xu, Dr Chang	**Deep Adder Networks on Edge Devices** This project aims to empower edge devices with intelligence by developing advanced deep neural networks that address the conflict between the high resource requirements of deep learning and the	243,694.00	243,694.00	243,694.00	229,259.00	960,341.00

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	generally inadequate performance of the edge. Multiplication has been the dominant type of operation in deep learning, though the addition is known to be much cheaper. This project expects to yield theories and algorithms that allow deep neural networks consisting of nearly pure additions to fulfil the requisites of accuracy, robustness, calibration and generalisation in real-world computer vision tasks. The success of this project will benefit deep learning-based products on smartphones or robots in health and cybersecurity. **National Interest Test Statement** Artificial Intelligence (AI), particularly deep learning, is driving the next technology revolution. However, the cost of obtaining state-of-the-art AI models is high, equivalent to five years' worth of emissions from an average car. The computational power these models require also prohibits their use in devices like smartphones and tablets. This project aims to redefine the efficiency of deep neural networks used in AI, reducing the cost of training and deploying them in real-world applications while improving their generalisation and robustness. This increased efficiency will give Australian small to medium enterprises a competitive edge in embracing AI and enhancing automation, allowing them to find new applications in mobile devices such as smartphones, drones, autonomous cars, and robots. Active collaboration with industries, including existing partners in the IT and finance sectors, will enable the findings of this research to be translated into practical applications that drive economic growth and technologically benefit Australian society.					
FT230100653 Kassal, A/Prof Ivan	**Simulating chemical reactions on quantum computers** This project aims to enable a new capability for simulating practically relevant chemical dynamics and reactivity in regimes where conventional computational chemistry fails. It expects to do so by generating an extensive toolbox of quantum algorithms that would allow quantum computers to carry out otherwise intractable simulations of a wide range of chemical processes using existing quantum devices. As quantum technology matures, these algorithms should enable quantum computers to accelerate computational screening of new chemical processes in a wide range of fields, enabling faster discovery of, for example, improved catalysts, batteries, medicines, fuels, and solar cells. **National Interest Test Statement** This project will enable near-term quantum computers to solve difficult computational problems in chemistry relevant to designing new drugs and advanced materials for clean energy storage. Our novel analog and digital approaches will develop new quantum algorithms that reduce the size of quantum computers needed for chemical simulations, making these calculations possible sooner. Our results will allow chemists and materials scientists to rapidly screen molecules and materials for desirable properties, a current challenge on conventional computers and a high-priority opportunity identified in the National Quantum Strategy. Using quantum computers to accelerate molecular and materials discovery would advance Australian industry and lead to better health outcomes, for example, by discovering better medicines and pharmaceuticals, higher-performance materials for energy conversion and storage, or improved catalysts for the chemical industry. The new algorithms will be translated into commercial use in partnership with quantum-computing firms, giving a competitive advantage to the Australian quantum industry.	278,573.00	278,573.00	278,573.00	278,573.00	1,114,292.00
	The University of Sydney	1,918,845.00	2,012,309.00	2,016,681.00	1,958,214.00	7,906,049.00
University of Technology Sydney						
FT230100062 Söderström, Dr Bill	**Unlocking bacterial shapeshifting and its role in antimicrobial resistance** This project aims to combine advanced imaging with innovative microfluidics to identify how microbial shapeshifting can be exploited as a target for new antimicrobials. Infections that are hard to treat due to increasing antimicrobial resistance not only have an enormous, global impact on mammalian health, including livestock and humans, but also carry a growing economic burden. Advanced understanding of microbial life can propel urgently needed progress this area. Specifically, the project outcomes are expected to aid the development of next generation antibiotics. The new fundamental knowledge should also benefit translational prevention, identification and management efforts of a rising national and global health threat. **National Interest Test Statement**	223,390.00	215,282.00	215,132.00	174,970.00	828,774.00

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	According to a recent study in The Lancet, an estimated 5 million people die globally each year with an antimicrobial resistant infection; this figure is expected to reach 10 million deaths annually by 2050. Current reports led by CSIRO have estimated that in Australia alone, Antimicrobial Resistance (AMR) costs are in excess of $500 million per year and rising. Resistant bacteria increasingly appear in the environment of humans and livestock, but established infection control is becoming ineffective. Innovative ways of attacking AMR are urgently needed. This project will develop pioneering, technological approaches to how changes in bacteria relate to antibiotic resistance at a molecular scale, enabling the design of novel therapeutics specifically targeting this mode of bacterial lifestyle. Once adopted by pharmaceutical industry and used in human and livestock health applications, the outcomes from this project would have lasting impacts on three critical areas: health, the environment and agriculture, resulting in better health for Australians, a stronger agricultural sector and reduced economic cost.					
FT230100104	**Wireless Integrated Circuits for the Era of 6G: System-in-a-Package**	225,070.00	225,070.00	210,635.00	210,635.00	871,410.00
Zhu, Dr Xi F	The aim of this project is to build a hardware foundation for future wireless integrated circuits, using a combination of silicon and compound semiconductor technologies. The project will generate knowledge for circuit design and system integration to pivot towards the engineering of emerging 6G technology. Expected outcomes include a transceiver-in-package using multiple semiconductor technologies and the development of sovereign design capabilities. The results will constitute an important step towards implementing 6G. Benefits for Australia include the development of early career workers, generation of intellectual property, and securing social and economic benefits for Australians through application of this next-generation technology.					
	National Interest Test Statement					
	Future wireless technologies relying on high-speed mobile networks are expected to become ubiquitous over the coming decade and will be worth trillions of Dollars globally. However, some foundation technologies, such as electronic integrated circuits, are currently still in their infancy and too costly for mass production. This project will produce innovative, low-cost electronic integrated circuits crucial for emerging applications, such as wireless links that will be up to 50 times faster than today. These high-speed wireless devices will not only benefit metropolitan areas, but especially end-users across Australia's vast regional areas, advancing real-time applications in telehealth, remote education, smart farming, etc. Research workforce training in this high-demand area will contribute to addressing domestic skill shortages in the ICT sector, and adoption by the growing number of technology start-ups in electronic circuit design would also allow Australian business to offer competitively-priced and high-performing commercial products to global markets, resulting in job creation and new export income.					
FT230100121	**Situated Anomaly Detection in an Open Environment**	292,313.00	292,313.00	292,313.00	263,443.00	1,140,382.00
Chen, Prof Ling	This project aims to investigate situated anomaly detection in an open environment. Existing anomaly detection techniques follow the setting of conventional machine learning and discover anomalies from a set of collected data. In contrast, this project proposes to develop the next-generation of anomaly detection algorithms by learning from interactions with an open environment, which enables the discovery of new anomalies and the early detection of anomalies. The established theories and developed algorithms will advance frontier technologies in machine intelligence. The success of the project will contribute to a wide range of real applications in cybersecurity, defence and finance, bringing massive social and economic benefits.					
	National Interest Test Statement					
	Real-time cyberattack detection and proactive defences will allow Australian businesses and government to be better protected against the increasing threat of intrusions and data breaches. Typically, the data collected from a cyber incident is analysed for irregularities only after losses or damages have already occurred. This project aims to develop intelligent anomaly detection algorithms for real-world systems - in networks where normal data traffic patterns are stable or evolve gradually. The detection of sudden changes in these patterns by software agents allows the automatic and immediate deployment of countermeasures against the attacker to prevent severe losses. Intelligent agents capable of distinguishing between normal network activities and potential attacks, including new/unknown threats, are of great interest to the fast-growing cybersecurity sector. Once adopted into commercial products, these agents will deliver significant national security benefits by keeping Australian businesses, government agencies, public institutions, utilities and defence facilities better protected from cyberattacks.					
	University of Technology Sydney	740,773.00	732,665.00	718,080.00	649,048.00	2,840,566.00
University of Wollongong						
FT230100001	**From Snowball Earth to Animals: the Influence of Mantle Dynamics**	248,824.00	244,824.00	239,824.00	224,824.00	958,296.00
Flament, Dr Nicolas	This project aims to investigate how solid Earth processes contributed to 'Snowball Earth' events around 700 million years ago and to the explosion of complex life 540 million years ago, which will					

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	shed light on our origin as a species. The approach consists of merging cutting-edge models of the plate-mantle system with the global rock record. The intended outcome is to understand relationships between mantle convection, the behaviour of the magnetic field, global sea levels, continental-scale topography, and the composition of the ocean and atmosphere. Expected significant benefits include building capacity in Earth Sciences and the development of new models that can be used to explore the mineral endowment of the Australian crust. **National Interest Test Statement** The global rock record indicates that complex life evolved 540 million years ago, following profound changes in the magnetic field and climate, including 'Snowball Earth' events when the planet was covered in ice. There is a lack of understanding about the dynamic origin of the environmental changes that led to the explosion of complex life. To address this knowledge gap, this project will merge state-of-the-art models of the dynamics of Earth's deep interior with the global rock record. Insights gained will include the deep Earth context for the evolution of resource-bearing Australian basins and for the deposition of globally significant rock formations from South Australia that contain some of the first complex fossils and are evidence for 'Snowball Earth' events. The project will also reveal how changes in Earth's atmospheric CO2 and climate have occurred on all time scales. With investment from the minerals industry, the models developed in the project could be used as an exploration tool for metals and minerals that are essential to the Australian economy and to the transition to a low-carbon society.					
FT230100257 Tang, Dr Shiyang	**Electro-triggered solidification of supercooled fusible alloys** Stiffness is typically considered a static property of a material. Traditionally, once the stiffness is specified, it is not expected to change during operation. This project aims to turn a problem (i.e., supercooling) into an opportunity for creating fusible alloy composites with electroprogrammable stiffness that can outperform state-of-the-art materials by offering all desirable properties. Expected outcomes are the rapid, continuous, large, and reversible change in stiffness of the composite through electrical control. This project will provide significant benefits by enabling an increasing number of emerging applications in areas such as robotics, manufacturing, and consumer wearables that require materials with tuneable stiffness. **National Interest Test Statement** This project aims to create a smart material that can actively adjust its stiffness through the application of electricity, thus pushing the boundaries of performance and versatility for future applications in robotics and wearable technology. It will generate new knowledge in composite materials, with broad impacts in manufacturing and wearable devices. Specifically, the proposed variable adaptive skin for robots will enable exceptional compliance and object manipulation, leading to cost-effective, high-performance robotic grippers in manufacturing. This will increase the reliability of robotic assembly and prevent losses through damages caused by hard contact and system malfunctions. Moreover, the composite material can create smart wearables such as adjustable splints for better user adaptation. Through collaboration with the Australian manufacturing industry, this project will prioritise the development of commercial processes and products, advancing the nation's global competitiveness in advanced manufacturing and healthcare technology.	201,070.00	212,440.00	203,940.00	208,940.00	826,390.00
FT230100629 Howard, A/Prof Steven J	**Unravelling early self-regulation: A longitudinal study** National data show persistent issues in Australian children's social-emotional vulnerability. Research shows we have had limited success shifting these trajectories through current education and intervention efforts. In short, we understand enough about self-regulation to establish it as a priority target in early childhood, yet not enough to meaningfully alter current trajectories. This project will develop a 'big picture' theory of children's self-regulation abilities and change, supported by Australia's first longitudinal study of early self-regulation, from preschool into early primary school (ages 4 to 6). This robust theory of change is expected to better position ongoing education and intervention efforts to succeed. **National Interest Test Statement** This project will involve an Australian-first longitudinal study of how young children develop self-regulation abilities, with the aim to improve future education and social outcomes for Australian children as they develop to adulthood. This research will produce a more comprehensive and nuanced understanding of self-regulation change–from its moment-to-moment fluctuations to its longer-term growth, including its precursors and the ramifications of these changes. It will respond to social issues of immediate public interest related to child self-regulation (e.g., 'big behaviours' after COVID-19 lockdowns; young children's digital diets and decisions) to better equip children's everyday carers to navigate these challenges. Translation of project outcomes will occur through existing collaborative networks of industry and government change-makers–alongside a public dissemination strategy–to inform educational policy and improve the effectiveness of self-regulation practices in homes, schools and services.	285,781.00	284,391.00	284,391.00	236,560.00	1,091,123.00

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		2023-24	2024-25*	2025-26*	2026-27*	
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)
	University of Wollongong	735,675.00	741,655.00	728,155.00	670,324.00	2,875,809.00
	New South Wales	7,115,986.00	7,249,530.00	7,148,887.00	6,717,236.00	28,231,639.00

* 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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(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)
Queensland						
Griffith University						
FT230100084	**Developing a new class of RNA delivery vehicle using synthetic virology**	242,909.00	242,599.00	242,599.00	240,709.00	968,816.00
Sainsbury, Dr Frank	This project aims to develop robust protein cages derived from the empty shells of viruses, or capsids, to protect and deliver sensitive cargo such as RNA in agricultural settings. It will do so by directed evolution of non-infectious capsids in the lab. This will uncover the molecular mechanisms underpinning the response of viruses to chemical and biological signals and create a new class of RNA delivery vehicle. This synthetic biology approach combines virology and protein engineering to establish a platform biotechnology for stable and effective delivery. The project expects to demonstrate the potential of nature's nanoparticles, virus capsids, to enhance the efficacy of RNA technologies in a wide range of applications.					
	National Interest Test Statement We know that RNA molecules can be successfully used as disease control measures but its use beyond human medicines and vaccines is limited as RNA easily breaks down. The goal of this project will be to develop an approach to deliver sensitive RNA molecules in challenging environments such as agricultural settings. A biological "toolbox" will be created to study the ways that viruses move to different hosts, providing vital knowledge to inform pest and disease control strategies. Use of these new tools will enable new bio-pesticides to prevent soil-borne plant diseases responsible for annual vegetable crop losses amounting to $120 million in Australia alone. This project will benefit the nation by creating new preventatives for agricultural pests and diseases, enhancing the competitiveness of Australian primary industries. Alignment of this project with the global need and massive commercial interest in RNA-based technologies will support growth in Australia's biotechnology industry. The findings will be made widely available through open access publication and licensing agreements with industry partners.					
	Griffith University	242,909.00	242,599.00	242,599.00	240,709.00	968,816.00
Queensland University of Technology						
FT230100243	**Energy Neutral Anthropogenic Nitrogen Management**	277,800.00	277,800.00	277,800.00	277,800.00	1,111,200.00
Liu, Prof Yang	This project aims to develop an innovative energy-neutral biological ammonium management strategy based on a novel anaerobic ammonia oxidation pathway. Ammonium-rich waste streams from urban and agricultural settings are a major cause of eutrophication and impose severe environmental burdens to human and ecological health. This project is expected to fundamentally change how we manage ammonium pollution, and will have immediate applicability to engineered bioreactors systems. This will provide significant benefits in supporting a wide range of industries that struggle with finding affordable and net-zero ways to manage ammonium wastes, providing an important step to reach global net-zero carbon emissions.					
	National Interest Test Statement Globally, and in Australia, wastewater treatment is energy intensive and costly to operate and maintain. To provide a sense of scale, energy consumption by the wastewater sector accounts for some 1-4% of the national electricity load, most just to aerate sewage for biological reduction of organics and ammonia. Striving to meet 2050 sustainable development goals, wastewater treatment plant managers are determined to achieve net-zero emissions over the next decade. However, it is unlikely that energy-neutral wastewater treatment can be achieved without innovative ammonium management. This project aims to develop an energy-neutral ammonia management strategy using innovative biological processes. Research outcomes will have immediate applications and commercial potential in sectors such as local government, agriculture, mining, food processing, and landfills. Hence, this project will empower billion-dollar industries grappling with ammonia-related challenges while potentially reducing global greenhouse gas emissions by around 1%.					
FT230100400	**Unlocking the potential of bacterial polymers by defining key determinants**	248,583.00	247,054.00	245,135.00	244,915.00	985,687.00
Kenyon, Dr Johanna J	Sugary structures that coat the surface of some bacteria, known as capsules, can be modified by bacterial viruses (bacteriophage) in the environment. For the bacterial genus Acinetobacter, this influences their use as naturally renewable 'green' biopolymers for remediating environments					

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	contaminated with petroleum hydrocarbons. This project aims to characterise crucial capsule polymerase enzymes using a combination of bioinformatics and experimental methodologies to establish how bacteriophage influence Acinetobacter capsules. Outcomes include the development of an innovative genomics pipeline to detect capsule change, improving the use of living bacteria for bioremediation and sustainable rehabilitation of natural ecosystems. **National Interest Test Statement** The future prosperity of Australia relies on healthy and sustainable natural ecosystems. However, humans are generating a toxic legacy with an estimated 160,000 sites in Australia contaminated with toxic compounds that have devastating effects on health and the environment. To mitigate the expense of cleaning and excavating to rehabilitate these ecosystems, living bacteria that degrade petroleum hydrocarbons or other compounds can be applied to these environments as cheap, naturally renewable, biodegradable solutions. The ability of these bacteria to clean-up oil spills is attributed to the long chains of sugars on their cell surface. However, these structures have a propensity to change in the environment due to interactions with other microbes. This project will employ a cross-disciplinary approach to deliver an innovative computational tool for detection of genetic changes, enabling whole genome sequencing to be used to model and guide bioremediation efforts, improving Australia's position as a global leader in economically viable and sustainable applications for rehabilitation of natural ecosystems.					
FT230100560 Pope, Prof Phillip B	**HoliCOW - A holobiont strategy to uncover the core microbiome in cows** Human population growth is driving a rise in cattle production for food, which necessitates sustainable practices that simultaneously optimise animal nutrition while reducing methane emissions, a critical greenhouse gas. This project aims to unravel and exploit biological connections across the cow holobiont, which pertains to the feed cows eat, their bodily function and the microbes in their rumen. This project will leverage multi-layered molecular data derived from the cow holobiont to identify, characterise and ultimately control the core rumen microbiome that causes methane production in animals. The outcome will be new knowledge to facilitate microbiome-based interventions that benefit animal production and reduce its carbon footprint. **National Interest Test Statement** To meet the goal of limiting global warming to 1.5C, methane emissions from ruminants must be reduced 11-30% by 2030 and 24-47% by 2050 compared to 2010 levels. Thus, reducing enteric methane emissions whilst increasing animal productivity is the single-most critical challenge that faces the livestock industry. This project will create a thorough mechanistic understanding on the microbiological, biochemical and genetic processes that cause methanogenesis in the cow rumen. These activities will identify core microbiota that are critical to cow performance and methane production across different breeds of animals, which is essential to enable reliable predictions of the effects of different treatments. Delivery of this projects research outcomes will benefit the design of improved methane-intervention strategies, and in doing so will assist Australia's ability to meet its commitment to the Global Methane Pledge; recently signed by 122 nations to take voluntary actions to contribute to a collective effort to reduce global methane emissions by at least 30%, which could eliminate over 0.2C warming by 2050.	292,573.00	287,523.00	287,523.00	243,653.00	1,111,272.00
FT230100724 Coelho, Dr Luis Pedro	**Understanding prokaryotic small proteins from context** Prokaryotic small proteins are increasingly recognised to play important biological roles but have been largely overlooked due to the lack of adequate tools to study them. This project aims to develop new methods to identify and predict the functions of small proteins from microbial communities by studying sequence patterns in their genomes. These predicted functions will be confirmed in the laboratory, leading to a catalogue of newly characterised small proteins from a diverse range of habitats and geographies. By creating new ways to study the role of small proteins in the global microbiome, we will provide the foundational knowledge required to leverage these proteins for use in biotechnology. **National Interest Test Statement** This project develops a new approach to identify and characterise peptides found in microbes, one of the most abundant and diverse types of organisms on Earth. By innovatively identifying a new collection of previously unknown peptides from microbes, this project will accelerate future uses across a broad range of areas from antibiotic resistance to reducing the environmental impacts of agriculture. It will show how these peptides can be developed as new antibiotics, addressing a major health crisis. In Australia, antibiotic resistant urinary tract infections alone are cause almost a billion dollars in healthcare costs, and, in total, thousands of Australians die every year due to antibiotic resistant infections. Once protected by Australian patents, translation pathways for outcomes of this project include commercial partnerships to ensure the economic benefits of this research are realised in Australia.	239,694.00	244,894.00	252,094.00	242,824.00	979,506.00

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	Queensland University of Technology	1,058,650.00	1,057,271.00	1,062,552.00	1,009,192.00	4,187,665.00
The University of Queensland						
FT230100010	**Thinking about possibilities: Towards a unified cognitive framework**	216,438.00	214,878.00	207,638.00	217,350.00	856,304.00
Redshaw, Dr Jonathan P	Thoughts about possibilities are fundamental to what makes us human. We routinely imagine what might happen in the future and reflect on how the past could have turned out differently. This psychology project aims to establish the circumstances in which children and non-human primates think about alternative possibilities, and to explain how they do it. The project expects to provide new knowledge of cognitive development and evolution, and to distinguish between simple and complex processes for thinking about possibilities. Expected benefits include progress towards a unified cognitive framework that may ultimately be leveraged to help people better reason about possibilities and bring them to fruition.					
	National Interest Test Statement					
	Regular Australians are often confronted with decisions between alternative possibilities and contingencies they must plan for. The capacity to consider possibilities is critical even from early life, as children face choices between which subjects to study, which skills to practice, and which career paths to pursue. Remarkably, however, it remains unknown how children come to think about possibilities at all. This project will administer psychological tasks to children of different ages, as well as a comparison group of non-human primates, to illuminate both simple and complex ways of thinking about what might happen next. Research translation will involve sharing findings with psychologists and policymakers in order to facilitate downstream social benefits to the community. Examples of these benefits include new assessment tools that can identify children at risk of falling behind their peers in making prudent decisions and preparing for alternatives. The project will therefore lay the foundation for teaching Australian children to better reason about possibilities and turn them into reality.					
FT230100230	**Exploring volcanic arcs as factories of critical minerals**	248,184.00	246,224.00	246,674.00	240,274.00	981,356.00
Ubide, Dr Teresa	Volcanoes at destructive plate boundaries (magmatic arcs) host most global copper deposits, critical for renewable energy and in unprecedented rising demand. This project aims to use high-resolution geochemical zoning of erupted crystals to uncover how magmatic processes lead to copper mineralisation and explosive volcanic eruption in arc volcanoes. The expected outcome is new knowledge on the inner workings of volcanoes and their copper enrichment potential. Anticipated applications are refined exploration targeting for copper and improved volcano hazard assessment. This will benefit the Asia-Pacific region and enhance the capacity of mining companies in the global race to produce metals of the future.					
	National Interest Test Statement					
	The accelerating renewable energy transformation is putting huge demands on the supply of copper, an excellent conductor of electricity and heat. After millennia of mining copper, all easily accessible deposits are known. The race to find more copper relies on exploration innovation to locate hidden, inaccessible deposits. This project aims to repurpose a technology initially developed to research magma transport, into an exploration tool to find copper. The project will use new, detailed geochemical information locked in individual crystals formed at depth below volcanoes. It is in these plumbing systems where physical processes control whether the magma system becomes mineralised or whether the volcano will catastrophically erupt. The crystal fingerprint could potentially provide a tangible exploration tool to Australian companies searching for copper in ancient magmatic systems in Australia and globally. This will bring economic and environmental benefits to Australia by safeguarding critical mineral security and enabling the energy transition.					
FT230100251	**Solar driven methane conversion for green methanol production**	210,070.00	210,070.00	210,070.00	200,505.00	830,715.00
Wang, Dr Zhiliang	This project aims to develop advanced photoelectrode materials for solar driven methane partial oxidation to produce methanol. The key concepts are to develop new semiconductor devices and alloy metal cocatalysts in solving the slow charge and mass transfer challenges in catalytic methane partial oxidation reactions. The expected outcomes include ground-breaking approaches for catalytic materials design, efficient solar fuel production and cutting-edge knowledge on methane activation mechanism. The program is aligned with Australia's Net-Zero Emission 2050 target, representing an innovative pathway in converting greenhouse gases into valuable chemicals, which will bring environmental and economic benefits to Australia.					
	National Interest Test Statement					

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	Australia’s prosperity in coal mining and livestock is driving a dangerous acceleration in methane emission, a greenhouse gas with 25-fold greater heat trap capability than carbon dioxide. An urgent solution is needed to ensure Australia can meet its Net Zero target while maintaining the strong economic benefit of these industries. This project aims to deliver a technology for converting methane into methanol using sunlight. Methanol, also known as liquid sunshine, is a promising green fuel that has the potential to replace fossil fuels. However, over 90% of Australia’s methanol is imported from overseas at significant cost. Success of this project will enable green methanol to be produced locally using Australia’s abundant solar energy and methane sources. The development of this sovereign capability will ensure Australia has a safe energy net with a stable supply chain of green fuel. The expected outcomes have the potential to broaden adoption of green methanol in numerous industries, reducing greenhouse gas emissions and contributing to the Australian Government’s 2030 Emission Reduction Target.					
FT230100388 Ploschner, Dr Martin	**Investigating spatio-temporal instabilities in next-generation lasers** This project aims to decipher the transient spatio-temporal dynamics of lasers with an emphasis on investigating chaotic instabilities whose fundamental laws are unknown and whose effects impair laser performance in applications with a billion-dollar aggregate value. This project seeks to solve the problem by unravelling the evolving beam's structure on picosecond timescales using an optical device that dissects the beam in space and time. The expected outcome is a suite of tools capable of guiding global efforts to develop next-generation lasers. The discoveries would propel Australia to become a characterisation nexus of the laser industry and usher in the era of faster telecommunication, enhanced sensors and high-precision manufacturing.	203,793.00	203,590.00	203,627.00	203,281.00	814,291.00
	National Interest Test Statement The industry that manufactures lasers is worth billions of dollars and forms the technological backbone of diverse markets, e.g. smartphones, augmented reality, self-driving cars and data communication. Engineers are attempting to design next-generation lasers that are faster, more powerful and can communicate over longer distances. However, the instruments available to engineers for this task are very blunt, making the laser development cycle precarious, expensive, and slow. This project aims to empower engineers with a suite of tools required to produce novel lasers for the emerging telecommunication, sensing and material processing markets. Deployed in Australia, the instruments will guide the global manufacturing efforts to develop next-generation lasers and transform Australia into a characterisation nexus of a lucrative laser industry predicted to be worth 5.7 billion AUD by 2027. Application of the technology will lead to more efficient, reliable, and faster lasers in the infrastructure underpinning our information-age society, with increased efficiency bringing substantial environmental benefits.					
FT230100426 Baktashmotlagh, Dr Mahsa	**Rethinking Topological Persistence** This project aims to address the lack of transferability and uncertainty-awareness in AI models. Despite their success, AI models are met with bias and uncertainty when deployed in the real world. As a result, they are rarely used in high-risk industries like cybersecurity or transport. This project expects to build uncertainty-awareness into models by teaching them to return UNKNOWN when they encounter a previously unseen thing, instead of misclassifying it. Further, the evaluation methods to be developed will not rely on access to test data, allowing cost-effective, private, and safe AI for high-stakes decision support. The outcomes will benefit Australia by accelerating economic investment and fostering greater social acceptance of AI.	252,594.00	243,694.00	243,694.00	229,259.00	969,241.00
	National Interest Test Statement Accelerating Australia's investment in automation, as outlined in the Robotics Roadmap 2018, is projected to contribute $2.2 trillion to the economy over the next 15 years. The safe and responsible deployment of AI systems is one important enabler of this acceleration. However, for high-risk sectors like cybersecurity and transport, adoption of AI is hindered by uncertainties and perceived risks associated with its use. This project aims to address this by developing uncertainty-aware, safe, and responsible AI systems. This will incentivize high-risk industries to integrate AI into their decision-making processes and enable small businesses to compete with large players who have access to proprietary data. This research will not only focus on theoretical advancements but also on practical implementation by establishing transparency regarding the behaviour, limitations, and responses of AI systems, which will instil confidence and trust in the public's use of AI technologies. These will foster wider adoption and increased investment in AI, driving economic growth, accessibility and inclusivity in Australia.					
FT230100465 Slonchak, Dr Andrii	**Why certain viruses don't get along in mosquitoes. The molecular mechanism.** The overall goal of this project is to obtain an understanding of how certain insect-only viruses make mosquitoes incapable of transmitting diseases. These viruses, called insect-specific flaviviruses, can be employed as biocontrol agents for mosquito-borne human and veterinary diseases. However as it is currently unknown how exactly they affect mosquitoes, the safety and	205,230.00	202,442.00	202,486.00	202,692.00	812,850.00

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	efficacy of their use can't be predicted. The proposed project will dissect the very intricate mechanisms of interactions between insect-specific flaviviruses and mosquitoes and explain how exactly they prevent disease transmission. It should generate novel fundamental knowledge, implement innovative methodologies and provide training for students and junior scientist. **National Interest Test Statement** Mosquito-borne flaviviruses such as West Nile and Japanese Encephalitis viruses inflict economic harm on Australia's primary industries by causing diseases in livestock. In addition, they pose a persistent threat to public health. This study focuses on insect-specific flaviviruses that only infect mosquitoes, but not vertebrates, and make them uncapable of pathogenic virus transmission. It seeks to unravel the exact mechanism that make mosquitoes resistant to pathogenic viruses. The study will generate new knowledge about insect flaviviruses, mosquito immunity and virus-mosquito interaction. Short term, this will benefit virology and entomology training and strengthen Australia's international standing in the field. The results will also inform future design of safe and effective biocontrol strategies for mosquito-transmitted viruses. This can result in long-term benefits for the Australian agricultural and public health sectors, by preventing the spread of these viruses and therefore reducing the burden of flavivirus diseases on livestock and human population.					
FT230100468 Khalil, Dr Zeinab	**Towards the sustainable discovery and development of new antibiotics** This project aims to define how to access silent biosynthetic genes within microbial genome to facilitate access to new chemical diversity hidden within microbial genomes. Using interdisciplinary approaches in genome mining and metabolomics technologies, the project expects to inspire and enable the future design of more effective antibiotics. Expected outcomes from this program include define new microbial defence molecules, to meet future demands in agrochemical and environmental sciences. It will also train future scientists and develop international collaborations. This should provide significant benefit, including a higher-quality workforce for research and innovation, positioning Australia at the forefront of drug discovery. **National Interest Test Statement** While microbial natural products have historically proved highly valuable, little is known about how to create new compounds from existing natural resources in a sustainable way. This project is critically important to Australia – addressing the lack of chemical diversity and inspiring the development of safe and effective chemical products. This project will produce new tools and resources to sustainably exploit the unique chemistry hidden within the Australian microbiome. The project will benefit Australia by producing cutting-edge and globally competitive technologies to produce new environmentally sustainable resources. Potential future benefits to the Australian public include discovering new drug leads to identify eco-friendly compounds for environmental sustainability and for agricultural practices to enhance crop productivity. Project outcomes will support and prompt existing and future collaboration with domestic and international colleagues across academia and industry, to more efficiently and sustainably extract value from Australia's natural microbial resources.	192,070.00	188,070.00	185,070.00	189,070.00	754,280.00
FT230100513 Zuryn, A/Prof Steven	**Microbiome Regulation of the Host Mitochondrial Genome** This project aims to describe newly discovered processes by which bacteria that reside in the gut of an animal influences host mitochondria, the powerhouses of the cell. Using advanced genetic and molecular methodologies, this project aims to generate new knowledge on improving mitochondrial function as well as advance our understanding of the emerging field of microbiome research. Expected outcomes include a novel and universal technology platform in which to engineer small molecules and probiotics to improve mitochondrial health and enhance fitness in a range of animals. This should provide significant benefits, through both scientifically relevant outcomes and economic benefits through technological advancements. **National Interest Test Statement** The community of bacteria (microbiome) that lives within the digestive track of animals mediates potent effects on viability, fitness, and other life history traits, although it is still unclear how. This project has revealed a new beneficial relationship between specific bacteria and the DNA within the host animal's mitochondria, the cell's powerhouses. Capitalising on this discovery, the outcomes of this fellowship are expected to reveal the mechanisms that regulate the bacteria-mitochondria interaction and provide a foundation from which to create small molecules and probiotics that are targeted at improving mitochondrial genetic health in a wide range of settings. This proposal will benefit the nation's biotechnology capability within the growing probiotic space, providing economic and commercial benefits to Australia. By actively improving mitochondrial genetic health in animals, the outcomes of this project may also deliver benefits to Australia's agricultural industries by enhancing the fitness and breeding of important livestock species.	275,914.00	273,473.00	273,752.00	274,281.00	1,097,420.00
FT230100547 Phillips, A/Prof Andrew B	**Paths to primacy: How rising powers win domination in Asia, 1500-present** This Fellowship aims to investigate how, when and why rising powers have historically won regional	265,271.00	265,628.00	263,279.00	263,200.00	1,057,378.00

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	domination in Asia from 1500CE-present. China today threatens to displace America as Asia's pre-eminent power. This study will comprehensively examine Asia's historical geopolitics since 1500, and expects to to produce a new conceptual framework that explains how, when and why rising powers either succeed or fail to seize regional primacy from their Great Power rivals. The project expects to significantly improve Australia's historical understanding of the power contests that have made modern Asia, and enhance policymakers' ability to learn from this history in understanding and responding to modern struggles for regional supremacy. **National Interest Test Statement** China is now challenging America for recognition as Asia's leading Great Power, threatening the peace that has upheld Australian security since 1945. Australian policymakers have responded with balancing strategies, designed to check China's ambitions and preserve US leadership. These strategies draw inspiration from Western powers' historical success in constraining rising powers in Europe. But they ignore Asia's vastly different history, where successful rising powers have often won regional domination. This project will produce the first comprehensive database of Asia's Great Power contests from 1500-present, and develop a new framework explaining how, when and why rising powers in Asia succeed or fail in their bids for regional domination. This research will help policymakers develop more historically informed and practically effective strategies to manage China's rise in ways that best defend Australia's security and sovereignty. The research will be shared with national security practitioners through workshops that build off existing collaborations, ensuring rapid knowledge transfer to policymakers.					
FT230100651 Bracknell, Prof Clint T	**Making social cohesion ecocentric through Indigenous language and song** This project expects to develop Indigenous language and song in ways that reframe and Indigenise social cohesion, expanding it from a human-centric policy goal to include connections with everything in Country. Designing and implementing an unprecedented and sustained program of Noongar language and song revitalisation in the south of Western Australia across community, schools, and the performing arts, it should advance the potential for Indigenous expressive culture to nourish reciprocal social and ecological relationships that are adaptable to environmental change. Emerging from a hotspot for biodiversity and global warming, it intends to explore how Indigenous creative responses can focus and spur action on pressing global challenges. **National Interest Test Statement** Indigenous languages and performance traditions simultaneously nourish a sense of community and a strong connection to the local landscape. Using mixed methods including interviews, surveys, and workshops, the project will work with communities to investigate how Australia can engage with Indigenous expressive culture to facilitate cooperative action on climate change. An important outcome will be development of understanding of how Indigenous ways of relating to the environment though language and performance can contribute to addressing global issues. This could enable productive Indigenous influence in policy. Apart from the direct environmental benefit through facilitating action on climate change, the project has significant social and cultural benefit by invigorating the Noongar language, enhancing cultural heritage and a sense of place, and encouraging locally distinctive Indigenous performance. The project also directly contributes to Closing the Gap.	259,573.00	276,153.00	274,863.00	277,733.00	1,088,322.00
FT230100683 Bermingham, Dr Michael J	**Next generation titanium alloys for additive manufacturing** The rise of 3D printing creates unique opportunities for Australian manufacturers to participate in high value global supply chains. However, the lack of development in high quality printable materials is stopping manufacturers from accessing the full potential of 3D printing. This project aims to develop a design strategy for the next generation of titanium metals designed for 3D printing. This project expects to improve functionality of 3D printed metals with qualities that go beyond the most demanding industry acceptance criteria. This project should provide significant benefits by creating new capabilities and improving the productivity of Australian manufacturers while lowering the cost of products for consumers. **National Interest Test Statement** Australia is a leader in metal 3D printing with a growing ability to supply titanium products into global markets. However, the titanium alloys currently used for 3D printing were designed decades ago for other purposes and all have significant issues when processed by 3D printing. To fix these issues, manufacturers currently re-process 3D printed products which increases manufacturing costs and lead time. This project takes a new approach to develop the next generation of metal alloys suitable for 3D printing that go above industry standards without needing extra processing. This research will support Australian manufacturers to produce high quality titanium products faster and more affordably, allowing them to more competitively take part in global supply chains. As a material with many applications, including in defence, this strengthens Australia's advanced manufacturing ability and supports the growth of an important industry, while also boosting jobs and local economies. To translate this research into practice, our results will be shared with manufacturers via industry trade	246,831.00	246,693.00	246,693.00	244,396.00	984,613.00

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(Columns 1 and 2)	(Column 3)	2023-24 (Column 4)	2024-25* (Column 5)	2025-26* (Column 6)	2026-27* (Column 7)	(Column 8)
	workshops and events.					
	The University of Queensland	2,575,968.00	2,570,915.00	2,557,846.00	2,542,041.00	10,246,770.00
University of Southern Queensland						
FT230100316	**Robust Bulk Thermoelectric Technology for Harvesting Waste Energy**	256,694.00	244,694.00	249,694.00	252,694.00	1,003,776.00
Hong, Dr Min	This project aims to develop robust thermoelectric technology to harvest waste energy from the use of fossil fuels by (i) establishing new strategies for enhancing thermoelectric properties, (ii) creating mass-production synthesis to reduce the materials cost, and (iii) exploring computation methods to guide the device assembly. Its focus is to improve the average thermoelectric performance, overcome the brittleness of materials, and ensure thermal stability. This project expects to generate new knowledge in manipulating transport properties. The intended outcome of affordable, robust, and functional thermoelectrics can be used for recovering waste heat, which will significantly benefit Australia's economy, environment, and energy industry.					
	National Interest Test Statement Thermoelectrics is a sustainable energy conversion technology. Over 60% of the globally consumed primary energy is wasted. There is a compelling need to develop new thermoelectric materials to recover waste heat. This project will address this challenge by developing a new generation of high-performance thermoelectric materials, providing an alternative technology for power generation and refrigeration. On this basis, high-value consumer products such as watches powered by human heat, portable coolers, and wearable air-conditioning devices can be explored. The thermoelectric market is predicted to reach US$1,443 million by 2030. This project will facilitate the development of high value-add waste heat harvesting technology based on thermoelectric materials. This will position Australia as a global leader in the market of thermoelectric generators. Moreover, the project outcomes will strengthen Australia's research and innovation capability in developing sustainable energy-converting materials.					
FT230100517	**Watching planets grow in real time**	210,106.00	215,070.00	215,070.00	215,070.00	855,316.00
Zhou, Dr Yanjun	This project will conduct the first in-depth examination of the atmospheres of newly born small planets around other stars, yielding a better understanding of how planets evolve early in their lives. The atmosphere of our Earth is its most distinguishing feature. Key outcomes of this project include unveiling the mechanisms that drive the erosion of early planetary atmospheres, leading to a better understanding of the processes that sculpt all planets, including those in our own Solar System. The project leverages Australian and international expertise across exoplanetary, stellar, and Solar System astrophysics, with key outcomes in developing techniques for Australian utilisation of world-class multi-wavelength space facilities.					
	National Interest Test Statement As a habitable world, Earth's atmosphere is its most distinguishing feature. This project will broaden understanding of the origins of planets and habitable worlds, by observing how the intense radiation from young stars impacts how the atmospheres of their planets form and evolve. This research offers a fresh perspective by combining interdisciplinary Australian expertise in planetary science, stellar astrophysics, and space weather, and enables the next generation of Australian researchers to access world-class space telescopes, such as NASA's Hubble Space Telescope and the European Space Agency's Characterising Exoplanets Satellite. The techniques developed in this project also enable a continuation of Australia's key role in delivering a scientific revolution in our understanding of stars and their planetary systems, by utilising the next generation of space-based observatories such as the James Webb Space Telescope.					
	University of Southern Queensland	466,800.00	459,764.00	464,764.00	467,764.00	1,859,092.00
	Queensland	4,344,327.00	4,330,549.00	4,327,761.00	4,259,706.00	17,262,343.00

* 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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South Australia						
Flinders University						
FT230100138	**Benchmarking the neurophysiology of human cortex models in vitro**	273,910.00	294,573.00	294,573.00	282,573.00	1,145,629.00
Bardy, Dr Cedric	This project aims to improve human brain models in vitro by developing an analytical tool benchmarking biophysical similarities to the adult human cortex. This project expects to generate new knowledge by testing for the first time the theory that integrating sensory-like inputs and awake/sleep-like cycles of electrical activity in vitro may complete the maturation of human brain organoid models. It will also generate new methods to simplify the analysis of multimodal path-clamping data (Patch-seq). Expected outcomes will facilitate research collaboration and the reproducibility of accurate experimental replicates of the human brain. This will provide significant benefits in the global race to understand human brain computation mechanisms.					
	National Interest Test Statement					
	"Understanding how the human brain functions is a significant global research challenge with immense potential to benefit the lives of millions of Australians. This project will fine tune the cultivation of stem cells outside the body to generate specific brain cells and tissues. New technologies will be developed to measure how well the bioengineered tissues match those in the adult human brain. Short-term benefits include commercialisation opportunities for the Australian biotech industry. Longer-term benefits to all Australians will come from using the tissues and technologies to: 1. better understand data processing principles in the human brain to inspire new computational approaches, 2. provide insights into brain damage resulting from genetic or environmental stress, 3. provide new approaches to understanding and improving mental health and well-being in Australians to decrease the currently high social and economic costs of lower personal well-being and work productivity, 4. enhance preclinical models to identify brain disorder treatments and improve the cost-efficiency of Australian clinical trials. "					
FT230100172	**Solar-Driven C-H Functionalization Reactions**	274,573.00	274,573.00	274,573.00	259,573.00	1,083,292.00
Koenigs, Prof Dr Rene M	This project aims to investigate the functionalization reaction of unreactive C-H bonds using light as the source of energy. Light is a transformative change to synthesis as thermal activation is exchanged to solar activation. The latter gives access to excited state chemistry and enables reaction steps that are thermally inaccessible. It is a key strategy to leverage synthesis to the demands of the 21st century and to minimise its ecologic footprint. At the same time this strategy provides a lever to profoundly impact and drive new concepts in synthesis. Significant benefits are expected, such as increase in fundamental knowledge on photochemical processes, but also the access to new materials for applications as drugs or OLEDs.					
	National Interest Test Statement					
	This project will investigate new methods for making organic small molecules for applications as diverse as pharmaceutical products and light emitting organic materials (OLEDS) used in TV sets around the world. The synthesis of such small molecules currently requires energy-demanding thermal processes based on fossil fuels and the use of lengthy sequential synthesis steps, which add to costs and wastes. The research aims to use sunlight as a renewable energy source to synthesise small organic molecules in a new more economic and environmentally benign way. The research will benefit Australia through the commercialisation of the intellectual property (IP) generated, which will be actively pursued through communication of the new IP to the Australian chemical and pharmaceutical industry by the researchers and the University's commercialisation team for implementation by Australian companies to reduce both costs and wastes normally associated with the production of these materials. This work will therefore benefit both the Australian economy and our environment.					
FT230100462	**Submerged cultural landscapes and the underwater heritage of Sea Country**	284,943.00	284,943.00	287,443.00	261,573.00	1,118,902.00
Benjamin, A/Prof Jonathan	This project aims to substantially extend our knowledge of the vast but poorly characterised submerged cultural landscapes on the Australian continental shelf, which remains one of the critical gaps in Australian archaeology. Original fieldwork will target locations in Western Australia and the Northern Territory to enrich and contextualise the submerged archaeological record within the broader discourse. The project will combine archaeology, marine science and Indigenous knowledge to enhance our understanding of Pleistocene and early Holocene human-environment dynamics. Research will be undertaken in partnership with Traditional Owners and will support a					

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	national policy for the protection of Indigenous underwater cultural heritage. **National Interest Test Statement** Two million square kilometres of Australia's past cultural landscapes were drowned by rising sea levels after the last ice age. This project will focus on a critical gap in the study of Australia's deep past: the submerged cultural heritage of Australia's continental shelf. The first Australians lived in this landscape before the continental shelf was drowned to separate Australia from New Guinea. This fragile Indigenous archaeological heritage is under-studied and under increasing risk thanks to impacts such as offshore development and climate change. This research will substantially improve the study of Australia's submerged heritage. The outcomes of the project will align with the national trajectory for Australia to ratify the UNESCO Convention on the protection of underwater cultural heritage, advance discussions on Indigenous cultural heritage under water, impacting management, industry, research and local communities around Australia. Research will be undertaken in partnership with Traditional Owners and will support a national policy for the protection of Indigenous underwater cultural heritage.					
FT230100499 Roberts, Prof Amy L	**From Baskets to Boomerangs: Knowledges, Lifeways and Colonial Legacies** This project aims to transform our understanding of Australian Aboriginal lifeways by undertaking a comprehensive study of objects made from fibre and wood, from iconic boomerangs through to woven basketry. Although crucial to toolkits for millennia, systematic research about plant-based technologies has been limited, even though knowledge about their creation has been passed down across generations. This project, initiated by River Murray Traditional Owners, will employ innovative archaeological science techniques, explore colonial legacies and use creative engagement methods to provide new insights into the diversity of Aboriginal experiences and connect Traditional Owners with their material cultural heritage housed in museums. **National Interest Test Statement** In contrast to studies of archaeological objects made from stone or bone, systematic studies of fibre and wood objects are rare, despite their crucial role in human life for millennia. From iconic boomerangs to woven baskets, the research will comprehensively study Indigenous Australian fibre and wood museum objects from the River Murray in South Australia. This project, initiated by Traditional Owners, will provide new evidence about Aboriginal ways of life and environments while archival research and interviews will explore unique histories and colonial legacies. The research will benefit Indigenous Australian community members through employment opportunities and privilege Aboriginal ways of knowing. The benefit to all Australians will come from a deeper understanding and appreciation of Aboriginal cultures, both past and present, and how they are connected. Enduring weaving and carving practices will be communicated via workshops, field work and 'artist in residence' programs, accompanied by broad distribution of all findings through public presentations and publications.	278,743.00	278,743.00	272,443.00	272,443.00	1,102,372.00
	Flinders University	1,112,169.00	1,132,832.00	1,129,032.00	1,076,162.00	4,450,195.00
The University of Adelaide						
FT230100092 Baraglia, Dr David P	**New techniques and invariants in low-dimensional topology** The aim of this project is to introduce and apply new methods and invariants in the field of low-dimensional topology by developing parametrised and equivariant enhancements of Seiberg-Witten theory and Floer homology. These new refined invariants, made possible by recent advances in gauge theory, will be more powerful than existing ones, enabling the detection of new exotic phenomena. Expected outcomes include effective means for distinguishing families of spaces, measuring their complexity and new obstructions for their existence. The new invariants and techniques will lead to the resolution of some open problems in low-dimensional topology and enhance Australia's reputation as a world leader in this field. **National Interest Test Statement** Modern mathematics builds the theoretical framework necessary for describing the world around us and underpins the fundamental sciences and their applications. This project will deliver new mathematical tools and formulas to study geometric shapes such as knots and spaces of three or four dimensions. These novel tools will improve our understanding of these spaces leading to future applications across a broad spectrum of growing Australian industries including medical imaging technology, advanced manufacturing, financial technology, mathematical biology, data analysis and machine learning. By sharing our findings in scientific journals and at conferences, and disseminating results to the research community, this project will further enhance Australia's reputation as a leading centre for research in an area of fundamental mathematics, crucial for economic prosperity and national security in an increasingly data-driven age. The project will also provide mathematical training to young Australians through the inclusion of graduate students and early career researchers.	211,824.00	240,694.00	240,694.00	240,694.00	933,906.00

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FT230100192	**Photocatalysts for Converting Plastic Wastes into Hydrogen and Chemicals**	203,505.00	214,940.00	214,940.00	214,940.00	848,325.00
Ran, Dr Jingrun	The aim is to produce new fundamental science for sustainable production of hydrogen and value-added chemicals through a solar-driven photocatalytic approach using abundant plastic wastes and high-performance photocatalysts. A range of active, selective, robust and cheap photocatalysts will be developed for conversion processes at ambient temperatures and pressures, via an interdisciplinary approach combining atomic-level material design principles, in situ/ex situ characterisations and theoretical computations. Expected outcomes will be of high impact for solar energy use, and fuels/chemicals generation. Environmental impact will derive from consuming abundant plastic wastes; helping mitigate plastic contamination of global concern.					
	National Interest Test Statement					
	In Australia, 2.5 million tons of plastic waste are generated every year. But only 13% of these plastic waste are recycled and about 130,000 tons of plastic waste are sent to landfill, polluting the environment and threatening the human health through the food chain transfer. This project will utilise Australia's ample solar energy to convert plastic waste into clean/carbon-free hydrogen fuel and value-added chemicals, using the clean, environmentally-benign and cost-effective photocatalytic technology. The developed technology will be shared with government agencies responsible for resolving plastic-derived energy and environmental issues. This project will also expand the fundamental knowledge in catalysis and materials science, boost the Australian plastic waste upcycling industry/hydrogen industry, alleviate plastics contamination, and reduce our dependence on non-renewable fossil fuels in Australia. This project will endeavour to alleviate the environmental pollution caused by plastic waste, benefiting the environment and public health in Australia.					
FT230100203	**Striving for the path of least herbicide resistance**	207,570.00	202,570.00	207,870.00	212,370.00	830,380.00
Soares da Costa, Dr Tatiana P	This project aims to investigate novel strategies to mitigate the rise in herbicide resistance threatening Australian agricultural production and exports. The project expects to pioneer long-term strategies for the development of herbicides that "resist" resistance generation in weeds to prolong their effectiveness. Expected outcomes include advances in the development of single- and multi-target herbicidal compounds with new modes of action, and validation of their potential to yield synergistic combinations and delay the evolution of resistance. This should lay the foundations for significant long-term benefits to farmers and consumers, both in Australia and globally, including increased crop yields and improved food security.					
	National Interest Test Statement					
	Weeds represent a major threat to Australia's $71 billion agricultural industry by drastically reducing the yield and quality of crop plants. Concerningly, Australia ranks second in the world for the largest number of unique herbicide-resistant weeds, yet only one herbicide with a new mode of action has been introduced to the market in the past 40 years. This research will investigate three strategies for designing herbicidal compounds that are less prone to generating resistance in weeds, and therefore remain effective for longer: by identifying new herbicide targets; by developing mixtures of new herbicidal agents to boost efficacy; and by developing herbicides that act against multiple targets in weeds simultaneously. The knowledge generated will contribute to the development of new herbicide technologies. Consequently, the outputs of the project will have long-term social, economic, and environmental benefits, bolstering weed management strategies to improve food production while reducing environmental impact, and pioneering new directions and leadership for globally relevant agricultural research.					
FT230100524	**Next-generation computational models to understand human joints**	287,513.00	284,573.00	264,573.00	254,573.00	1,091,232.00
Thewlis, A/Prof Dominic	This project aims to investigate human joint systems through combining state-of-the-art imaging and high-fidelity biomechanical models. The methods developed in this project are expected to generate new ways of studying the dynamic response of musculoskeletal tissues to activity, including how musculoskeletal physiology can adapt to biomechanical stimuli. Expected outcomes include establishing a non-invasive method for characterising whole joint systems. This project will provide significant knowledge gain on the biomechanical regulation of human joints across form, function, dynamics and loading which may help across many facets of society to guide physical activity choices.					
	National Interest Test Statement					
	Human joints diverge in their response to the world around us—some will thrive whereas others will fail. This project aims to build knowledge on how human joints respond and adapt to biomechanical stimuli (e.g., running). This project will use advanced imaging techniques and develop computer models to assess human joints non-invasively—a significant improvement on current low-resolution models and traditional invasive tissue sampling					

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	methods. Outputs from this project are expected to benefit Australia economically and socially by contributing knowledge on how joint failure, which costs Australia ~$3.5B annually, can be managed or avoided. The toolkit developed in this project is also expected to guide physical activity choices across society through the identification of the relationship between phenotypes of joints and their response to biomechanical stimuli. Through established industry and defence science collaborations, the models will be available to Australian researchers to advance the monitoring of joint status and for predictive modelling of a joint's response to novel biomechanical stimuli.					
FT230100526	**Engineered redox polymers for catalytic water purification**	236,259.00	251,894.00	250,694.00	250,694.00	989,541.00
Duan, Dr Xiaoguang	This project aims to develop a novel family of chemically and structurally controlled redox polymer as metal-free catalysts for wastewater micropollutant treatment. Innovations lie in the synthesis of high-performance and nanostructured carbon-based materials, multiscale modeling, and in situ characterizations for understanding structure-property relationship in carbon catalysis. Expected outcomes will deliver innovations in functional materials, mechanism, catalytic engineering, and sustainable separation processes. This project will provide significant benefits in renovating smart nanomaterials in advanced manufacturing and clean environmental technologies, promoting Australia's economic development and environment protection.					
	National Interest Test Statement					
	During COVID-19, large amounts of pharmaceuticals (e.g. paracetamol and ibuprofen) were consumed and discharged into Australia's wastewater from our households, hospitals and quarantine hotels. These hazardous micropollutants cannot be completely removed by traditional wastewater treatment plants and may lead to superbugs in nature. This project will develop a new class of advanced polymer materials for advanced water purification. Through combined theory and experiment, we will generate mass production of low-cost polymers to drive new green nanotechnologies for treating pharmaceutical-contaminated wastewater and drinking water. New technologies will be patented and commercialised for integration into existing wastewater treatment plants and other purification units in medical, petrochemical, farming and mining industries. These advances will provide significant benefits to Australia's advanced manufacturing and clean environmental technologies, promoting Australia's economic development and water safety in the post-COVID era.					
FT230100598	**Rational Electrolyte Design and Engineering for Next-Generation Batteries**	232,894.00	249,694.00	245,894.00	249,694.00	978,176.00
Mao, Dr Jianfeng	The fast-growing energy storage market demands new battery technologies with high energy density. Lithium (Li) metal batteries are an ideal solution, although instability of the Li metal/electrolyte interface remains a challenge. The project aims to drive key advancements in electrolyte engineering for Li metal batteries with long life and high safety. Advanced characterisation and computation will reveal the structure-property relationship of electrolyte to build electrolyte design principles. This will contribute to ground-breaking knowledge, commercialisation, and boost Australia's capability to design and manufacture next-generation energy storage devices for billion-dollar markets in smart grids, portable devices and electric vehicles.					
	National Interest Test Statement					
	This Project involves cutting-edge experimental and computational research in materials science, chemistry and engineering to design next-generation lithium metal batteries, which offer significant improvements of energy density compared with conventional Lithium Ion technology. This will contribute to long-range EVs and reliability of electricity grids in the shift to clean energy, reduced dependence on fossil fuels/CO2 emissions and increased national energy security. Further key benefits for Australia will be new knowledge in battery chemistry and related manufacturing, to support future access to high-tech markets and help position our industries to develop new energy storage devices. Additionally, from a resource perspective, Australia is the world's leading producer of mineral resources for the battery materials. This project will help to accelerate Australia's battery manufacturing development to expand further into the battery value chain. Project outcomes will be disseminated via articles, conferences, and social media, with patenting of commercially valuable IP in collaboration with industry.					
FT230100648	**Past trends and future risk of climate extremes in southern Australia**	253,824.00	237,824.00	244,824.00	234,824.00	971,296.00
Tyler, Dr Jonathan J	Prolonged droughts and periods of heightened flood and fire risk present a major challenge for Australia's society and economy. This proposal aims to better resolve the causes and risks of decadal climate extremes through a suite of high quality records of temperature, rainfall/evaporation and humidity in southern Australia over 2000 years. Novel geochemical analyses will be developed and applied to lake sediments – method development which is likely to benefit climate, minerals and biosecurity research. New knowledge of mechanisms underlying climate variability is expected to benefit fundamental research, while future-facing models will allow land managers and policy makers to better anticipate extraordinary climate events.					

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	National Interest Test Statement Droughts, floods and fire present major challenges to habitability and economic prosperity in Australia. Robust predictions of future climate risk require high quality records that capture the full range of natural climate variability. This project aims to address the absence of such records in southern Australia, by developing new temperature, rainfall/evaporation and humidity records for the last 2000 years. These data will be used to model multi-decadal climate extremes for the next 100 years to provide actionable advice for government, landscape, water management and tourism. The ability to anticipate, and plan for climate threats would support Australia's Strategy for Nature, and the National Climate Resilience and Adaptation Strategy.					
FT230100658 Goldsworthy, Dr Mitchell R	**Neural noise in human cognitive ageing and reserve** Age-related increases in neural noise degrade information transfer in the brain and lead to diminished cognitive function. Yet with cognitive reserve, some people are able to maintain healthy functioning well into their later years. This project aims to investigate the effects of neural noise on brain connectivity, cognitive performance and reserve, advancing breakthrough work on the neural physiology of healthy cognitive ageing and malleability of neural noise. This will be delivered by novel combinations of electrophysiology, neuroimaging and non-invasive brain stimulation. Benefits extend from developing neural markers for measuring cognitive reserve to new strategies for building resilience to age-related cognitive decline.	245,767.00	246,677.00	246,638.00	245,772.00	984,854.00
	National Interest Test Statement While cognitive decline is pervasive among older adults, 'cognitive reserve', on the other hand, can explain why some individuals are able to maintain healthy cognitive function into their senior years. Combining neurophysiological tools, imaging, and non-invasive brain stimulation, this project aims to uncover the neural mechanisms of cognitive reserve. It will offer the first evidence linking noise in the brain's electrical activity to cognitive reserve, advancing knowledge of the neuroscience of cognitive ageing. To enable adoption, we will share the findings with the research community and the broader public via journals, conferences, public lectures and media outlets. In the long term, the outcomes will lead to significant economic and health benefits for Australians by developing new strategies for building resilience to age-related cognitive decline, and future applications towards a novel diagnostic tool that can assess the risk of cognitive decline, ultimately improving the quality of life for Australia's ageing population.					
	The University of Adelaide	1,879,156.00	1,928,866.00	1,916,127.00	1,903,561.00	7,627,710.00
	South Australia	2,991,325.00	3,061,698.00	3,045,159.00	2,979,723.00	12,077,905.00

* 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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Tasmania						
University of Tasmania						
FT230100234	**The puzzle of landfast sea ice: 'Fast' ice and near-term climate impacts.**	248,894.00	248,894.00	248,894.00	220,024.00	966,706.00
Fraser, Dr Alexander D	Sea ice which is held motionless against the Antarctic coastline (so-called landfast, or 'fast' ice) is hugely important for global climate and Southern Ocean ecosystems but its extent has recently plummeted. This project will address major knowledge gaps by providing novel satellite-based mapping and analysis of fast ice extent, towards enabling incorporation of fast ice into Australia's new sea ice-ocean Earth system model for the first time – to allow assessment of its impacts on global ocean circulation and ice shelf melt. Outcomes also include new automated capability for monitoring fast ice extent, analysis of its variability and drivers, and first maps of its thickness and roughness.					
	National Interest Test Statement Australia has recently endured a La Niña-driven flooding crisis. A slowdown in global ocean circulation, as seen since the 1970s, promotes La Niña conditions. Such circulation is controlled by dense water formation around the edge of Antarctica, and is tightly linked with the presence of landfast (stationary, or 'fast') sea ice, which plummeted to an unprecedented low in 2022. Fast ice also controls sea-level rise by regulating the thickness and stability of ice shelves. Despite its crucial importance, the extent and variability of fast ice are not well known, and critically it is currently not represented in the Australian Climate and Earth System Simulator, known as ACCESS. This project will address these gaps by automating mapping of fast ice from satellite imagery, and incorporating it into the next major iteration of ACCESS. This Fellowship will allow us to assess the climate consequences of a reduction in fast ice extent and weakened ocean circulation for the first time, helping to reduce uncertainties in Australia's future climate and sea-level rise projections, and inform adaptation strategies.					
	University of Tasmania	248,894.00	248,894.00	248,894.00	220,024.00	966,706.00
	Tasmania	248,894.00	248,894.00	248,894.00	220,024.00	966,706.00

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		2023-24	2024-25*	2025-26*	2026-27*	
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)
Victoria						
Deakin University						
FT230100030	**The politics of medievalism: persuasive narratives**	212,070.00	212,070.00	212,070.00	207,070.00	843,280.00
Young, Dr Helen V	This project aims to understand how narratives about the medieval past help form identities and spread ideologies in the present, across the political spectrum, time and national borders. It aims to generate new knowledge about medievalism and its persuasive power. It will shed new light on extremist exploitation of popular culture using an innovative interdisciplinary approach, digital analysis, and engaged partnerships. It will enhance capacity to identify extremist messaging and create new grassroots programs promoting political tolerance and resilience to extremist propaganda and far-Right ideology, generating social and cultural benefit by strengthening Australian security, social cohesion and national values.					
	National Interest Test Statement					
	The anti-egalitarian and anti-democratic ideologies of the far-Right are at odds with Australian values of social cohesion, multiculturalism, democracy and equality. Those ideologies are often expressed through references to the Middle Ages, such as in the manifestos of the Oslo and Christchurch terrorists, This project is uniquely placed to have significant benefit to Australia by innovatively addressing poorly-understood cultural aspects of extremist ideology and its spread through exploration of such references and their contexts. The new knowledge created would enable development of: 1) a robust framework for identifying extremist propaganda, increasing capacity to identify threats by adding a new set of data points to intelligence analysts' toolkits; 2) ground-breaking grassroots programs building resilience to extremist messaging and reinforcing tolerance and democratic values, and; 3) new methods for research translation to improve the public's historical literacy. This will contribute to strengthening Australian values and national security.					
FT230100065	**Nanobionic sensors for Real-Time Plant Health Monitoring**	210,490.00	214,065.00	214,000.00	203,165.00	841,720.00
Wang, Dr Yichao	This project aims to develop nanosensors to detect and monitor plant health in real-time by measuring stress molecules. The project will create new knowledge on functional materials with unique optical, electronic and thermal properties as well as their bio-nano interactions with plants. The expected outcomes of the project will provide insight into 1) how localised nanosensors target organelles in living plants to 2) generate signals that can be picked up by portable devices to 3) report on plant health. Functional nanosensors will enable smart farming, precision agriculture and contribute to future agronomic research, further strengthening Australia's position as an international leader in nanobiotechnology.					
	National Interest Test Statement					
	The project aims to create a new type of miniature sensor that will measure chemical reactions within plant cells, providing real-time monitoring of plant health. Such sensors will shape agricultural practice, by enabling non-destructive monitoring and, thereby, early interventions to mitigate and manage plant stress. Our understanding of physiological processes associated with plant health will be improved by early detection of established stress-signalling molecules. In addition to significant advancement and application of functional nanomaterials and nanotechnology, the knowledge produced will be of fundamental importance to realising viable smart farming, precision agriculture and breeding practice. Significant environmental and social benefits will be gained, including increased crop yields, which will benefit Australian industries and the community. Intellectual property generated will contribute to the Australian economy, since Australians will own the patents and can license them. Outcomes will place Australian research and agriculture at the forefront of current technological advancements.					
FT230100276	**Animals and geopolitics in South Asian borderlands**	240,363.00	244,674.00	242,205.00	247,460.00	974,702.00
Narayanan, Dr Yamini	The project evaluates the impact of animals on the politics of South Asian borderlands, which are exposed to climate change, species decline and intensifying nuclear state rivalry. Using a comparative multispecies ethnography of India's borders with Pakistan, Bangladesh and Nepal, it will study the role of animals in reinforcing or subverting the power of sovereign states. Expected outcomes are new analytical and conceptual tools to understand these overlooked actors in geopolitics and the links between foreign, security and transboundary conservation policies. This knowledge has potential application in demilitarisation and cooperation around transborder animal flows, benefitting security, ecosystems and Australian interests in South Asia.					

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(Columns 1 and 2)	(Column 3)	2023-24 (Column 4)	2024-25* (Column 5)	2025-26* (Column 6)	2026-27* (Column 7)	(Column 8)
	National Interest Test Statement The project will examine the relations between animals and geopolitics in India's borderlands with Pakistan, Bangladesh, and Nepal. Borderlands are politically volatile and ecologically fragile. A site of potential conflict amid nuclear powers, this region is of serious concern to Australia. As part of the Quadrilateral Security Dialogue, India is vital for our security and prosperity. Geopolitics has largely ignored the political and ecological relevance of animals. Animals move across borders, mark territory, and are herded, hunted, and evicted. A detailed multispecies approach will uncover the ways animals shape politics, state sovereignty and ecological change in the contested South Asian borderlands. By engaging Australian and South Asian security, diplomatic and conservation actors with this new knowledge, the project will improve Australia's capacity to deploy soft power in animal and conservation diplomacy and enhance our regional interests by using ecological approaches toward security and stability.					
	Deakin University	662,923.00	670,809.00	668,275.00	657,695.00	2,659,702.00
Monash University						
FT230100021 Strengers, Prof Yolande A	**Home helper robots: Understanding our future lives with human-like AI** This fellowship aims to understand and plan for the social effects of embedding 'cute' home helper robots into people's everyday lives. The project is expected to generate new knowledge and resources to understand and respond to the emerging opportunities and risks associated with home helper robots, including their ability to support household tasks, and to provide child and aged care and companionship. Expected outcomes include an improved understanding of anthropomorphised robots in everyday life and innovation in home helper robot theory and imaginaries. This should provide benefits such as informing robot design and policy to improve social outcomes, consumer protections and human-robot relationships.	276,605.00	277,503.00	280,959.00	278,354.00	1,113,421.00
	National Interest Test Statement Australia faces access and affordability challenges associated with childcare, aged care, and mental health support for people suffering from loneliness and depression. Home helper robots are uniquely poised to address these challenges; however, their risks and opportunities are largely unknown. The trend towards 'cute' robots generates potential privacy, security and wellbeing vulnerabilities that are underexplored, while broader social considerations are underexamined. This research will offer government and consumer protection agencies, regulators and policy makers essential knowledge needed to realise and address the benefits and risks of this emerging class of robotics. Understanding and responding to these opportunities and challenges will help Australian governments and care providers anticipate future household needs, as artificial intelligence and robotics are further embedded in the home environment. The new knowledge and resources produced by this project will place Australia at the forefront of the social implications and opportunities for robotics and artificial intelligence.					
FT230100180 Zhu, Dr Yuman	**Additive Manufacturing of Nanotwinned Titanium Alloys for Critical Use** The project aims to use 3D printing technology to create new titanium alloy components that are substantially lighter and stronger than current versions and therefore highly relevant for high temperature and stress uses in leading-edge industries such as aeroplane manufacture. The project expects to create new means to strengthen and improve the resilience of the commercial alloys' microstructure with unprecedented in-service performance and thereby substantially broaden the industrial adoptions of 3D-printed products. This should also provide significant cost and environmental benefits and enhance Australia's international standing in cutting-edge research on advanced manufacturing and materials.	207,070.00	207,070.00	196,070.00	187,070.00	797,280.00
	National Interest Test Statement The project aims to produce new 3D-printed titanium alloys with unprecedented mechanical attributes for critical uses in aerospace (e.g. aeroplane manufacture), defence and energy industries. To date, 3D-printed titanium alloys still lack the ability to withstand extreme temperatures and stresses, limiting their practical use for producing many valuable components. The project will provide essential knowledge and 3D printing routes to fabricate commercial titanium alloy parts that have novel microstructures and exceptional mechanical properties to resist damage in harsh service environments. This will widen the adoption of cost-effective 3D printing technology enabling it to access to new markets and supply chains, benefit Australia's local additive manufacturing industry, and improve the environmental performance of Australia's advanced manufacturing sectors.					
FT230100402 Cook, Dr Carly N	**Creating conservation landscapes that effectively safeguard biodiversity** The current extinction crisis creates an imperative to protect remaining habitat wherever it occurs. This project aims to reveal how to improve protection for biodiversity outside of designated	244,824.00	244,824.00	239,824.00	244,824.00	974,296.00

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	Protected Areas by advancing the concept of Conserved Areas, where conservation can be a product of other goals. This project is expected to generate novel insights into how to recognise Conserved Areas, reveal the risks and benefits associated with different type of protection and develop vital tools to ensure these areas effectively conserve biodiversity. Benefits will include a blueprint to meet global environmental commitments using well-designed systems of Protected and Conserved Areas as part of integrated conservation landscapes. **National Interest Test Statement** Continued biodiversity loss requires urgent action. Australia has pledged to end deforestation, reduce emissions, and protect 30% of land and sea by 2030. To achieve this, Australia needs to define conservation areas more broadly than the current formal nature reserves. This Project uses evidence-based research to develop and test new tools and measures that promote and monitor successful biodiversity conservation across diverse areas, including water catchments, urban reserves and sacred sites. A key outcome will be defining Conserved Areas that protect biodiversity outside formal reserves, recognising the contribution that landholders make to conservation, including Indigenous and local communities. The Project delivers environmental and social benefit by providing a blueprint to assist communities to understand, record and enhance their conservation efforts. It will generate an inclusive and integrated plan for the Australian Government to meet their global commitments, creating internationally recognised Conserved Areas that protect biodiversity beyond the boundaries of currently recognised reserves.					
FT230100565 Vidovic, Dr Dragoslav	**Aluminium at the centre of sustainable catalysis** The project aims to establish new directions in the field of Lewis acid catalysis by creating a unique set of aluminium compounds. As catalysis is an important principle of green chemistry and as aluminium is the most abundant metal in the Earth's crust (i.e. sustainable), the project's aims are exceptionally well aligned with the society's targets to alleviate the negative effects of human activities on the environment. Expected outcomes of this project include significant advances related to industrially relevant processes, potentially degradable polymers and valorisation of the most prevalent greenhouse gas. Thus, the overall project should provide significant benefit to our collective efforts to mediate human impact on climate change. **National Interest Test Statement** The global chemical industry is continually growing to meet the needs of an expanding population, and this industry relies on catalysts to efficiently manufacture many vital chemicals. Designing chemical catalysts based on inexpensive and non-toxic elements has become increasingly important in meeting environmental and sustainability targets. This project investigates Aluminium for use as a “green catalyst”. It will aid the Australian chemical industry’s growth by offering innovative methodologies to address fundamental aspects of chemical catalysis, for use in production of fine chemicals and pharmaceuticals. The project will reduce energy requirements, reaction times and waste production in comparison to conventional procedures, and is therefore considered ‘green chemistry’. Aluminium is one of the most abundant metals in the Earth’s crust, and its use in catalysis is at the centre of sustainability. As a result, this project enables next-generation sustainable manufacturing within Australian chemical industries, while at the same time resulting in a positive impact on the environment.	249,824.00	249,824.00	249,824.00	249,824.00	999,296.00
FT230100588 Guo, A/Prof Zihua	**Partial differential equation: Schrodinger operator and long-time dynamics** This project aims to develop new analysis methods associated to the Schrodinger operator, and to solve several challenging problems regarding dispersive partial differential equations (PDE). Long-time dynamics of PDE solutions are a key goal in both pure and applied mathematics, and have been extensively studied by leading mathematicians and mathematical physicists. However, it is unknown how to investigate large solutions when the order of the PDE's nonlinearity is low. This project expects to develop new methods to attack such problems. The results of the project will be of great importance in mathematics and physics, as many fundamental physical models in areas such as optics, fluid mechanics and quantum mechanics fit the paradigm. **National Interest Test Statement** This Project aims to enable a more rigorous description and prediction of scientific, engineering or financial phenomena that change over time. The rigorous studies of this Project will provide a more advanced, theoretical basis to launch investigations and predictions not currently possible within many fields of science, engineering and finance such as numerical simulation, fluid dynamics and option pricing and risk management. Project outcomes will increase the basic knowledge of how things flow, advancing many scientific, engineering and financial fields with regard to the ability to describe, predict and then use more complex phenomena. For example, Project outcomes will help researchers in fluid dynamics better understand how flow of traffic or air evolves over time, which is crucial in designing efficient transportation systems and predicting weather patterns. Project outcomes will also help researchers in finance gain a deeper understanding of how options and derivative securities evolve over time, which could lead to improved pricing models and risk management	242,073.00	270,943.00	270,943.00	270,943.00	1,054,902.00

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	strategies.					
FT230100656	**The cognitive neuroscience of motor skill learning**	243,818.00	249,818.00	245,818.00	245,818.00	985,272.00
Coxon, Dr James P	The capacity to produce skilled motor behaviour is essential for success in almost every aspect of our lives, whether it be playing sport, driving a car, operating machinery at work, or touch-typing. This project aims to establish the causal role of brain regions in motor skill learning by combining cutting-edge techniques in neuroimaging and brain stimulation. It is expected to lead to fundamental new knowledge on how new motor memories are created to enable the expression of skilled motor behaviour. The knowledge gained from this project may identify new strategies for learning skills that are widely applicable to education, industry, sport, and health.					
	National Interest Test Statement					
	This project will investigate the neural mechanisms of motor skill learning. Skilled motor behaviour is essential for success in almost every aspect of our lives, whether it be playing sport, driving a car, operating machinery at work, or touch-typing. It is critical that we understand the processes in the brain that drive learning and memory to attain a high level of motor skill so that optimal strategies can be developed to support learning in workplace, health, and education settings. This research will generate new knowledge regarding how skill is attained, and pioneer new approaches to stimulate structures deep within the brain that were previously inaccessible. The knowledge gained through this ground breaking research could lead to improved training and increased productivity of the Australian workforce.					
	Monash University	1,464,214.00	1,499,982.00	1,483,438.00	1,476,833.00	5,924,467.00
RMIT University						
FT230100131	**Building better: Neighbourhoods to benefit children with disability**	274,701.00	293,443.00	292,223.00	262,789.00	1,123,156.00
Badland, Prof Hannah M	This project aims to identify which neighbourhood features support wellbeing for children with disability. The project expects to advance innovation by combining Australian disability policy, children's lived experience of disability, and high-quality child development and built environment data. Expected outcomes of the project include new, co-created insights for how urban neighbourhoods can enable children with disability to thrive and a suite of end-user indicator tools to monitor their progress. Expected benefits include improved policy options and tools for government and advocates to plan and deliver more equitable neighbourhoods, and ultimately better participation, inclusion, and wellbeing for children with disability.					
	National Interest Test Statement					
	Human wellbeing is affected by the local environment. This project will use Australian disability policy, place-based data, and perspectives of children with disabilities to identify neighbourhood features that can assist children with disability to reach their full potential. It will help identify the types of neighbourhoods that enable children with disability to thrive and provide a monitoring framework for government and advocates to evaluate the transition to more inclusive cities. These tools will guide the creation of more equitable and supportive neighbourhoods, benefitting children with disability through increased community participation and social inclusion, improved long-term social and health outcomes, and greater life-long economic contributions (e.g. entering employment). Adoption pathways include workshopping the monitoring framework with local and state government and disability advocacy groups to ensure it is useful prior to release, alongside policy briefs, neighbourhood profiles, and city scorecards for these stakeholders to use.					
FT230100475	**Aligning personalised news recommendations with the public interest**	246,890.00	251,563.00	253,932.00	207,443.00	959,828.00
Meese, Dr James M	The project aims to investigate the growth of personalised recommendations in the Australian news sector, which sees readers and automated systems collectively adopting curatorial roles previously undertaken by editors. The research expects to provide the first evidence base around the adoption and deployment of personalised recommendations across the Australian news media. Expected outcomes include enhancing our understanding of how to sustain the important democratic role that the institution of journalism plays in a personalised and automated environment. Expected benefits include the provision of robust evidence to inform industry and policymakers, and support the development of best practice across the news media sector.					

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	National Interest Test Statement News media organisations increasingly use AI and automated technologies to personalise news for readers. The project will examine how to balance this growing capacity for personalisation, with the broad provision of quality, public interest news, essential for democracies. We do not know how to translate the values and norms held by industries with social responsibilities into automated systems. To solve this problem, the project will develop and test methods to better align these technologies with the news sector's publicly oriented norms and standards. This project will deliver economic benefit by assisting the news sector with a major technological transition, and has the potential to create jobs and cost efficiencies. Social benefits to Australia will flow from the retention of high-quality news availability and new evidence to inform active policy debates about AI regulation. Methods developed will be adopted through consultation and dissemination via briefings, events, and roundtables with news media organisations and policymakers.					
FT230100571 Menicucci, A/Prof Nicolas C	**Unifying discrete and continuous methods in quantum information theory** This project aims to address a critical gap in quantum information theory by unifying the way that both discrete and continuous quantum systems are represented in mathematical models. This project expects to generate new knowledge in quantum information science by using cutting-edge mathematical tools and insights from signal processing theory. Expected outcomes of this project include a new mathematical framework for use in quantum science and technology development. This should provide significant benefits, such as new ways to efficiently simulate certain quantum processes on ordinary computers and novel approaches to handling noise in quantum computers.	269,573.00	269,573.00	269,573.00	254,573.00	1,063,292.00
	National Interest Test Statement From advanced computers to secure communication platforms and precision sensors – with applications in medical imaging, counterintelligence, underground navigation, and more – quantum technology is forecast to be an $86 billion global industry by 2040. Australia has played a leading role in its development for the last 25 years and is well placed to develop sovereign capabilities in this vital strategic sector. Given recent advances in the precise control of objects smaller than an atom, the next step is to get these quantum objects to work together in larger devices. This project addresses a key technical roadblock hindering the development of such devices. Resolving it will allow advances in control of a particular type of quantum hardware to be easily applied to other types, as well. Working directly with leading quantum technology companies will ensure that these innovations are translated into practical solutions to current roadblocks in designing these advanced computers, sensors, and communication platforms.					
	RMIT University	791,164.00	814,579.00	815,728.00	724,805.00	3,146,276.00
Swinburne University of Technology						
FT230100054 Hocking, Dr Rosalie K	**Innovations in Green Chemical Manufacture from Synchrotron based Techniques** This project aims to find sustainable ways to produce commodity chemicals by developing new catalysts. New synchrotron techniques will be developed and applied to provide new knowledge about the spatial and temporal factors affecting the selectivity and efficiency of electron transfer, redox reactions and diffusion, key for catalyst design. Expected outcomes include the development of new catalysts, new catalyst design concepts and a knowledge repository/database of analytical observations key for unlocking new materials knowledge. This should provide significant economic and environmental benefits by placing Australia at the forefront of the sustainable production of commodity chemicals.	250,262.00	249,694.00	243,694.00	230,824.00	974,474.00
	National Interest Test Statement The project will use synchrotron-based techniques to probe and develop new materials capable of manufacturing commodity chemicals from common gases, water, and sunlight. It will produce new knowledge on sustainable chemical manufacture, laying the groundwork to make production of fuels and chemicals carbon neutral. This will contribute to Australia's commitment to zero carbon emissions by 2050. The project leverages existing government investment in the Australian Synchrotron and offers further benefits including the development of new knowledge about critical materials and systems as well as new ways to characterise them. Translation and adoption pathways include publication, patents, and direct sharing of knowledge including datasets with other researchers and companies. Adoption will be further facilitated by collaboration with industry for commercialisation to realise the value of new materials, system improvements and novel ways to characterise materials.					
FT230100229 Wang, Dr Jia	**A few-body perspective on polaron physics and polaron interactions** This project aims to develop novel approaches to investigate one of the most celebrated quasiparticles, polarons, and polaron interactions, which plays a critical role in understanding the properties and functionalities of various advanced materials. However, the complexity of real	196,019.00	194,770.00	192,270.00	194,770.00	777,829.00

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	materials poses challenges to a fundamental understanding. This project innovatively applies the clean and controllable cold-atom system to simulate the same physics, where an innovative integration of few-body formalisms will be developed and precisely tested. The new knowledge generated in this project expects to shed new insight into polaron physics and pave the way to engineer polaron-based materials for applications in emergent quantum technologies. **National Interest Test Statement** This project investigates the physics of polarons, which describe disturbances to particles when immersed in a quantum environment. Understanding polaron physics is vital for harnessing the quantum properties of advanced materials and enhancing the efficiency and effectiveness for energy harvesting, storage, and transmission processes. By unravelling the quantum nature of materials, this project addresses a critical knowledge gap and unlocks the potential for significant technological advancements. The research offers benefits from research leadership and capacity for Australia's emerging quantum industry, forecast by CSIRO at $2.2B market value and generating 8,000+ jobs by 2030. The project will enable Australia to lead in quantum research and equip the workforce with cutting-edge theoretical modelling and computational skills, fostering a high-level talent pool ready for the quantum industry era. This project aims to ensure practical applicability by facilitating knowledge transfer to the industry sector, enabling the implementation of advanced technologies in energy storage and transportation.					
	Swinburne University of Technology	446,281.00	444,464.00	435,964.00	425,594.00	1,752,303.00
The University of Melbourne						
FT230100125 Kaitu'u-Lino, Prof Tu'uhevaha J	**Exploring protease inhibitors in placental development and maturation** The placenta is essential for reproduction in many diverse species. This project aims to elucidate fundamental contributions of protease inhibitors and the proteases they target to placental development and maturation. It is expected to generate new knowledge around whether SPINTS play a fundamental role in disparate animals that independently derived a placenta, suggesting convergent genetic evolution. The project is expected to result in disciplinary collaboration, produce novel models, and promote future projects in many species. The project should result in significant benefits toward advancing knowledge in reproductive biology, have economic and commercial benefits, and further enhance Australia's outstanding reputation in the field. **National Interest Test Statement** The placenta, vital for reproduction in many species, is critical for fetal well-being and development. This project aims to elucidate the intricacies of placental development and maturation across diverse species, encompassing lizards, marsupials, and mammals. The project will focus on decoding how specific molecular pathways control cell function and behaviour. Unravelling placental development's molecular mechanisms holds potential for enhancing reproductive outcomes in placenta-dependent animals. This knowledge potentially bears substantial implications for livestock production, presenting opportunities to enhance economic growth and commercial success in Australia. Furthermore, conservation breeding programs may benefit, fostering the preservation of endangered species and contributing to environmental sustainability. In addition to advancing scientific knowledge, this project fosters scientific and community outreach. We will raise awareness of the integral role of the placenta in reproduction through news articles and social media platforms.	275,393.00	280,439.00	280,439.00	274,144.00	1,110,415.00
FT230100158 Hu, Dr Hangwei	**Unlocking Viral Contribution to Terrestrial Nitrogen Cycling** This project aims to investigate how soil viruses steer key nitrogen cycling microorganisms and processes, by utilising emerging approaches of viromes, DNA-stable-isotope probing, and Raman-spectroscopy-based single-cell-sorting technology. This project expects to generate new knowledge in harnessing the potential of soil viruses to improve fertiliser nitrogen use efficiency through manipulating the biological pathways of nitrogen losses from agricultural ecosystems. Expected outcomes of this project include novel and comprehensive evidence for the roles of soil viruses in controlling terrestrial nitrogen cycling processes. This should provide significant benefits to Australian agriculture and environmental management. **National Interest Test Statement** More than 50% of applied fertiliser nitrogen in agriculture is lost to the environment, causing greenhouse gas emissions, biodiversity loss, climate change, and environmental pollution. This project will tackle a major scientific knowledge gap for harnessing the power of soil viruses, the most abundant biological entities on Earth, to control the activities of microorganisms leading to nitrogen losses. This project will create novel	232,964.00	245,266.00	240,164.00	237,434.00	955,828.00

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	evidence for a mechanistic understanding of the roles of soil viruses in controlling nitrogen-cycling process, which provide foundation which future studies can build upon to refine strategies to maximise fertiliser nitrogen use efficiency and reduce nitrogen losses in agriculture. The contribution of increased crop nitrogen use efficiency to the Australian economy are increased profitability of primary production, net value added through agribusiness value chains and reduced social cost through mitigation of potent greenhouse gases such as nitrous oxide.					
FT230100220 Nisbet, Prof David R	**Engineering a technology platform for organoids** Protein delivery technologies hold great potential to improve organoids (miniature organs used as in vitro models), allowing a deep understanding of development. However, current limitations must be overcome - particularly cost, precision, and efficacy. This project will engineer delivery materials to improve the efficacy of organoids, allowing control over the location and timing of protein delivery. Outcomes will include a technology platform of immediate use in the agriculture sector and for animal model alternatives. The benefit will be widespread, ensuring the growth and sustainability of our health and agriculture sector. The project will increase public understanding of protein delivery technologies, aiding in technology adoption.	275,073.00	276,573.00	275,093.00	260,261.00	1,087,000.00
	National Interest Test Statement A US Act in 2021 allowed alternatives to animal testing to investigate the safety and effectiveness of proteins, permitting new methods for testing pharmaceuticals. Organoids, a new method to examine organ development, are miniature organs engineered from stem cells artificially grown on scaffolding. Yet, current organoid technology is challenged by extreme variability. This project will engineer consistent organoids by developing an innovative tool and technology platform that enable reliable synthetic cell environments. It will improve the efficiency, and broaden the applicability of organoid technology, providing environmental, economic and commercial benefits. Livestock and veterinary research will benefit by phenotyping for optimized breeding stock for the first time: i.e. drought and tick resistance cattle. Also, organoid technology will replace the current standards for testing and reduce the need for animal models in many areas of biomedical research. With mainstream appeal, results will be disseminated through media outlets including TV and radio.					
FT230100235 Egorova-Brumley, Dr Natalia	**Neurobiological mechanisms of the interaction between pain and sleep** The project aims to reveal the brain mechanisms behind the interaction between such fundamental biological phenomena as sleep and pain. This highly interdisciplinary project expects to deliver significant insights into how poor sleep changes the brain to increase pain sensitivity in healthy adults, by combining novel lab-based mechanistic sleep and pain manipulations and naturalistic longitudinal observation. The rich multimodal dataset generated by the project will be made publicly available to enhance research transparency and international collaboration. This should provide significant benefits, ultimately opening up ways to improve quality of life and wellbeing of the Australian population.	259,744.00	259,744.00	259,787.00	209,031.00	988,306.00
	National Interest Test Statement Even a night of poor sleep increases pain sensitivity in healthy people, likely by changing the way the brain processes pain. With 48% of healthy Australians experiencing poor sleep, and the significant financial, economic, and social burden associated with the management of pain, understanding basic brain mechanisms responsible for pain sensitivity induced by poor sleep is the first step towards solutions to this problem of national significance. This could occur by discovering specific brain regions and networks that could be targeted with brain stimulation to reduce sleep-induced pain sensitivity. New insights from the project on how the brain changes due to poor sleep affecting pain sensitivity could likely contribute to significantly improved economic, health and social benefits to the Australian community. We will collaborate with media outlets and advocacy groups such as the Sleep Health Foundation and Painaustralia, to communicate findings, reaching both the general public and healthcare professionals.					
FT230100296 Watts, Dr Joseph W	**The Cultural Evolution of Mentalising** Thinking about mental states, such as beliefs, desires and intentions, is a universally important human ability known as mentalising. This project aims to use new cross-cultural databases and computational comparative methods to study five ways that mentalising practices vary across world cultures. The findings of this research have the potential to provide the first systematic overview of how mentalising practices vary globally as well as reveal the historical and social processes that shape the diverse ways that people think about the mind. Benefits of this knowledge include a more culturally sound basis for future developments in community-focused professions such as education, community development and counselling.	193,940.00	193,940.00	193,940.00	193,940.00	775,760.00
	National Interest Test Statement					

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	Understanding and communicating mental states, such as intentions and emotions, plays a crucial role in personal wellbeing and social functioning. There is growing recognition of cross-cultural variation in how people think about and express mental states, but this variation remains poorly understood. This project will use cutting-edge computational methods to investigate dimensions of variation in how people conceptualise and express mental states in different languages. The findings have the potential to enhance intercultural understanding, bridge communication gaps, promote empathy, and strengthen social cohesion within our diverse society. The findings of this project also have the potential to benefit Australia by informing the cultural competencies of community-focused practitioners such as teachers, community development workers and mental health professionals. Equipped with a deeper cultural understanding of how people think about and express states of the mind, these practitioners can tailor their approaches to effectively engage and support individuals from diverse backgrounds.					
FT230100297 Weaver, Dr Rachael A	**The Economics of Birds: Colonial Australia's Relationship to Native Species** This project aims to produce the first comprehensive analysis of native bird species in the cultural, scientific, and economic life of colonial Australia. It expects to generate new knowledge about Australia's environmental imagination, identity and practices locally, nationally and globally. Anticipated outcomes include new insights into the circulation, cultural meanings and uses of species and species knowledge and the tensions between enchantment and pragmatism in creative, affective and material responses to birdlife. This should significantly benefit understandings of Australia's past and present by mapping its historical relationships to bird species and producing new insights into the pressing ecological concerns of today.	199,824.00	199,824.00	199,824.00	199,824.00	799,296.00
	National Interest Test Statement Native bird species played an important role in the imaginative, social, and economic life of colonial Australia. They were studied and celebrated, and seen, by turns, as a resource to be exploited (for food, feathers, or live trade) or as a pest to be eradicated. But precisely how Australia has valued its remarkable birdlife has not yet been systematically analysed. By examining representations of native birds across an expanded historical archive (including literary works, artworks, natural history artefacts, and policy), this project will develop new understandings of their place in Australia's social, cultural, and environmental history. This will provide strong national benefits by enriching public discussion about species, nurturing contemporary fascination with birds (seen, for example, in citizen scientist movements and 'Bird of the Year' polls), informing public policy, and – as biodiversity declines - helping shape Australia's ongoing relationship to, and management of, native bird species.					
FT230100352 Osborne, Dr James M	**CellMechBio: the influence of cellular mechanobiology on organ development** Through a set of collaborative interdisciplinary application projects, with open scientific questions, this project aims to develop cutting edge mechanobiological mathematical models of organ development and function. The expected outcomes of this project are a step-change in the fidelity of multicellular models of three-dimensional tissues and the scientific investigations into the mechanobiological processes regulating organ development, currently not possible, that these models support. In addition to significant benefits from advances in fundamental mathematical and biological knowledge, this project plans to develop a mechanobiological modelling framework made available to the wider scientific community by an open source release.	246,125.00	243,844.00	243,844.00	243,844.00	977,657.00
	National Interest Test Statement For decades, scientists have been studying the process by which human organs develop, grow and function. Rather than relying on experiments alone, mathematical modelling, specifically multicellular modelling offers a unique pathway to understanding these processes. This project will develop cutting-edge multicellular mathematical models and computational tools that will provide major new insight into how organs in the body develop and function. These models will be used by researchers, in Australia and worldwide, to understand organ development, test biological mechanisms and develop new technologies. This will provide major social and economic benefits for Australia, improving health outcomes for citizens and reducing the long-term costs of health treatment. There are also significant commercial benefits for Australian industries, particularly the health and pharmaceutical industries, who can use these models to reduce the cost of testing technologies and treatments that address organ health.					
FT230100476 Palmer, A/Prof Lucy M	**The neural basis of memory** Although they define us, our knowledge about how, and where, memories are processed and stored within the brain is still in its infancy. This project aims to investigate the morphological and functional changes that occur in cortical neurons during memory formation. By recording from both mouse and human neurons, this study will bridge the gap in knowledge between the heavily-investigated rodent brain and the human brain and advance our knowledge on how remote memories are formed in individual neurons within the frontal cortex of the brain. These findings will	288,385.00	288,385.00	288,385.00	259,515.00	1,124,670.00

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(Columns 1 and 2)	(Column 3)	2023-24 (Column 4)	2024-25* (Column 5)	2025-26* (Column 6)	2026-27* (Column 7)	(Column 8)
	highlight potential neural mechanisms that might be awry in cases of memory loss and amnesia. **National Interest Test Statement** Memory processes coordinate our everyday life and help to ensure our health and well-being. Although they define us, our knowledge about how memories are formed and stored within the brain is limited. To address this vital gap in knowledge, this project investigates the changes that occur in brain cells known to be involved in memory formation. This research will advance our knowledge on how memories are formed and stored within the brain, and highlight the potential mechanisms that might be awry in cases of memory loss. This new knowledge will likely yield significant economic and social benefits to Australia and the Australian community by contributing to brain-inspired engineering and the development of advanced brain-like artificial intelligence, as well as aiding the development of novel pharmacological and neurotherapeutic strategies to help support people with brain conditions where memories are compromised.					
FT230100480 Dumontheil, Prof Iroise D	**Know thyself: Development of metacognition in childhood and adolescence** This project aims to advance our understanding of the development of children and adolescents' insight into their own thoughts and behaviours, or metacognition. Individual differences in metacognition impact learning and contribute to the educational achievement gap observed in many countries, including Australia. By combining analysis of existing international cohort data and state-of-the art developmentally appropriate neuroimaging methodology, the project is expected to create new basic research knowledge. An intended benefit is the development and evaluation of an evidence-based intervention to enhance the metacognitive skills of primary and secondary school pupils and improve their achievement in mathematics. **National Interest Test Statement** There is an educational achievement gap in many countries, including Australia, which is exacerbated by socio-economic status, gender, indigeneity, and location. Metacognition, or thinking about thinking, allows individuals to monitor their thoughts and behaviour and strategically adapt to improve their performance. Metacognitive skills are foundational to children's ability to develop successful learning strategies at school. As part of this proposal, new collaborations with leading experts and institutions will strengthen Australia's research capacity and advance our understanding of developmental and individual differences in metacognitive skills. Poor maths skills significantly impact life chances, therefore, the project is intended to benefit Australian children and adolescents by providing a new evidence-based metacognition training intervention expected to enhance their mathematics achievement. The project will further allow the training of early career researchers who will contribute to advancing the grounding of education in scientific research and help maximise the potential of every learner.	293,619.00	265,243.00	265,343.00	249,853.00	1,074,058.00
FT230100559 Young, Dr Neil D	**Using 'omic and digital technologies toward better fasciolosis control** In Australia, liver fluke disease caused by Fasciola hepatica causes major economic losses to livestock production. Triclabendazole is the most effective drug for parasite control, however, resistance to this drug has emerged and continues to spread in Australia. This project expects to create a novel resource to identify new drug targets, generate new knowledge about the genetic composition of F. hepatica populations and unravel the genetic determinants underlying triclabendazole resistance. The curation of functionally-annotated genetic data for F. hepatica populations will underpin the development of diagnostic tests, drugs and vaccines to deliver a new generation of intervention strategies to control liver fluke disease. **National Interest Test Statement** A disease caused by parasitic liver flukes results in economic losses of > $129 million per annum to the Australian livestock and dairy industries. Emerging drug resistance has increased the prevalence of liver fluke disease in South East Australia and threatens to further impact productivity. By characterising genetic variations in Australian liver flukes we will develop new anti-parasitic drugs and understand the mechanisms that confer resistance to fast-track new diagnostic tests to improve the on-farm management of liver fluke disease. This will directly benefit farming communities and the agri-food sector and improve productivity and biological efficiency. Our genomic resource will also be used to develop new anti-parasitic drugs and vaccines. Contributing to the next generation of integrated parasite control strategies will improve food productivity and safety and enhance Australia's reputation for clean, safe food.	239,694.00	245,694.00	244,744.00	218,874.00	949,006.00
	The University of Melbourne	2,504,761.00	2,498,952.00	2,491,563.00	2,346,720.00	9,841,996.00

Victoria University

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(Columns 1 and 2)	(Column 3)	2023-24 (Column 4)	2024-25* (Column 5)	2025-26* (Column 6)	2026-27* (Column 7)	(Column 8)
FT230100681	**Representing, Debating & Protesting the Nation: The Visual Legacy of Sport**	247,424.00	245,424.00	245,824.00	247,762.00	986,434.00
Klugman, Dr Matthew	Pictures of lifesavers, cricketers, footballers, and so many others have frequently been used to represent Australia to itself and the world, while other sporting images have sparked national debates about racism, and sexism. Yet there has been no broad study of the impact and legacies of Australian sporting iconography. This history will use sporting images to enrich understandings of Australia's past and present, and in particular the roles that sport plays in shaping national pride, passions, concerns, and movements for social change. The project will lead to a major exhibition, and will also develop innovative digital education resources that assist the teaching of history to primary and secondary school students throughout Australia.					
	National Interest Test Statement Sporting images have been used to both represent Australia, and to protest the Australian nation. This project aims to study the impact and legacies of Australian sporting iconography to understand the roles that sport plays in shaping national pride, passions, concerns, and movements for social change. Outcomes include a major exhibition that will facilitate public reflection on the cultural, social, and political power of sport in Australia. Additionally, the development of digital education resources will enable the teaching of history to primary and secondary school students in each state and territory. Sport is a site of both widespread public fascination and significant government investment, with the Commonwealth Government spending over $245 million every year on promoting sport (an amount set to increase in the lead-up to the Brisbane Olympics in 2032). This project will provide important benefits by increasing understanding of the impact and legacies of Australian sport, while also using the fascination with sport to help facilitate the teaching of Australian history.					
	Victoria University	247,424.00	245,424.00	245,824.00	247,762.00	986,434.00
	Victoria	6,116,767.00	6,174,210.00	6,140,792.00	5,879,409.00	24,311,178.00

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		2023-24	2024-25*	2025-26*	2026-27*	
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)
Western Australia						
Curtin University						
FT230100348	**Linking the deep carbon cycle with critical mineral deposits**	211,070.00	211,070.00	211,070.00	206,070.00	839,280.00
Doucet, Dr Luc S	This project aims to determine how the global carbon cycle controlled the occurrence of carbonatites, which provide most of the world's rare earth elements, using novel methods to improve our understanding of carbonatites and carbon-rich mantle rocks. This project expects to generate new knowledge on how global geodynamic processes, including the supercontinent cycle, influenced carbon recycling and mantle enrichments. This project will have significant economic benefits for targeting economically critical mineral deposits required to transition to a decarbonized world and placing the carbon cycle in a paleogeographic context to understand the climate in deep time.					
	National Interest Test Statement					
	Earth's mantle is the ultimate source of all critical metals and elements, including carbon and other components of greenhouse gases. This project will use novel combinations of geological and geochemical approaches to systematically map the uneven distribution of carbon and rare earth elements in the Earth's mantle for the first time. Such knowledge will deepen our understanding of how certain Earth processes or geographic locations have influenced the global occurrence of rare earth elements, creating a framework for resource companies to design exploration strategies that optimize their mining efforts towards greener energy sources. This will be of particular economic and environmental importance to Australia, given its substantial mineral endowment, world-leading mining technology sector, and commitment to green and renewable energy sources. More broadly, the outcomes of this project will determine the past, present and future long-term climate trends that control the formation and evolution of our unique, habitable planet.					
	Curtin University	211,070.00	211,070.00	211,070.00	206,070.00	839,280.00
The University of Western Australia						
FT230100109	**Advanced hydrodynamics for next generation of offshore infrastructure**	249,694.00	242,494.00	242,294.00	210,124.00	944,606.00
Zhao, Dr Wenhua	This project aims to develop rigorous and precise prediction models for next generation offshore infrastructure, by capturing nonlinear wave-structure interaction. This project expects to generate new knowledge in offshore hydrodynamics (a branch of fluid mechanics) applicable to Ocean Engineering, using cutting-edge numerical technology, state-of-the-art physical modelling, and unique full-scale field data. The expected outcomes include enhanced capacity to estimate hydrodynamic response and advanced design tools for floating wind, floating solar and offshore aquaculture. This will provide significant benefit by enabling cost-efficient and viable designs, thereby accelerating the development of offshore renewable energy.					
	National Interest Test Statement					
	Australia has a world leading offshore industry, contributing $80+ billion and 350,000 jobs per annum to the national economy. This position can be enhanced by rapid deployment of innovative infrastructure for offshore renewable energy and aquaculture, requiring solutions that are likely to be floating and dramatically different in form to what has come before. This project will tackle key challenges associated with next generation floating infrastructure. Scientific understanding of nonlinear physics will be developed through advanced modelling and novel data analysis. The cutting-edge science from this project will help address the feasibility of adopting floating wind in Australian open waters, enable safe operations of floating solar and beyond into green hydrogen, and improve the robustness of offshore aquaculture. This will unlock improved design with reduced cost and increased reliability and safety, thereby assisting with energy transition and creating value for Australia through the businesses that service this sector.					
FT230100214	**Quantifying kelp carbon and nutrient flows for nature-based solutions**	219,672.00	203,807.00	220,098.00	195,050.00	838,627.00
Filbee-Dexter, Dr Karen F	This fellowship aims to resolve carbon removal and nutrient mitigation potential of Australia's kelp forests now and in future. It will create new understanding of the ecosystem services provided by the Great Southern Reef, and the capacity of kelp forests to provide nature-based solutions to					

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	reduce emissions and improve coastal water quality. Using a combination of global models and ecological experiments on kelp forests and their replacement ecosystem states, the fellowship will predict changes in function with warming. This information is critical to determine net ecosystem mitigation potential and will significantly advance our understanding of the potential of kelp forests to generate co-benefits while conserving biodiversity. **National Interest Test Statement** This fellowship will provide new insight on the nutrient and climate-regulating benefits of Australia's kelp forests. It will quantify the transport of carbon and nitrogen bound in kelp tissue out of coastal zone and into deep ocean sinks, and predict climate-driven shifts in these pathways. To confront the current climate and environmental crisis, we need to understand all mitigation options, including natural climate solutions from kelp forests. Beyond carbon, this fellowship explores if the removal of nitrogen by kelp forests is significant globally. This will help generate new options for Australia to meet its 2030 emissions reduction targets, while exploring a nature-based solution to improve coastal water quality. The knowledge generated is also required for Australia's Environmental Economic Accounting activities and Nationally Determined Contributions for coastal ecosystems. Sound understanding of services from kelp forests can facilitate new conservation and restoration efforts that contribute to the UN Sustainable Development Goals: 'Climate action (SDG13)' and 'Life below water (SDG14)'.					
FT230100283 Fritz, Dr Georg	**Establishing Vibrio natriegens as Ultra-Rapid Host for Synthetic Biology** This project aims to harness Vibrio natriegens, the world's fastest-growing bacterium, as a microbial cell factory for synthetic biology and biotechnology. The project expects to develop new genetic tools and genetically-engineered microbes that can rapidly transform cheap feedstocks, such as plastic waste, into valuable chemicals and bioplastics. Expected outcomes include new knowledge on the mechanisms driving V. natriegens' rapid growth, as well as building Australian multidisciplinary research capacity in synthetic biology that can translate this potential into bio-manufacturing processes. Significant benefits include the means to cut plastic pollution in our environment and to provide the basis for a carbon-negative chemical industry. **National Interest Test Statement** Plastics have been essential to modern life, but they generate incredible amounts of waste (300 million tonnes globally every year). Tackling plastic pollution is now an urgent global problem, however affordable methods to increase our plastic recycling capacity and develop biodegradable plastic alternatives are lacking. This project will use genetic engineering to turn the fastest growing bacteria on the planet into a "microbial recycling factory", allowing it (1) to rapidly decompose plastics into their building blocks, and (2) to efficiently produce natural alternatives to plastic from these building blocks. The outcomes of this project will pave our way into a greener, cleaner and cheaper plastic economy, with significant commercial benefits for Australian companies with whom we will liaise to encourage the adoption of the technology we create. There will also be broad environmental and ecological benefits for Australia, and the planet, due to less plastic pollution.	250,385.00	250,385.00	250,385.00	221,515.00	972,670.00
FT230100333 Dipierro, Prof Serena	**New perspectives on nonlocal equations** This project aims at tackling cutting-edge problems in the field of mathematical analysis, with specific focus on nonlocal equations, by introducing innovative approaches and a unified perspective. It focuses on the use of long-range interactions to deeply understand new effects arising in several mathematical problems of great impact. The research will be performed through stimulating international collaborations, providing exchange opportunities and ideal conditions for students to complete their training. The expected outcomes include new techniques to solve difficult problems, high impact international research collaborations, training of the next generation of mathematicians and top tier journal publications. **National Interest Test Statement** Mathematics is a cutting-edge science that is central to our understanding of all natural and social phenomena. This project will establish new solutions for mathematical problems in both natural and applied sciences, such as the study of the dynamics of populations of both humans and animals. For example, an enhanced understanding of how populations of endangered species move and reproduce would have far-reaching consequences for conservation. This project will also reinforce Australia's international connections with top institutions in Europe and the USA, enhancing the reputation of Australia as a world-leader in science and mathematics. Translation of the outcomes of this research will be through liaison with scientists in other fields, such as biologists and physicists, since our results will shed new light on pivotal problems in their disciplines.	260,573.00	274,573.00	274,573.00	274,573.00	1,084,292.00
FT230100340	**Deep Time Images in the Age of Globalisation**	271,573.00	280,073.00	280,073.00	280,773.00	1,112,492.00

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(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)
Porr, A/Prof Martin	Using rock art as a focus, this innovative comparative project will examine the processes that create contemporary heritage. The project aims to answer questions such as: What motivates tourists to visit rock art sites in different parts of the world? And what preconceptions do tourists and Traditional Owners have about each other? This project will transform our understanding of rock art heritage sites and provide invaluable foundations for future approaches towards heritage management, preservation, and communication. For the first time, the creation of rock art heritage will be analysed simultaneously in the Northern and Southern Hemisphere as the product of global intertwined intellectual processes and ongoing legacies. **National Interest Test Statement** Australia's significant rock art is part of contemporary Aboriginal culture and is of importance to a national and international community with interests in heritage, art, and culture. This heritage is often contested and subject to cross-cultural misunderstandings, threatening the preservation of its tangible and intangible components. The project will undertake a comparative analysis of some of the world's most significant rock art locations, including several UNESCO World Heritage sites. The project will generate unique new knowledge related to the processes of production, management, and communication of heritage. The project will contribute to a more balanced and reflective treatment of Aboriginal heritage in Australia and will have direct commercial implications for a better understanding of tourist biases and expectations. These aspects are crucially important for Australia's post-Covid recovery and the development of responsible and sustainable cultural tourism for remote Aboriginal communities.					
	The University of Western Australia	1,251,897.00	1,251,332.00	1,267,423.00	1,182,035.00	4,952,687.00
	Western Australia	1,462,967.00	1,462,402.00	1,478,493.00	1,388,105.00	5,791,967.00
		24,514,215.00	**24,790,591.00**	**24,634,426.00**	**23,684,318.00**	**97,623,550.00**

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