Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
Australian Capital Territory						
The Australian National University						
FT210100392	**Breaking barriers to high-performance room-temperature quantum technologies**	234,236.00	231,431.00	226,646.00	226,632.00	918,945.00
Doherty, Dr Marcus W	This project aims to break the major barriers to realising high-performance quantum technologies that operate at room temperature by exploiting the unique properties of colour centres in diamond and two-dimensional materials. This project expects to yield profound new knowledge of colour centres and new theoretical methods, experimental techniques and quantum devices. Expected outcomes are significant enhancements of existing technologies, invention of novel two-dimensional technologies, and expanded domestic capability and international collaborations in quantum technology. These outcomes will benefit Australia by securing its global competitiveness in quantum industry and providing transformative tools to science, defence and industry.					
	National Interest Test Statement					
	This project aims to benefit Australia's economy and security by expanding its capability to innovate and manufacture world-leading quantum technologies, expanding its expertise and facilities to train the workforce for the emerging quantum industry , and strengthening strategic international collaborations for continued innovation. Quantum technologies are transforming science, defence and industry through applications in areas like cybersecurity, artificial intelligence, financial and engineering optimisation, biomedicine and advanced materials. Thus, a highly competitive quantum technology industry is rapidly emerging around the world with significant economic and security implications. Due to past research and funding, Australia is in a strong position to compete in the emerging quantum industry and security environment. This project expects to provide Australia a substantial competitive advantage by developing novel quantum technologies that are cheaper, more compact, more robust, and address a much broader range of applications than competing technologies by operating at room temperature.					
FT210100440	**Lighting Up Dark Fibre for Seismic Imaging**	280,000.00	280,000.00	280,000.00	250,000.00	1,090,000.00
Miller, Prof Meghan S	Distributed acoustic sensing (DAS) is a newly emerging passive seismic technique that converts telecommunication fibre-optic cables (dark fibres) into thousands of individual ground motion sensors. This project aims to harness DAS and the big data arising from it to develop unprecedented high-resolution images of the Earth's structure, detect micro-seismicity, and thereby relate geological observations to Earth processes. Outcomes of this powerful technique include fine-scale seismic imaging of the Earth's subsurface as the best proxy for geological processes and geochemistry. Benefits include transforming exploration of mineral resources, water, changes in subsurface structure, as well as geohazard assessments for Australia and worldwide					
	National Interest Test Statement					
	Distributed acoustic sensing (DAS) will transform seismic imaging by acquiring vast amounts of truly, high spatial resolution (meter scale) data of the Earth's sub-surface structure. Current techniques for this type of Earth imaging using passive sources are incapable of achieving this high a resolution due to 1) limitations in instrumentation sampling/spacing, and 2) the high cost of the instruments and challenging logistics to deploy them. This project will utilize DAS to convert existing fibre-optic telecommunication cables as a massive linear array of ground motion sensors (seismometers) for imaging the Earth's subsurface. The innovative technology will provide new data methods and products related to subsurface imaging, which will lead to increased economic and logistic viability. Benefits for Australia include enhanced geo-hazard assessment (eg earthquakes), nuclear test monitoring, environmental monitoring and exploration and recovery of natural resources. Students and researchers in Australia will also be trained in these absolute cutting-edge technologies, data collection and processing techniques.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100452	**A Multispecies Anthropological Approach to Influenza**	200,534.00	210,031.00	210,031.00	200,676.00	821,272.00
Fijn, Dr Natasha E	Influenza-type viruses currently pose a considerable threat to humanity, as well as to both domestic and wild animals. This project aims to address a significant gap in our knowledge about cultural perceptions towards influenza across different species, particularly horse flu. Through multispecies anthropology, planned outcomes are to gain a greater understanding of cross-species medical knowledge, including insights into cultural heritage, biodiversity and disease resilience through an integrated socio-cultural-ecological approach. Benefits of these new insights into multi-species dynamics will be a greater understanding of viral spread and Mongolian pastoral health practices that may be employed in the prevention of influenza.					
	National Interest Test Statement					
	Zoonotic diseases, such as COVID-19, spread from wild to domestic species and to humans, impacting the functioning of ecology, economy and society. While Australia has successfully prevented widespread outbreaks with effective biosecurity and vaccination strategies, experience with zoonotic diseases demonstrate the severe risk of uncontrolled spread, which can devastate livestock production and lead to mass culling, trade embargoes and human health impacts. Robust, collaborative research on equine influenza in Mongolia–highly transmissible and susceptible to mass outbreaks–will give Australia access to pastoral knowledge generated over centuries about the prevention and management of influenza across species. Australian farm and veterinary practice will benefit from knowledge leading to new approaches in viral mitigation, biodiversity, pasture health and enhanced herd management, all safeguarding livestock health and rural livelihoods. In turn, these will contribute to Australia's economic, trade and food security by reducing the risk of influenza impacting human and domestic animal health.					
FT210100495	**Next generation supramolecular frameworks**	247,346.00	247,346.00	247,346.00	233,293.00	975,331.00
White, Dr Nicholas	This project aims to prepare new supramolecular frameworks assembled by hydrogen or halogen bonds. It is anticipated that this work will increase fundamental understanding of supramolecular self-assembly processes and the dynamic processes that are possible within these rearrangeable systems. The project aims to prepare a family of related frameworks, which will allow a detailed comparison of the stability, porosity and biotechnological applicability of new supramolecular materials. The expected outcomes are the development of lightweight and benign organic systems that will have applications in the removal of toxic organic and heavy metal pollutants from water, and in the encapsulation and stabilisation of catalytically-active enzymes.					
	National Interest Test Statement					
	Supramolecular frameworks are crystalline three-dimensional materials held together by weak chemical interactions. While they have many potential benefits, most frameworks are weak and cannot be prepared predictably. This project aims to develop new, stable frameworks in a predictable manner and investigate their use in enzyme encapsulation and environmental decontamination. Enzymes are biological molecules that are incredibly powerful at conducting chemical reactions cheaply and effectively, however, their application in industry is limited by their fragility. The systems prepared in this research will encapsulate fragile enzymes, rendering them stable in a wide range of industrially-relevant conditions while retaining their activity. Other aspects of this work will investigate the use of supramolecular frameworks to remove heavy metals and other toxic pollutants from drinking water, and prepare porous materials that can bind and store gases such as carbon dioxide.					
FT210100623	**Local responses to missing persons and post-conflict peacebuilding**	244,540.00	236,540.00	244,540.00	244,540.00	970,160.00
Kent, Dr Lia M	This project aims to fundamentally reshape dominant thinking on the problem of missing persons in post-conflict peacebuilding. Through the first large-scale comparative ethnography of Timor-Leste and Sri Lanka, the research will bring local community approaches, needs and practices around the missing in from the margins to the centre of scholarly analysis and practice. Outcomes include new knowledge about local agency and community understandings of the missing that are relevant to peacebuilding, and enhanced collaborations with scholars and policymakers. Expected benefits include improved international, state and NGO responses to missing persons to meet the needs of families and communities and facilitate sustainable peace after conflict.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement Australia supports a stable, peaceful Indo-Pacific through peacebuilding aimed at preventing countries such as Timor-Leste and Sri Lanka from relapsing into conflict. A legacy of these conflicts is thousands of missing persons. Failure to address the problem of 'the missing' exacerbates local tensions and impedes rebuilding. Effectively responding to this problem is critical to Australia's peacebuilding efforts and will help reduce other drivers of instability in the region such as illegal people movement. This project goes beyond top-down international responses and engages deeply with local understandings of the problem of 'the missing'. It will expand Australia's knowledge base on peacebuilding and inform foreign policy. Its findings also have the potential to shape the policy and practice of key agencies including the International Committee of the Red Cross. This can help to deliver improved peacebuilding programs in post-conflict communities in the Indo-Pacific with high 'missing' numbers, fostering a stable and prosperous region to the benefit of Australia's economic and security interests.					
FT210100724 Lazar, Prof Seth	**Automatic Authorities: Charting a Course for Legitimate AI** Public and private actors are increasingly using Artificial Intelligence (AI) to exercise power over citizens, who are increasingly unsure whether to accept that power. AI faces a crisis of legitimacy. This project aims to use technically- and empirically-grounded philosophy to make Australia a global leader in the study and design of legitimate AI. The project expects to launch and make fundamental progress in a new field: the Political Philosophy of AI. Expected outcomes include new strategies shared with industry and government partners for designing and deploying legitimate AI systems. Expected benefits include the opportunity to enjoy the public and private efficiencies enabled by AI, without compromising our freedom and equality.	259,476.00	259,476.00	259,476.00	242,270.00	1,020,698.00
	National Interest Test Statement We are in the middle of a technological and political revolution. Advanced Artificial Intelligence (AI) systems are being used by both states and digital platforms to exercise unprecedented power over citizens, causing public concern and distrust. Despite its potential to reduce market and government inefficiencies, AI faces a crisis of legitimacy. By making fundamental philosophical progress grounded in robust empirical and technical foundations, and by working closely with high-level industry and government advisors, this project will launch and lead a new field of the Political Philosophy of AI, and chart a course out of that crisis. Government and industry advisors—who are responsible for designing and governing AI systems—will use and share actionable guidance based on our foundational research to increase the adoption of legitimate AI systems in both public and private sectors. These outcomes will contribute to important political and technological benefits: empowering Australian citizens and consumers to use AI in ways that support, rather than undermine, their fundamental freedom and equality.					
FT210100759 D'Costa, Prof Bina	**Children's displacement and humanitarian protection in the Global South** This Fellowship project aims to demonstrate how child protection is central to the dynamics of forced migration and the key to robust humanitarian programs in protracted crises. Through a comparison of operational measures in child marriage, trafficking, child labour, and sexual abuse, the research expects to develop new insights in humanitarian protection. Outcomes and benefits include a new theoretical framework of protection in emergencies and the design of scalable tools that offer actionable advice for policymakers and practitioners. The project will enhance Australia's capacity to engage strategically in delivering humanitarian aid that contributes to children and young people's meaningful protection in forced migration contexts.	253,714.00	262,908.00	240,545.00	233,370.00	990,537.00
	National Interest Test Statement This project contributes to pressing issues of national concern by creating new knowledge on children's protection to inform Australia's humanitarian strategies. One outcome of this research would be to reveal the central importance of gender-sensitive and child-centred protection strategies in Australia's humanitarian agenda. Another outcome would be to develop an inclusive protection agenda for children and young people that builds on Australia's strong engagement in support of the Women, Peace and Security agenda in the humanitarian space. By developing innovative methodological tools and guidelines, this project directly informs Australia's development and humanitarian objectives of building resilience, empowering young women and girls, and building communities. The research will make recommendations for better child protection mechanisms in humanitarian emergencies and for strengthening the protection partnering arrangements with the Global South. It will reaffirm Australia's commitment to the 2030 Agenda for Sustainable Development by contributing to knowledge and research-informed policy advocacy.					
	The Australian National University	1,719,846.00	1,727,732.00	1,708,584.00	1,630,781.00	6,786,943.00
	Australian Capital Territory	1,719,846.00	1,727,732.00	1,708,584.00	1,630,781.00	6,786,943.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
New South Wales						
Macquarie University						
FT210100241 Rossmanith, Dr Kate A	**Seeking 'Closure' in Unsolved Homicide Cases** The project aims to transform conceptual understandings of 'closure' by studying the experiences of bereaved families and frontline police confronting unsolved homicide. Through fieldwork and interviews, it will research how police and families struggle to manage feelings of loss, frustration, blame and failure. The project will craft new language and narrative modes to better situate feelings of grief, confusion and non-resolution, and help people comprehend and ultimately even find meaning in these experiences. Results will lead to significantly improved communication between families and police, to the development of more effective support strategies, and will have social and cultural applications far and beyond the justice system. **National Interest Test Statement** This project addresses an urgent need for research on the ill-defined concept of 'closure'. This will be achieved through a world-first investigation into the experiences of bereaved families and police investigators who confront unsolved homicide. It will improve communication between families and police, with positive implications for law enforcement resources, and will transform debates regarding the needs of victims. Via workshops with policymakers, the project will develop improved support for families and police. It will potentially impact on police handling of bereaved families in Australia and worldwide, and change public perceptions of policing. Through a broadly disseminated nonfiction book and audio-documentary, it will create new forms of narrative that address people's grief, confusion and feelings of non-resolution, thus helping people grapple with traumatic, unresolved events within and beyond the justice system (e.g. bushfire victims). It will position Australia at the forefront of research that combines creative practice and social science methods to examine emotions in criminal justice.	248,346.00	224,380.00	234,900.00	220,148.00	927,774.00
FT210100320 Suchet-Pearson, A/Prof Sandra	**Enabling Indigenous and Country-led understandings of sovereignty** The project aims to transform understandings of sovereignty from a concept to a series of practices by which pluralistic authority is drawn from intimate human and non-human relationships. It will collaboratively facilitate and document ongoing relationships in which Indigenous peoples respond to the active agency of non-human elements. The project will support a series of on-Country workshops and co-author practical resources to support community-led research. The anticipated goal is to mobilise Indigenous knowledges in Australia to nurture regenerative sovereignties - healing relationships between people and places - with significant implications for our collective response to social and environmental change. **National Interest Test Statement** The project addresses Indigenous communities' goals to care for each other and care for place. It is designed to deepen understandings about positive, regenerative relationships between Indigenous people and places, and enable these understanding to help heal damaged relationships. This will expand understandings of sovereignty from a focus on human-human interactions to an appreciation of how power dynamics are created through relationships between people and non-human beings. It will directly benefit Indigenous communities through employment on workshops and multimedia outputs that ensure these regenerative practices continue, are revitalised and appropriately shared. These are intended to lead to intra- and inter-community outcomes including practical resource manuals, policy recommendations and an engaging, accessible book. The project has the potential to benefit the broader Australian community by deepening and affirming responsibilities to society and place. Indigenous-led and engaged, it will build Australia's capacity to respond to environmental change in a socially just and creative way.	237,570.00	231,170.00	254,970.00	254,970.00	978,680.00

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100345	**Rethinking animals in research: Developing a novel ethical framework**	171,205.00	171,705.00	195,705.00	187,705.00	726,320.00
Johnson, Dr Amanda J	Current approaches to animal ethics face challenges addressing significant problems in animal research. These problems include: harms to research workers and animals, poor translation of results from animals to humans leading to ineffective treatments and poorly directed future research efforts. This project addresses these challenges by developing an innovative, empirically-informed relational approach to animal ethics. The new approach will deliver a novel framework that minimises harms to humans and animals, and improves the quality of results obtained from experiments. Benefits include a more ethically robust practice of animal research and more targeted deployment of finite research resources.					
	National Interest Test Statement					
	95% of drugs that enter human clinical trials do not make it onto pharmacy shelves, despite having shown promise in animal experiments. This is a significant worry. It means that limited funding for research may not be well spent, that the efforts of researchers and trial participants may be wasted, and that animals have been sacrificed for no good reason. The gap between animal trials and human response also means that patients may not receive the best possible treatments as some potentially valuable drugs will be discarded based on animal tests. This project will develop a new way of approaching animal testing that addresses these concerns, and it will deliver a framework to support ethically-strengthened practices in animal research. There are clear benefits for Australia from supporting this project. As well as reducing the harms of animal research, it will help to better target finite research funding in medicine, leading to benefits for the commercial research sector as well as our economy more broadly.					
FT210100357	**Universities as entrepreneurial urban actors**	228,370.00	263,638.00	263,538.00	232,370.00	987,916.00
Ruming, A/Prof Kristian J	This project aims to critically analyse the role of universities in shaping Australian cities. By mobilising a detailed case study approach, the project expects to generate new theoretical and applied knowledge about how universities influence the planning, built form and social and economic functioning of our cities. Anticipated outcomes include a clearer understanding of how universities configure their local environment, how they are mobilised within planning documents to achieve urban objectives and how land development is now a core activity for universities. This will bring significant benefits to urban planning and communities via policy recommendations outlining social and economic improvements related to university development.					
	National Interest Test Statement					
	The university sector is a major contributor to the national economy ($34 billion, 2018). While the bulk of this economic contribution comes in the form of tertiary education and research, universities are also major landowners in our cities and many have embarked on major planning and development programs. Universities are now actively engaged in the property market and are some of the largest developers in our cities. Yet, little is known about how they shape the form and function of our cities or how property development has emerged as a central strategy of universities. This project fills this vital gap. The project will benefit the Australian community through a greater understanding of how universities shape our cities, influencing issues such as housing, transport infrastructure, the development of strategic centres, urban renewal or their role in global city goals. The project will investigate how universities are central in delivering government urban and economic objectives, such as the City Deals (Federal Government) and strategic planning ambitions, such as metropolitan plans (State Government).					
FT210100715	**The role of genome reorganisation in adaptation and speciation**	210,705.00	210,705.00	210,705.00	191,905.00	824,020.00
Potter, Dr Sally	Local adaptation and speciation are fundamental evolutionary processes that rely on changes to the genome. However, the role of genome architecture (e.g. chromosomal rearrangements, gene duplications) in driving these processes is poorly understood. This project will use advanced comparative genomics and bioinformatics to examine the role of chromosome rearrangements in driving adaptation and speciation, and evaluate rates of molecular evolution between the X-chromosome and autosomes. Utilising Australia's endemic mammalian fauna as a tractable model system, I will link population processes with macro-evolutionary outcomes to show how genome architecture underpins biodiversity.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project invests in areas of immediate importance to Australia and its place in the world, through understanding how species have adapted to harsh arid environments, and how our unique diversity has formed. Our biodiversity is not only valuable to Australia, but also to the world, as many of our species are only present here. Our marsupials and other small mammals which have the highest rate of extinction bring economic, commercial, environmental and cultural benefits through our tourism industry. This project leverages and expands on the existing multi-million dollar investments to “Increase awareness among the public and conservation managers of the diversity of Australian mammals and how genomics can aid in their protection”. This project will facilitate this by providing greater knowledge about how Australian diversity has formed and adapted.					
FT210100737 Wang, Dr Yuling	**Integrated Nanoplatform for Multiomics Analysis of Cell-to-Cell Interaction** This project aims to develop an integrated nanoplatform for analysis of exosomes produced by host-pathogen interaction at the single cell level. This will be accomplished by engineering an innovative device involving plasmonic nanoparticles to probe exosomes molecular profiles over time. The intended outcome is a generic and robust platform for detailed molecular analysis of the consequences of cell-to-cell interactions. Single cell scale will greatly improve detection accuracy for heterogeneous cell populations. Benefits will include new knowledge of cell-to-cell communication and intellectual property in manufacturing, which will foster collaborations across institutions and Australian industry by providing new technological solutions.	241,000.00	224,000.00	224,000.00	224,000.00	913,000.00
	National Interest Test Statement This project will address the need for new technologies that enable the analysis of key molecules involved in cell-to-cell (e.g. host-pathogen) interactions, that occur in response to changes in their microenvironment, thus providing great potential for applications in disease diagnostics. The project will produce a new generation of microscopic particles (known as nanotags), capable of delivering accurate sensing results and offering enormous potential for improved health and environmental outcomes, with applications in the life, agricultural and environmental science industries. This project will develop a generic platform for detailed molecular analysis of any cell-to-cell interactions providing significant economic and social benefits to Australia through, for example, more reliable and cost-effective infection monitoring. The completion of this program will lead to the development of a novel integrated nanoplatform, thus opening commercial opportunities in the manufacturing, nanobiotechnology and diagnostic sectors and increasing Australia’s competitiveness in the global market.					
	Macquarie University	1,337,196.00	1,325,598.00	1,383,818.00	1,311,098.00	5,357,710.00
The University of New England						
FT210100851 Rader, Dr Romina	**Bridging the gap between crop pollination services and pollinator health** Insect pollinators play an integral role in the quantity and quality of production for many food crops, yet there is growing concern that in agricultural landscapes, the limited availability of floral and non-floral resources might be contributing to global pollinator health declines. This project will synthesize global datasets, develop new methodological tools and conduct new, targeted empirical work to develop an integrated approach to pollinator resource management with the explicit objectives of maintaining both wild pollinator health and to support crop pollination service delivery in modified systems.	225,000.00	225,000.00	225,000.00	225,000.00	900,000.00
	National Interest Test Statement The conservation and management of wild and managed pollinators and the pollination services they provide is a critical issue for many stakeholders resulting in global policies to protect pollinators and their role in food production. While national and international plans have resulted in policies for floral enhancement, we know little about exactly which plants are best for pollinator health and which are compatible with crop pollination service delivery. Australian horticulture is worth 3.5 billion annually to the Australian economy and 75% of fruit and vegetable, seed and fibre crops benefit from pollen transfer by animals. This project will address key knowledge gaps to optimize the dual role of pollinator health and pollination service delivery.					
	The University of New England	225,000.00	225,000.00	225,000.00	225,000.00	900,000.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
The University of New South Wales						
FT210100150	**Nanoengineering Smart and Precise Antimicrobial Polymers**	191,811.00	191,811.00	192,811.00	178,758.00	755,191.00
Wong, Dr Edgar H	Designing the next generation of antimicrobial polymers. This proposal aims to combat the critical global issue of antibiotic resistance via fundamental and innovative chemistry design solutions. The proposed new design will enable the polymers to activate intelligently and precisely in the presence of specific stimuli such as bacterial enzymes for the first time, thereby endowing the polymers with both antimicrobial and biocompatible properties. Both properties are crucially needed for successful translation into practical applications. This proposal will lead to new and effective avenues in fighting multidrug-resistant bacteria and will significantly benefit Australia's healthcare and agriculture sectors.					
	National Interest Test Statement					
	Antibiotic resistance has recently been recognised by the World Health Organisation as a critical global issue that urgently needs new solutions. This proposal will deliver new and effective avenues to address this challenge via fundamental and innovative chemistry methodologies in the form novel intelligent antimicrobial macromolecules. In addressing this challenge, this proposal will provide significant long-term economic benefits. Specifically, by reducing medical costs in healthcare through shorter length of hospital stays because of faster patient recovery, and by protecting livestock in the agriculture sector from bacterial infections. This proposal will also garner commercial interests from industry leading to job expansions in the biotechnology field in Australia, whilst enhancing Australia's international reputation in research and education.					
FT210100165	**An advanced multiphase model for geometrical evolution and anomalous flows**	275,000.00	270,000.00	275,000.00	245,000.00	1,065,000.00
Armstrong, A/Prof Ryan T	The project aims to provide new insights into the ways that Australia’s abundant energy resources are utilised for energy security and environmental stewardship. Simulation developments and fundamental insights on multiphase porous media flows provide significant outcomes toward the national priorities. These developments are paramount for various applications, such as geological storage of CO2, oil/gas recovery, groundwater remediation and energy storage. This will provide benefit to the oil/gas industry which spends hundreds of millions of dollars on reservoir modelling; the proposed research will provide the fundamental insights necessary to advance the utility of these simulations and other porous media applications for energy storage.					
	National Interest Test Statement					
	The current models used in the resources sector for subsurface reservoir modelling are inadequate to capture a variety of commonly occurring flow regimes. This project will develop an advanced, realistic model that will transform the current modelling techniques with outcomes ready for industry application across a broad range of sectors. The project will produce a diverse set of experimental and simulation data that will be used in machine learning networks to dynamically update the model. The scientific advancements developed in this project will provide benefits to related industries that spends hundreds of millions of dollars on reservoir modelling. The outcomes will be directly transferable to technologies necessary for energy security, resource extraction, recovery of transition fuels, groundwater remediation and greenhouse gas storage. These technologies are key research priorities facilitating important economic sectors vital for the Australian economy.					
FT210100173	**Extreme Heat: A new driver of desert mammal assemblages**	234,443.00	244,540.00	244,490.00	234,540.00	958,013.00
Moseby, Dr Katherine M	Heat waves cause more deaths than any other severe weather event and are becoming longer, more frequent and more intense. Consequently, extreme heat may soon rival predation and rainfall as a major driver of desert mammal assemblages. This project will investigate how heat wave attributes (duration, intensity, frequency), species attributes (physiology, behaviour, plasticity) and landscape features (refuges, fire, grazing) interact and contribute to lethal and sublethal effects of extreme heat on desert mammals. Modelling will predict changes in desert mammal assemblages under different climatic and land management scenarios. Results will inform fire and grazing management, threatened species recovery programs and arid zone restoration.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement Desert ecosystems cover 70% of Australia and support a range of land uses including stock grazing, conservation, indigenous and mining. However, our deserts are now being exposed to extreme heat waves under climate change. Desert animals will soon be coping with heat waves that are more intense, more frequent and longer than the most devastating heat waves experienced to date. Humans can tolerate extreme heat through access to airconditioning, swimming pools and water. But what about our native mammals? Heat waves push animals to their thermal limits and can cause mass mortality events. Desert mammals are already threatened by feral predators, fire, overgrazing and drought. Heat waves are a new emerging threat. Understanding the impacts of extreme heat on desert mammals will enable us to design effective mitigation strategies to protect desert ecosystems and enable them to continue to support a diversity of land uses. My research will directly benefit arid zone conservation, mining rehabilitation and sustainable grazing management by understanding the importance of heat refuges and how they can be conserved.					
FT210100176 Gratton, A/Prof Gabriele	**Resilient Democracy for the 21st Century** This project will establish novel foundational theoretical frameworks for the design of democratic institutions that can withstand internal and external pressure towards autocratisation. It will develop state of the art dynamic models of information manipulation and political dynamics, and analyse large-scale online survey experiments, as well as contemporary and historical data. This combination will deliver new insights into the management of sensitive information and how to protect democracy from information manipulation. Ultimately, the project will generate a body of theoretical and empirical evidence for the design of more effective and resilient democratic institutions for a more inclusive economic development.	278,370.00	265,370.00	236,370.00	233,370.00	1,013,480.00
	National Interest Test Statement This fellowship will advance our understanding of how institutions, economics, and culture co-determine whether a democracy is resilient. It will produce fundamental knowledge about the design of democratic institutions that are resilient to sudden shocks in the quality and quantity of information, violent and economic threats, and changes in the cultural composition of voters' background as a result of mass migrations and societal evolution. The results will help design institutions that are robust to forces that lead to autocratisation by allowing democratic governments to respond with more timely and effective policies to new demands brought on by economic shocks. The results of this project will help shape policy recommendations, especially for the management of sensitive information, social media, and government communication, but also for the design of democratic institutions across the world. These recommendations are important for Australia and democracy worldwide, and especially for institution building in developing nations that are key to Australia.					
FT210100186 Guilfoyle, A/Prof Douglas	**Small States' use of law of the sea litigation against greater powers** This project will investigate how small States are using law of the sea dispute settlement mechanisms to gain political advantages in conflicts with greater powers, including Security Council permanent members. It is important to understand how the UN Convention on the Law of the Sea can be leveraged to defend coastal State rights in strategic disputes concerning sovereign rights, unresolved boundaries, and military affairs. This research will better equip lawyers and policy makers to understand how such strategic litigation strengthens or undermines the rules based order at sea. The project will assist Australia to maintain its leading role in defending that maritime order and the UN Convention on the Law of the Sea as its cornerstone.	238,370.00	238,370.00	236,370.00	236,370.00	949,480.00
	National Interest Test Statement Australia, as a continent surrounded by three oceans, has a critical national security interest in the maritime domain. The Foreign Policy White Paper 2017 affirms both Australia's 'fundamental interest in the legal regimes' that govern the oceans and that Australia must ensure the rules protecting the sovereign rights of coastal states are defended. If these rules are not defended when challenged they will erode. Compulsory dispute settlement under the UN Convention on the Law of the Sea (UNCLOS) is a key means for smaller States to defend their individual sovereign rights and the international rules-based order in the maritime domain more generally. It is in the national interest to better understand the use law of the sea litigation by small State against greater powers generally, as it may apply in our region, and as it may be invoked against Australia. The project will support Australian capacity to defend our fundamental national interest in the rules based maritime order. It will do so by generating new knowledge of the opportunities and risks in novel and emerging uses of UNCLOS dispute settlement.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100303	**Efficient and Scalable Processing of Dynamic Heterogeneous Graphs**	270,000.00	270,000.00	270,000.00	275,000.00	1,085,000.00
Zhang, A/Prof Wenjie	This project aims to develop efficient and scalable algorithms to process large-scale dynamic heterogeneous graphs where graph nodes and edges are of multiple types and the graph structure updates dynamically. Key challenges are expected to be addressed including complex structure, high speed, and large volume of dynamic heterogeneous graphs. The anticipated outcomes include novel computing paradigms, algorithms, indexing, incremental computation, distributed algorithms as well as a system prototype to demonstrate the practical value. Success of this project will open up a new research direction to enrich frontier technologies and benefit many key applications in Australia including cybersecurity, e-commerce, health and social networks.					
	National Interest Test Statement					
	This project will develop effective and innovative solutions for large-volume dynamic heterogeneous graph processing, which is in high demand for a broad spectrum of application in Australia. The success of this project will bring breakthroughs in technological advances in the processing of large-scale dynamic heterogeneous graphs including new theories, novel indexing, scalable processing techniques, complexity analysis and system development. This will ensure Australia to take a leadership and be in the forefront of this important research field. The project also has a great value to the development of local industry including cybersecurity systems to detect network intrusion and malware, e-commerce systems to detect financial fraud and predict customer preferences, health to identify useful functional structures in drug discovery, and social network to identify potential terrorists. The project will also facilitate the training of national most wanted IT professional talents.					
FT210100355	**Dissecting cell cycle regulation using programmable gene editing technology**	232,469.00	238,680.00	230,870.00	223,720.00	925,739.00
Weatheritt, Dr Robert J	This program aims to harness the unprecedented power of CRISPR-Cas13 gene-editing technology to develop high-throughput tools to explore the role of RNA regulation in cell cycle control. This project expects to generate new knowledge about cell division and RNA biology by utilizing this new technology and applying interdisciplinary approaches. Expected outcomes of this proposal include new research tools capable of broadly addressing biological questions across multiple disciplines (e.g. from health to food production). This project intends to provide significant benefits, such as enhanced biological knowledge, multidisciplinary training opportunities and will build Australia's capability in this rapidly expanding field.					
	National Interest Test Statement					
	RNA is essential for gene expression and cell division across all kingdoms of life. However, the lack of tools to manipulate RNA means there are extensive knowledge gaps in our understanding of these key processes. This project aims to develop scalable tools to manipulate virtually any RNA molecule and to use the tools to expand knowledge on how cell's divide. New tools and knowledge gained will have benefits across multiple industries ranging from crop productions in agriculture, animal welfare in veterinary science, to facilitating the future development of new drug targets for medical disorders. Together these approaches are highly applicable to Australia's biotechnology and pharmaceutical industries with widespread impact across the medical, veterinary and agriculture sectors.					
FT210100459	**Do regional climate models rain too much?**	262,417.00	258,991.00	260,876.00	256,317.00	1,038,601.00
Alexander, Prof Lisa V	This project aims to provide a best-practice, in-depth assessment of the climate model simulations that are used to support regional climate change impact assessments. The focus will be on rainfall and the hydrological cycle as these aspects are especially impacts-relevant. Innovation comes from the application of a common benchmarking framework which includes observational uncertainty and process-based understanding to address common modelling limitations. Any model failings identified will feed into model development strategies and support enhanced decision-making informed by regional climate model simulations.					
	National Interest Test Statement					
	A wide range of sectors will be impacted negatively if they do not adapt to changing climate conditions. Critical decisions related to water resources, infrastructure, biodiversity, agriculture and natural hazards are increasingly informed by what modelling says about future climate changes at the regional scale. Regional climate model simulations are a key tool in producing data of sufficient detail to be applicable to decision-making. Confidence in these simulations relies not only their ability to provide fine detail but also on their realism of larger-scale characteristics of the regional climate. This project aims to understand the water cycle components of regional climate model simulations for regions around the globe to help highlight potential model failings and, ultimately, to improve predictions of extreme rainfall and other impacts-relevant variables. The methods developed will shape international best-practice with regards to model evaluation of the variables relevant to decision-making by governments and the private sector.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100667	**Constitutional Design & Democratic Resilience**	260,176.00	260,181.00	260,192.00	268,030.00	1,048,579.00
Dixon, Prof Rosalind	Democracy is under stress worldwide. Both new and longstanding are seeing waves of democratic erosion. In many cases, this erosion is also taking new and more subtle forms, which are harder to detect than outright coups or suspensions of democracy – that is, they involve a form of “abusive constitutional change” that uses existing legal democratic norms and processes to subvert democracy from within. This Project will investigate the nature and scope of this problem of abusive constitutional change, as well as potential solutions through constitutional design. It will offer new theoretical insights for the field of comparative constitutional studies, and practical insights for policymakers in Australia and globally.					
	National Interest Test Statement					
	The project addresses the significant global political challenge posed by rising authoritarianism, or illiberal forms of populist government, and the extent to which would-be authoritarians are seeking to cement their own hold on power and erode democracy via processes of formal and informal constitutional change. It will provide insights into the scope and nature of this problem, and general design principles, grounded in real-world comparative experience and insights, and in doing so make a significant intellectual contribution to the field of comparative constitutional studies. The project also has clear significance for Australia: Australia has recognized the problem of authoritarian and military government as a crucial challenge to security, stability and economic prosperity globally and in the Asia-Pacific region. It has responded by making ‘effective governance’ one of its six foreign aid priorities. The Project will increase the effectiveness of this investment by providing clear principles to guide and underpin efforts at constitutionalizing effective democratic governance.					
FT210100668	**Engineering biomaterials that actively promote blood vessel growth**	237,000.00	237,000.00	235,000.00	235,000.00	944,000.00
Rnjak-Kovacina, Dr Jelena	This project aims to improve understanding of the effect of biomaterials on vascular growth & to develop new biomimetic materials using natural polymers silk & gelatin. It expects to generate new knowledge in biomaterials, matrix biology & advanced material processing. Expected outcomes include new knowledge & technological advances in biomaterial-driven vascular growth, porous material manufacture, & proteoglycan-mediated growth factor signalling, as well as cross-disciplinary, international collaboration & research training. This should provide significant benefit to Australia’s scholarly output & reputation & long term benefits to biomedical, veterinary, cosmetic, & food industries through new materials & processing technologies.					
	National Interest Test Statement					
	Biomaterials are integral in replacing injured/ diseased tissue in animals and humans, and in drug delivery and cosmetic applications. In particular, biomaterials will play a key role in the well-being of our aging population, where the demand for tissue replacement grafts far outweighs the supply. A key limitation of current biomaterials is poor integration with the host as a result of ineffective blood vessel growth, limiting their function and effectiveness. With the value of the biomaterials industry projected to be US $215.9 billion by 2027 globally, this is a key area of investment for Australian research and materials industry. The goal of this Fellowship is to design and engineer a new generation of biomaterials that promote effective blood vessel growth. This project will develop new knowledge on the effect of biomaterial properties on blood vessel interactions and new biomaterials and biomaterial fabrication methods. It is expected to lead to future commercial benefits in national priority areas of advanced manufacturing of high-value, high-performance materials, and health.					
	The University of New South Wales	2,480,056.00	2,474,943.00	2,441,979.00	2,386,105.00	9,783,083.00
The University of Sydney						
FT210100210	**High performance durable perovskite solar cells for space applications**	235,000.00	270,970.00	270,970.00	270,970.00	1,047,910.00
Ho-Baillie, Prof Anita W	There has been a rapid growth in space exploration and experimentation fuelled by global support. Space hardware needs to be powered by a sustainable source of energy. The use of solar photovoltaics is the preferred choice. As we move into the era of 'commercial space', cost will become paramount necessitating the development of new cost effective photovoltaic technologies. Metal halide perovskite solar cells show the greatest potential. They have a higher power to weight ratio and are significantly cheaper to be manufactured compared to incumbent space cells. This project aims to develop and demonstrate perovskite solar cells to achieve high areal power conversion efficiencies and long operating lifetimes withstanding space environment.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project aligns with the 2019-2028 Australian Civil Space Strategy and is timely as it builds space solar cell research capability and capacity in Australia which is lacking at present. While new knowledge and new cell designs generated in this project will be directly applicable to low earth orbit satellites, they will underpin cell technologies for Lunar and planetary science missions sharing similar environmental conditions. The learning from this research will also be translatable to aerospace and terrestrial cells. Perovskite solar cells have lower weight to power ratio (by 1 order of magnitude) and lower manufacturing cost (by 2 orders of magnitude) than the incumbent space solar cells. For the satellite market alone, ~1.3 million m2 of solar cells are expected to be required. Replacing currently-available space cells with perovskite cells (for the same power capacity) can achieve a saving of US$ 17 billion and reduce the mass of photovoltaic device material by 150 tonnes contributing to additional savings of US$ 408 million in launch cost.					
FT210100218 Wei, Dr Li	**Diatomic Electrocatalysts for Efficient Carbon Dioxide Conversion** This project will create novel electrocatalysts to produce valuable C2 compounds (ethylene, ethanol and ethylene glycol) from carbon dioxide reduction reaction. The precise catalyst structure control remains challenging but is crucial for pushing catalyst performance towards practical applications. By innovating organic macrocycle molecules as precursors, this project will generate a new paradigm of diatomic electrocatalysts with structure control precision at atomic-scale. Such catalysts are expected to deliver high catalytic performance to accelerate the transformation to a carbon-neutral future. Synchronously, they will also serve as an ideal platform for in-depth mechanism study and establishing guidelines for rational catalyst design	203,000.00	208,000.00	213,000.00	180,000.00	804,000.00
	National Interest Test Statement This project will promote the efficient and profitable conversion of waste carbon dioxide emission into valuable chemical feedstocks or energy-intensive fuels, hence, accelerate the transformation of Australia towards a carbon-neutral future and improve life quality for every Australians. This project will deliver a promising solution to address the storage and transportation challenges related to the intermittent nature of the abundant renewable electricity produced in Australia. The highly efficient energy-to-matter conversion will advance the prominence of Australia in the global chemical market. This project will also provide excellent training opportunities for promising students and strengthen the competitiveness of Australia in the nanomaterial and renewable energy research.					
FT210100228 Ouyang, Dr Wanli	**AUSLearn: AUtomated Sample Learning for Object Recognition** This project aims to enable computers to learn how to effectively use training samples for object recognition. Training sample is the only source used by computers to learn recognising objects. This project creates a new research direction that will enable the first full exploration of the power of samples. The aims will be enabled by leveraging the recent advances in reinforcement learning, fast training algorithms, and by developing novel deep learning algorithms. The new algorithms will benefit a wide range of applications, e.g. to effectively use car crash training samples for accurately identifying potential road crashes in transport and to effectively use rare medical imaging training data for robustly diagnosing diseases in health.	245,000.00	240,000.00	240,000.00	230,000.00	955,000.00
	National Interest Test Statement Reliable object recognition systems are critical to technologies such as intelligent transportation systems (ITS) in driverless cars. This project will develop new algorithms for computers to learn to recognise objects, which will improve the accuracy of technologies such as ITS. The outcomes of this project can be applied for many industries, especially the transport innovation sector that is projected by Austrade to `explode in value to more than $16 billion … by 2025'. Benefits to this sector include improving the reliability of identifying objects that might cause an accident, the key technology for avoiding road accidents in the modelling of autonomous vehicles, reducing the $27 billion cost of road crashes in Australia each year, and keeping Australian road users safer. This technology helps to recognise pedestrians and vehicles that might cause congestion, important in transport management and operations. A long-term goal outside the scope of this project is to apply the algorithms for medical imaging to improve brain disease diagnosis by collaborating with Sydney Neuroimaging Analysis Centre.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100244	**Archaeologies of community and colonialism in Oceania**	217,290.00	242,240.00	242,640.00	203,720.00	905,890.00
Flexner, Dr James L	This project aims to understand the colonial past, its repercussions for the present and future in Oceania and the relationships between global forces and local experiences. It will use an interdisciplinary approach to historical archaeology and community archaeology. The unique colonial landscapes in Mangareva, French Polynesia will provide a landmark case study with global implications. In addition to internationally significant scholarly outputs and collaboration development, the project will make a substantive contribution to public outreach and education. Benefits would include advancement of Oceanic contributions to global historical archaeology, and increased awareness of the meanings of colonial heritage among Pacific peoples.					
	National Interest Test Statement					
	Australia has long played a leading role in internationally significant archaeological research in the Pacific. This project will continue that legacy by advancing a pathbreaking interdisciplinary study of the colonial archaeology of Mangareva. It will create a context for ongoing collaboration with Australia's Pacific neighbours, particularly in French Polynesia. This project would contribute to the national interest by enhancing the research excellence of Australian institutions domestically and internationally. These international collaborations, which will connect cultural institutions in Australia, French Polynesia, and Europe, are essential to building a sustainable indigenous archaeology in the Pacific that can continue to provide insights into the region's pasts, presents, and futures.					
FT210100356	**Smashing Glass Walls: Building gender equality in male-dominated jobs**	264,600.00	254,600.00	254,600.00	254,600.00	1,028,400.00
Cooper, Prof Rae C	This project investigates gender segregation, which is a remarkably resilient problem in the Australian labour market, despite women's increasing labour force participation and strong educational attainment. It examines this problem with a focus on women's careers in very male-dominated occupations. In these contexts, women enter in low numbers, find it difficult to progress, and face extremely hostile working environments. Adopting a career stage, a worker- and industry-engaged, and a comparative design, the project will generate new insight into where and how sustainable careers for women are challenged in these contexts. This knowledge will inform strategies to build gender equality in jobs at the heart of the economy.					
	National Interest Test Statement					
	Challenging gender segregation and building career sustainability in male-dominated sectors and jobs will have demonstrable social and economic benefits for Australia. These benefits will flow to business (building diverse workforces and the supply of skilled labour in critical areas), to the economy (driving participation and growth), to government (meeting national targets and international commitments), and to women workers (opening up lucrative jobs for better earnings and lifelong economic security). The case study sectors of Engineering, Information Technology (IT) and Investment are crucial for the national economy, as they drive the delivery of vital national infrastructure and connect business across sectors and around the globe. These sectors will become all the more important as Australia designs a COVID19 recovery and it is imperative that women are better included as these sectors develop.					
FT210100422	**Socio-spatial implications of smart city development in India**	263,370.00	278,370.00	278,370.00	283,370.00	1,103,480.00
Alizadeh, A/Prof Tooran	The project aims to generate extensive new knowledge on the complex socio-spatial implications of smart city development; and the ways in which they have been further consolidated, expedited, and elevated in response to COVID, and to stimulate the pandemic-hit economies. It makes a significant contribution to smart urbanism discourse globally with a focus on equity and its special role at times of crisis. The outcomes include a Smart City Roadmap for advising diverse stakeholders on how to negotiate for and build inclusive smart cities - with significant benefits in strengthening existing, and building new connections between India and Australia in an area of bilateral national significance.					
	National Interest Test Statement					
	Economic benefits: Projections for the worldwide value of the smart city sector hover around the market size reaching US$50 trillion by 2050. By producing advanced knowledge on smart city development in India and engaging with the relevant smart city sector, this project is embedded in such a sizable market in a region that is expected to witness the highest growth rate globally. It has significant potentials for Australia to create economies of scale; and exponentially grow its smart city sector linked with India. Contribution to priorities identified by the Australian Government: The project fully aligns with the India-Australia Strategic Partnership which is built on the notion that there is no single major market out to 2035 with more growth opportunities for Australia than India. It will cultivate new and strengthen existing connections in an area of bilateral national significance (see 'Smart Cities Mission' for India, and 'Smart Cities Plan' for Australia); and elevate Australia as a global leader with specific interest in the smart city sector in India and the broader Asia-Pacific region.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100455	**Illuminating the dark neutrophil glycoproteome**	251,000.00	248,000.00	248,000.00	248,000.00	995,000.00
Andersen, Dr Morten T	This project aims to shed light on the highly complex and dynamic sugar-coated surfaces of neutrophil white blood cells critical for the cell communication and function of our innate immune system. The project expects to generate molecular-level insights into neutrophil biology by detailing the structure, formation, regulation, interactions and functions of these cell-surface sugars across the varied neutrophil life stages using systems glycobiology approaches. The project will map the extensive sugar remodelling on and in the neutrophil and reveal new sugar-mediated mechanisms governing key immune processes. This project will benefit the community by expanding our knowledge of fundamental processes underpinning our innate immune system.					
	National Interest Test Statement					
	This project will enhance our understanding of the immune system by decoding the molecular mechanisms of key processes. The knowledge gained will inform decision makers in healthcare, government and community sectors in understanding and controlling our immune system, and this will enable improvements in our population's health. The project will train students and scientists in analytical glycobiology, providing future workers with key sought-after skills tailored to the Australian biotech industry that cannot be obtained elsewhere in Australia. This project will also stimulate technological advancements and innovations in analytical glycoscience using innovative mass spectrometry methods, which will have commercial applications in the biotech industry and beyond, and lead to economic benefits in the future as Australian industries exploit this cutting-edge science.					
FT210100485	**The Births and Deaths of Stars**	165,255.00	165,255.00	165,255.00	165,255.00	661,020.00
Murphy, Dr Simon J	This project aims to investigate how the formation of planets and their stars are intertwined, by determining the ages, masses and compositions of the stars to unprecedented precision. It will probe the nature of compact remnants left behind when stars undergo supernova explosions by using an innovative approach to studying the motions of stars through space. Expected outcomes include the discovery of the closest supernova remnants to Earth, and detailed characterisations of the orbits of several hundred binary stars to reveal how stars form. This should provide significant benefits to major Australian astronomical surveys that are trying to understand Earth's place within our Galaxy.					
	National Interest Test Statement					
	This project directly addresses three of the six research questions in the Decadal Plan for Australian Astronomy 2016-2025, which seek to better understand our place in the Universe and the laws of physics that underpin our technological society. This project will advance our understanding of how the formation of stars and planets are interlinked. It will generate new knowledge about their birth characteristics that will inform both stellar astrophysics and planetary science, including the search for habitable worlds. Through observations with Australian and space-based telescopes, the project will also probe the nature of matter at extreme densities that exist only in the remnants of exploded stars and cannot be reproduced in terrestrial laboratories. The measurements thereby collected will shed light on how chemical elements are produced and distributed in our galaxy through cosmic time, and will augment major Australian astronomical surveys. The project brings together expertise from the US, Europe, and Japan, facilitating research training and the transfer of knowledge between these countries.					
FT210100858	**Nuclear and chromatin architecture in the replication stress response**	275,000.00	272,000.00	269,000.00	266,000.00	1,082,000.00
Cesare, A/Prof Anthony J	DNA replication is an essential biological activity required for the transmittance of genomic material across cell divisions. If errors occur during DNA replication, this results in dangerous outcomes including mutation, genome instability, and cell death. Cells cope with challenges to DNA replication through a process called the replication stress response. This fellowship explores a newly discovered pathway in the replication stress response where changes to the architecture of a cell nucleus, and movement of the genomic material inside, promotes repair of genomic damage that occurs during replication. The result of this project will be an understanding of fundamental biological processes that protect human genomes.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This research advances our fundamental understanding of the biology of DNA repair processes that protect vertebrate and other genomes to maintain cellular health and longevity. These insights could help combat the leading causes of disease in Australia, such as cancer. DNA 'replication stress' in cells is a major driver of the genomic instability that is a hallmark of these diseases. This project will explore a newly discovered pathway in the replication stress response where changes to the architecture of a cell nucleus and movement of the genomic material inside promote repair of genomic damage that occurs during replication. It will create valuable new knowledge that has the potential to advance Australian medicine and animal husbandry in key areas such as cancer therapy, cellular engineering and tissue bioengineering. The outcomes from this fellowship will enhance Australian research and train the next generation of genome biologists for the Australian workforce.					
	The University of Sydney	2,119,515.00	2,179,435.00	2,181,835.00	2,101,915.00	8,582,700.00
University of Technology Sydney						
FT210100100 Raina, Dr Jean-Baptiste	**Microbe-produced repellents and their roles in marine pathogen behaviours** Economic losses caused by disease outbreaks in marine fisheries and aquaculture exceed US$6 billion per year globally. Decades of research in human and plant pathogens have revealed that the ability of pathogens to infect their host is governed by behaviours; however our understanding of the chemical cues affecting the behaviour of marine pathogens is very poor. This research program aims to combine new approaches in microfluidics and chemical imaging to identify the cues that govern the behaviour of marine pathogens. Expected outcomes include an improved capacity to predict, monitor and manage marine diseases, as well as novel strategies to prevent disease outbreaks, helping to protect Australia's valuable marine estate.	210,905.00	210,000.00	210,000.00	210,000.00	840,905.00
	National Interest Test Statement The Australian marine industry is one of the fastest growing sectors of the economy, estimated to reach an annual worth of $125 million by 2025. However, the rise of diseases is negatively impacting the industry's productivity. This project will generate 3 main outcomes. (1) By identifying the repellent molecules dictating how pathogens spread in the environment and the factors influencing their production, it will elucidate when and where pathogens might cause an outbreak, improving our capacity to predict, monitor and manage marine and aquaculture diseases. (2) By leveraging the strong repulsion these molecules induce, it will provide novel approaches to prevent mass-mortality caused by pathogens in aquaculture, enhancing the profitability of the sector. (3) By investigating the ecological role of repellents in other marine bacteria, it will elucidate how their production might play a role in the carbon cycle, ultimately influencing the climate of our planet. These outcomes will be relevant to scientists, aquaculture farmers, marine ecosystems managers, and by extension, the Australian community at large.					
	University of Technology Sydney	210,905.00	210,000.00	210,000.00	210,000.00	840,905.00
University of Wollongong						
FT210100844 Li, Dr Zhi	**Iron-based high-temperature topological superconductors** Because of topological non-trivial nature and zero resistance, topological superconductors are very promising in the application of future electronic devices. This project aims to achieve intrinsic and robust topological superconductors at high-temperature by engineering iron-based superconductors via precisely controlling the defects, chemical doping, interface and substrates. Expected outcomes of this project will include high-temperature iron-based topological superconductors as new material platforms for the study of exotic properties of topological superconductivity and future application in high-temperature fault-tolerant quantum computing.	205,961.00	206,261.00	206,611.00	183,455.00	802,288.00

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement					
	By harnessing exotic quantum properties, quantum computers will potentially achieve revolutionize computation which can never be achieved by classical computers. Topological superconductors are newly discovered materials which are proposed recently to build quantum computers. Quantum computers built by topological superconductors will overcome the decoherence problem, which constrains the performance of current quantum computers. This project aims to advance the research of topological superconductors by achieving intrinsic and robust high-temperature topological superconductors. Australia has outstanding quantum computing research teams and startup companies. The high-quality topological superconductors fabricated from this project will be shared with quantum computing groups nationwide to fully explore the potential of topological quantum computing in Australia. The success of this project will further enhance the research strength of quantum computing in Australia and ensure the leading position of Australia in topological quantum computing.					
	University of Wollongong	205,961.00	206,261.00	206,611.00	183,455.00	802,288.00
Western Sydney University						
FT210100366	**Linking Stress Tolerance to Molecular Evolution of Grass Stomata**	239,000.00	260,000.00	263,000.00	262,000.00	1,024,000.00
Chen, Prof Zhong-Hua	Salinity and drought are two detrimental environmental stresses, affecting agricultural productivity and ecosystem health in Australia and around the world. This project will focus on the evolutionary, physiological and molecular aspects of stomatal regulation between wheat, barley and their wild relatives for salinity and drought tolerance. This project will advance the scientific knowledge in the evolution of stomatal regulation in two staple crops wheat and barley. The project will also assist plant breeders with increasing crop salinity and drought tolerance for global food security.					
	National Interest Test Statement					
	Salinity and drought tolerance of major cereal crops such as wheat and barley are important crop productivity at marginal land and beneficial to the agri-ecosystem in Australia. Significant impact in the short-term will be supported by outputs including a novel framework for predicting stomatal response to salinity and drought. The project will also develop innovative analytical tools, open data-sharing and knowledge-sharing with researchers, farmers and stakeholders. Outcomes in the medium-term may include development of screening tools for salinity and drought tolerant cultivars and crop management recommendations tailored to Australian farmers. Widespread economic and environmental benefits may be realised in the longer-term, including more productive and sustainable management of agricultural land affected by salinity and drought and crops based on a innovative foundation of tools for decision-making.					
	Western Sydney University	239,000.00	260,000.00	263,000.00	262,000.00	1,024,000.00
	New South Wales	6,817,633.00	6,881,237.00	6,912,243.00	6,679,573.00	27,290,686.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
Queensland						
Central Queensland University						
FT210100234 Vandelanotte, Prof Corneel	**Improving workplace productivity via an AI-based physical activity chatbot** This project aims to develop, train and evaluate a physical activity chatbot using artificial intelligence and machine learning to improve workplace productivity in sedentary office workers. Productivity losses, due to high numbers of physically inactive workers, cost the Australian economy $14 billion per year. The cost of effective and scalable workplace physical activity programs acts as a barrier to their implementation. As such, innovative programs that can reach large numbers of workers at minimal cost are needed. This project aims to generate new knowledge on the use of artificial intelligence to achieve behavioural improvements and will lead to the development of a new type of behaviour change program with broad applicability. **National Interest Test Statement** There is strong evidence for the benefit of regular physical activity on productivity indicators of workers such as absenteeism, presenteeism, work performance, burnout, injury, fatigue-related safety and staff turnover. Unfortunately, the majority of workers, especially office workers, are inactive, resulting in productivity losses. It is estimated these losses cost the Australian economy $14 billion a year. Therefore, it is important to develop innovative methods to increase physical activity behaviour in workers. However, businesses have identified cost as the most important barrier to the implementation of workplace physical activity programs. As such, there is a need for programs that can effectively reach and engage large numbers of workers at minimal cost. This project aims to develop, train and evaluate a physical activity chatbot using artificial intelligence and machine learning to improve workplace productivity in sedentary office workers. The knowledge from this project may lead to the development of programs to improve other behaviours (e.g. reducing food waste, adapting to climate change).	280,230.00	278,370.00	276,510.00	264,370.00	1,099,480.00
	Central Queensland University	280,230.00	278,370.00	276,510.00	264,370.00	1,099,480.00
Griffith University						
FT210100080 Wiseman, Prof Leanne G	**Unlocking digital innovation: Intellectual Property and the Right to Repair** This project aims to investigate the role that Intellectual Property (IP) plays in the rights and capacities of Australians to repair their smart goods. This project will generate new knowledge with regards to how IP can contribute to emerging regulatory approaches to the 'Right to Repair', which has consequences for a more efficient and sustainable use of Australia's resources. Expected outcomes include advanced knowledge and understanding of IP and the role it can play in rebalancing manufacturer and consumer relationships in digital consumables and in Australia's future environmental sustainability. This will enhance Australia's economy and society through legal, economic, and environmental regulatory reform. **National Interest Test Statement** This project will deliver legal, economic, commercial, environmental and societal benefits to Australia by unlocking digital innovations in consumables through the creation of an enabling legal and regulatory framework for the introduction of a Right to Repair for Australia. An Australian Right to Repair will bring environmental benefits that will, in turn, contribute to Australia's transition to a Circular Economy. Australian consumers, farmers, motorists, repair industries, designers, environmentalists, policy makers and regulators will benefit from this examination of the international Right to Repair movement through the lens of Intellectual Property. This will build Australia's capacity to respond to the broader environmental challenges associated with the increasing problem of inbuilt product obsolescence.	276,000.00	281,500.00	281,500.00	248,370.00	1,087,370.00

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100118	**Painting Country: the life and legacy of western Arnhem Land rock painters**	246,738.00	240,899.00	237,989.00	235,513.00	961,139.00
May, Dr Sally K	This project aims to generate new understandings of Australia's past by exploring the lives and legacies of known Aboriginal rock art artists. It addresses key questions in global archaeology relating to when, where and why rock art was created. Using innovative methodologies, this project intends to create a unique archive of 20th century rock art and oral history recordings from western Arnhem Land. The anticipated outcomes will include new internationally significant knowledge concerning the impacts of colonisation on artistic practices in Australia. Furthermore, the project aims to contribute new information and data that can be used to inform cultural heritage management and education programs both locally and across Australia.					
	National Interest Test Statement					
	This research will raise awareness of rock art as a rare visual record of human history and experience and contribute to improved conservation and management outcomes. Importantly, this research aims to help build pride in Aboriginal history, heritage and culture both within local Aboriginal communities and across Australia by highlighting the lives and achievements of known artists. This project will also generate benefits for cultural heritage management programs, the Northern Territory tourism industry, school programs and to provide new insights into the relationship between cultural heritage and Indigenous health and well-being. By generating and promoting this unique archive of Australia's history, this research will speak to an international audience eager to learn from the Australian experience in order to better understand, interpret and protect their own rock art heritage.					
FT210100617	**The internationalisation of nationalist populism**	253,370.00	258,370.00	263,370.00	258,370.00	1,033,480.00
McDonnell, Prof Duncan E	This project aims to explain the rising international cooperation between nationalist populists in democracies across the world. It expects to generate new knowledge about how and why these forces now work together to oppose common targets such as multilateral institutions, free trade and liberal democracy. Expected outcomes of this project include a sophisticated, evidence-based understanding of the dynamics and effects of contemporary nationalist populist cooperation. Given Australia's commitment to promoting good governance and strong democratic institutions, in addition to the interest overseas nationalist populists have shown in helping likeminded movements in Australia, the project will provide significant benefits for policymakers.					
	National Interest Test Statement					
	This project focuses on nationalist populism, whose rise across the world has been described by policymakers in Australia as one of the major twenty-first century threats to the country's foreign policy goals of promoting liberal democracy, global free and fair trade, and the rules-based international order. Moreover, the danger posed by nationalist populists is exacerbated by their increased collaboration on shared objectives, both within and across continents, witnessed over the past decade. This project, the first of its kind, will produce key knowledge for Australian policymakers and scholars into the origins, features, and effects of that collaboration. The outcomes of the project will inform critical and timely debates in Australia about the challenges posed to our values and interests by international cooperation between nationalist populists while providing insights into how we can respond to this new threat.					
FT210100663	**Solving the solvent problem in chemical modelling**	218,779.00	237,646.00	233,106.00	231,006.00	920,537.00
Gould, Dr Timothy J	This project aims to produce highly accurate, user-friendly chemical solvent models using interdisciplinary theoretical chemistry techniques. The benefits of these novel models are extremely broad since chemical modelling is more impactful than traditional laboratory based techniques in solving multi-faceted modern chemical problems. The proposed outcomes of the project are significant, as they will transform how applied research solves difficult and expensive real world chemical problems by allowing researchers to reliably include solvents in their models. It will have economic benefits for the chemical, mining and materials sectors in Australia, which represent billion-dollar industries.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project will develop important "virtual chemistry laboratory" models that enable researchers to optimise and discover chemical processes using highly accurate computer simulations, which are faster and cheaper than traditional discovery pathways. The new chemical models will help accelerate research and development cycles in multiple billion-dollar industries, including mining, chemical and pharmaceutical industries. By using these novel models, industries will be able to innovate more efficiently, providing (i) direct commercial benefit by significantly reducing R&D costs; (ii) environmental benefit by reducing laboratory waste; and (iii) national benefit by growing capabilities. It will also train the next generation of researchers in advanced chemical modelling techniques and boost Australia's position as a leader in virtual laboratory techniques that are rapidly being adopted by industries that use chemistry.					
FT210100792 Brown, Dr Christopher J	**Predicting coastal ecological futures in an era of unprecedented change** This project aims to show how we can predict the future for coastal habitats, fisheries and biodiversity, and validate the reliability of those predictions. Global change means ecosystems are rapidly changing beyond the bounds of historical data, so we can no longer extrapolate past trajectories to predict the future. Reliable predictions are needed to help managers mitigate the risks of future human activities to the environment. Expected outcomes are improved techniques for making predictions that can inform the adaptive management of ecosystems. This is expected to benefit the management of the coastal zone, including fisheries and habitat restoration, which will contribute to enhancing Australia's valuable ocean economy.	216,328.00	240,675.00	233,225.00	233,745.00	923,973.00
	National Interest Test Statement Eighty five percent of Australians live on the coast and rely on ocean resources for food, trade, transport and recreation. Marine ecosystems are estimated to be worth $25 billion per year to Australia, but rapid changes in climate, ecosystems and human activities are putting this value at risk. This project aims to provide predictive tools that will advance Australia's ability to predict change in fisheries, biodiversity and pollution. The predictions will inform management about the certainty of different future outcomes for coastal ecosystems. Predictions, and assessment of their certainty, are needed to help Australia adapt its management of valuable coastal marine activities to environmental change. Predictive tools will also enable management to identify solutions that balance the economy and environment. Better prediction of change in coastal marine values means the project has benefits to coastal economies, ocean food production and ocean environments.					
	Griffith University	1,211,215.00	1,259,090.00	1,249,190.00	1,207,004.00	4,926,499.00
Queensland University of Technology						
FT210100229 Sadiq, Prof Kerrie L	**International Tax in the Digital Age: A Blueprint for Allocating Profits** This project aims to investigate tax avoidance by multinational enterprises in the age of the digital economy. It addresses the difficult problem of determining the location in which profits are made. The project expects to generate new knowledge in international tax by developing a blueprint for allocating profits of multinational enterprises between jurisdictions that aligns with profit making activity and reduces international tax avoidance. A systematic structure for allocating profits of multinational enterprises will address the important problem of tax base erosion caused by profit shifting. This will provide the significant benefit of developing a major tool in securing Australia's revenue base in the digital age.	257,165.00	259,961.00	250,961.00	257,961.00	1,026,048.00
	National Interest Test Statement Taxation, and the maintenance of a sustainable national system of government finance are important foundations for productivity and economic growth during fiscally challenging periods like the current economic climate.The project will contribute to the protection of Australia's tax base through a blueprint to tackle international tax avoidance by multinational enterprises. An alternative model for allocating profits in the digital era will be used as a benchmark for evaluating current rules and proposed modifications to those rules. It will inform national tax policy and allow Australia to play a central role in international efforts to counter profit shifting.The project will generate a substantial national benefit through domestic resource mobilisation, contributing directly to the Australian Government's strategic research priorities by securing its revenue base through a tax regime that ensures economic well-being. Australia's contribution to the debates in this field are important to outcomes globally and as they relate to Australia itself.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100243	**Counting a Sixth Mass Extinction**	205,611.00	205,611.00	205,611.00	205,611.00	822,444.00
Wallach, Dr Arian	This project aims to investigate how values shape conservation science and policy by utilizing a feminist philosophy of science approach. This project expects to generate new biodiversity assessments by adjusting the cultural lenses through which species are counted and conservation status is assigned. Expected outcomes of this project include the creation of an interactive global biodiversity map, in which data changes when values change, which will reveal biodiversity trends, species, conservation risks and opportunities that currently remain outside conservation attention. This should provide significant benefits to biodiversity, by opening space for diverse values to broaden the scope of conservation science, ethics, and policy.					
	National Interest Test Statement					
	Australia is losing species at the rate of a mass extinction – and – the number of species in Australia is increasing. These statements are both factually correct although they contradict, because values shape biodiversity science. This project will unlock entrenched limitations in conservation science by applying diverse perspectives to biodiversity data. Using data visualisation and digital interactivity technologies, this project will create an open-access interactive mapping tool which applies cultural values to reveal hidden aspects of biodiversity and new conservation opportunities. This tool will highlight how each worldview reveals distinct biodiversity trends, risks and opportunities. By combining different cultural worldviews, this project will generate new policy directions that are less costly, more effective, and less socially controversial than current approaches. Conservation science and policy benefit biodiversity most when the values that inform them are diverse. This project will enable Australian society to embrace a vision of conservation that reflects and celebrates its diverse values.					
FT210100260	**Scalable and Robust Bayesian Inference for Implicit Statistical Models**	260,000.00	266,000.00	267,000.00	233,000.00	1,026,000.00
Drovandi, Prof Christopher	This project aims to develop the next generation of efficient methods for fitting complex simulation-based statistical models to data. Practitioners and scientists are interested in such implicit models to enable discoveries, produce accurate predictions and inform decisions under uncertainty. However, the associated computational cost has restricted researchers to implicit models that must have a small number of parameters and be well specified, impeding scientific progress. This project will develop new computational methods and algorithms for implicit models that scale to high dimensions and are robust to misspecification. Benefits will arise from the more routine use of implicit models in epidemiology, biology, ecology and other fields.					
	National Interest Test Statement					
	Calibrated statistical models can advance scientific understanding, facilitate decision making and generate predictions. For example, calibrated models are useful for weather forecasting, assessing financial risk, understanding biological systems, computing risks for invasive species, and so on. However, the ubiquitous use of oversimplified statistical models can have severe consequences, in terms of inaccurate predictions and suboptimal decisions. This project will develop innovative and principled statistical methods to significantly increase the scalability and robustness of statistical inference for computationally expensive simulation-based models, referred to as implicit models. The new methods will generate economic, commercial and environmental benefits for Australia by facilitating the widespread use of realistic models in many disciplines such as biology, ecology, finance and the environment. This project contributes to increasing capability in science, technology, engineering and mathematics, which is at the core of the governments science agenda as outlined in the National Science Statement.					
FT210100263	**Regulating and countering structural inequality on digital platforms**	239,194.00	248,386.00	258,392.00	258,078.00	1,004,050.00
Suzor, Prof Nicolas P	This project aims to find legal, ethical, technical, and commercial opportunities to counter inequality online. It uses machine learning and custom data collection tools to create new knowledge about how digital platforms—including search engines, social media, peer economy, and news platforms—can help to tackle misogyny, racism, and other forms of structural discrimination. It uses this knowledge to investigate the extent to which private sector digital platforms can be expected to monitor and regulate the actions of their users, what responsibilities they have to avoid contributing to discrimination, hatred, intolerance and abuse, and how the law should develop to ensure that our digital environment is more equal and fair.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project brings new data, theory, and analysis to the major challenge of addressing discrimination, abuse, hate and inequality online. Digital platforms have a great deal of influence over Australian society; peer economy or 'gig' platforms coordinate the way people work, search engines make decisions about the information we see, and social media platforms shape how we communicate. Under pressure from social movements like #metoo and #blacklivesmatter, many digital platforms have pledged to do more to combat sexism, racism, and other forms of discrimination on their networks. These are crucial issues, but we do not yet know what works to combat discrimination and inequality online, what exactly we should expect platforms to do, or how we might compel them to do it. This project is designed to produce new rigorous knowledge to understand how platforms can begin to effectively counter inequality and discrimination online. It uses this new knowledge to create evidence-based guides that can inform the development of public policy, law reform, and industry practice.					
FT210100521 Woodcroft, Dr Benjamin J	**An evolutionary landscape to better predict our future climate** Soil microbial communities are the most complicated and difficult to study on Earth, but their effects on our climate are profound. This project will examine the evolution of microorganisms and their viruses in soil using novel methods. It will uncover how the evolution of one microbial species influences the evolution of other community members. It will also apply a new model of evolution to the viruses that infect these microorganisms, constructing a viral 'tree of life'. This improved fundamental understanding of soil communities will be used to study climate feedback from permafrost wetlands, a key and poorly constrained input of global climate models, improving predictions of our future climate.	234,540.00	234,540.00	234,540.00	224,540.00	928,160.00
	National Interest Test Statement Microorganisms in Australian soil fulfill many ecological functions, both in natural and agricultural settings. The project will elucidate two fundamental yet abstract structures that govern these systems – interactions between microorganisms and an evolutionary 'tree of life' for viruses. Improved understanding of the ecological and evolutionary processes happening in soil has many implications for sustainable land management, including those within Australia's 'Soil and Water' and 'Food' research priority areas, and is intimately involved in Australia's contributions to global carbon cycling. To study these fundamental forces, the project will build free software packages and distribute them publicly. Additionally, the project's focus on methane cycling in northern hemisphere permafrost soil will contribute to increased accuracy of climate models, a benefit both for Australia and for all humanity.					
FT210100579 Bray, Dr Laura J	**Redefining tissue-specific endothelial cells through bioengineered matrices** This project aims to improve our understanding of the biological mechanisms that drive blood vessel formation and function. The endothelial cells that make up each blood vessel are inherently unique across different sites within the human body and this project expects to generate new knowledge regarding their organ specificity. Using advanced bioengineering approaches, this project will map human endothelial cell specificity and develop state-of-the-art modelling technologies to improve knowledge of environmental influence on endothelial cell fate and function. This should provide a new framework to modulate the adaptive capacities of endothelial cells and can potentially enable more predictive and targeted drug efficacy and safety testing.	254,540.00	226,646.00	226,646.00	226,646.00	934,478.00
	National Interest Test Statement The ability to regenerate tissues and organs efficiently and without error is a major goal of the medical technologies industry around the world. As the connecting pathway to all organs in the human body, blood vessels are an important system underpinning how organs form, how they change and how they regenerate. Due to the biological complexity of human blood vessels, most of the factors controlling the creation of blood vessels within different tissues are still to be identified. Specifically, the outcomes of this project will demonstrate how the surrounding tissue environment influences the formation of tissue specific blood vessels. We will use advanced scientific methods to observe and manipulate the behaviour of endothelial cells and to link these cell behaviours to tissue-specific functions. By creating seamless information from the microscopic to the macroscopic world, this project will allow us to comprehensively characterize how blood vessels form, how they function and beyond the scope of this project, how they may fail in disease.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100655	**Pathways to agri-food supply chains that co-benefit people and nature**	203,705.00	203,705.00	203,705.00	203,705.00	814,820.00
Tulloch, Dr Ayesha T	This project aims to improve biodiversity outcomes of agricultural food production and consumption, and expects to generate new knowledge about impacts of interventions and shocks on the environment, human health and livelihoods in agri-food systems. This will be achieved using an interdisciplinary approach that accounts for uncertainties in links between farmers, suppliers, consumers and supply-chain outcomes. The expected outcome is a value of information framework for identifying nature-friendly policies and actions with co-benefits for human well-being. Benefits include sustainability pathways with win-win outcomes for people and nature, and improved ways of meeting international commitments such as Sustainable Development Goals.					
	National Interest Test Statement This research will build theory, synthesise evidence and develop a practical framework for integrating nature into agri-food supply choices that are increasingly subjected to shocks from changed environmental and socio-economic conditions such as COVID-19. Evidence synthesis and case study models will show how informed, strategic interventions improve biodiversity while achieving health and livelihood outcomes. This project will equip governments, the agriculture industry and environmental not-for-profit sector in Australia and globally with decision support and policy guidelines for choosing biodiversity-friendly, healthy interventions in agri-food production and consumption, minimising risks to livelihoods, and providing tools to track supply-chain impacts at regional, national or global scales. Insights will enable us to meet changing food demands whilst avoiding perverse outcomes on human health and the environment. Benefits include improving Australia's capacity to achieve and report on international biodiversity and human well-being commitments such as the United Nations Sustainable Development Goals.					
	Queensland University of Technology	1,654,755.00	1,644,849.00	1,646,855.00	1,609,541.00	6,556,000.00
The University of Queensland						
FT210100266	**Molecular probe development for high specificity and spatiotemporal control**	246,346.00	246,146.00	249,446.00	238,393.00	980,331.00
Muttenthaler, Dr Markus	This project aims at developing next-generation molecular probes with enhanced specificity and spatiotemporal control for the study of proteins and neuropeptide signalling. It addresses recognised knowledge gaps and technical bottlenecks in neuropeptide and memory research. Expected outcomes include a deeper molecular understanding of long-term memory formation and the role of neuropeptides in this process, as well as innovative chemistry strategies and novel molecular probes to advance fundamental research across the chemical and biological sciences. Anticipated benefits include technological innovations of relevance to Australia's biotechnology sector and enhanced capacity for cross-disciplinary collaboration.					
	National Interest Test Statement This research will lead to several benefits: (i) New knowledge gains on neuropeptide signalling and on their role in important physiological processes, such as memory formation; (ii) Technological advancements in molecular probe development, neuro- and photo-pharmacology, and chemical biology to accelerate fundamental research; (iii) Economic benefits in the long-term, as breakthroughs in neuropeptide research can lead to multi-million-dollar returns; (iv) Enhancement of Australia's knowledge/skills base and research capacity due to the project's multidisciplinary nature, the outstanding research environment, the knowledge/skill transfer from Europe to Australia, and the world-class training of the next generation of scientists in the fields of Chemistry, Chemical Biology and Neuropeptide Research; (v) Promotion of Australia's scientific excellence and recognition in the areas of chemical biology and neuropeptide research, via both academic and non-academic channels, and (vi) New national and international collaborations to strengthen Australia's competitiveness on an international level.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100335	**Normalising Ability Diversity through Career Transitions:Disability at Work**	247,734.00	252,728.00	250,695.00	243,785.00	994,942.00
Harpur, Dr Paul D	This project aims to investigate how the higher education sector can better support people with disabilities to transition from economic exclusion to work. One in five Australians have a disability and of these 47.3% are not employed. This is a significant issue with regulatory failures and challenges often affecting rights to education and work being exercised on an equal basis. This project seeks to examine international legal norms, theories and strategic and operational practices in the higher education sector. Expected outcomes include advances in scholarship on ableism, informed policy reform, and transferable operational processes for the education and employment sectors, to improve the transition of people with disabilities to work.					
	National Interest Test Statement					
	Strengthening Australia's economic performance, helping the most vulnerable persons with disabilities and improving the operation of the higher education sector and labour market are all key national priorities. This project will have a tangible impact on all of these key priorities. Through increasing the capacity of the higher education sector to transition students with disabilities to work, this project seeks to turn welfare recipients into tax payers, while helping previously excluded groups to enjoy the cultural and economic benefits previously denied them. These profound benefits can be achieved through improving regulatory and policy interventions in ways that increase rights outcomes, without demanding greater resources This research seeks to inform institutional structures to be more inclusive of all students and staff and in doing so, create a new normal to for all Australians, including the 1 in 5 people who currently have a disability.					
FT210100589	**Metal Halide Perovskite Metal-organic Framework Crystal-Glass Composites**	213,051.00	184,865.00	189,345.00	184,945.00	772,206.00
Hou, Dr Jingwei	This project aims to investigate the highly stable and efficient semiconductive composite materials, recently discovered by my group, consisting of metal halide perovskite embedded in metal-organic framework glass. An integrated experimental and computational approach will be used to study the structures and interfacial bonding mechanisms that govern the highly sought-after properties for the composites. Expected outcomes are a new generation of environmentally safe perovskite devices for energy, environmental and health applications, e.g. lighting, displays, X-ray sensing, photocatalysis and photovoltaics. This project will position Australia at the forefront of semiconducting device research and create commercial opportunities.					
	National Interest Test Statement					
	Synthetic semiconductive perovskites can find use in a wide range of energy, environmental and biomedical applications. They are considered as the next generation of solar panel materials and quantum dot displays, and can enable low-dose, high-resolution X-ray imaging/sensing. Their practical applications are still hampered by their poor stability and environmental toxicity. This project aims to address the persistent problems for this family of materials, and thereby enable the highly sought-after perovskite devices not currently available in the market. The project outcomes grant significant progress in synthetic materials development, transforming Australia's vast abundance of natural resources to synthetic advanced materials. It will generate valuable compounds and devices within Australia for export. This project will place Australia at the forefront of the new generation semiconductive material products, and significantly augment advanced manufacturing for the Australian mining industry.					
FT210100624	**Decentralised Collaborative Predictive Analytics on Personal Smart Devices**	235,500.00	235,500.00	235,500.00	221,000.00	927,500.00
Yin, Dr Hongzhi	This project tackles the challenging problem of personalised predictive analytics with resource-constrained personal devices and massive-scale data. The knowledge to be generated concerns privacy, fairness, and resource efficiency in the era of Internet of Things. The expected outcomes include a collaborative learning paradigm for building personalised models on personal smart devices in open and fully decentralised settings. Privacy and model fairness are core tenets of the paradigm. Personalised predictive analytics is frontier research that will position Australia at the forefront of AI and give business the tools needed to deploy innovative business systems for market exploitation with a secure, equitable and competitive advantage.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement The major challenges facing humankind from big data and Artificial Intelligence (AI) are trustworthiness and energy consumption. AI has produced startling achievements and is deemed to shape the future of business and society, but all these advances require staggering amounts of computing power and energy to build big machine learning models. In addition, recent news about AI safety (e.g., privacy leaks and cyber-attacks) and discrimination is causing great concern among governments and the general public. This project aims to establish a novel low-power machine learning architecture to provide trustworthy intelligence on personal smart devices. The new architecture will significantly reduce the energy footprint required and provide individual users with strong guarantees on safety and fairness, positioning Australia at the forefront in enabling AI and cybersecurity capabilities in the era of the Internet of Things. It will translate to applications in smart healthcare, digital economy, online services, and manufacturing, representing significant new market advantages and economic benefits for Australia.					
FT210100675 Zych, Dr Magdalena A	**Gravity effects in quantum clocks and sensors: foundations and applications** Time is among the most precisely measurable quantities in physics, yet it is also the least understood concept in physics. This project aims to develop a mathematical framework describing measurements of time with high-precision clocks sensitive to both quantum and gravitational effects. The project expects to deliver new knowledge in the foundations of quantum physics by describing new gravitational effects in quantum systems. Expected outcomes include enhanced understanding of time in quantum theory and strategies for harnessing gravitational effects in high-precision clocks, bringing cultural benefits to society and paving the way towards improved quantum technologies that are expected to bring economic benefits in the next two decades.	217,705.00	219,705.00	192,205.00	160,705.00	790,320.00
	National Interest Test Statement State-of-the-art sensing and information processing devices use quantum systems, opening the path towards commercial quantum technologies estimated by CSIRO to contribute $4 billion to Australian economy and create 16 thousand jobs for Australians by 2040. Rapidly improving precision of these technologies means that even the minuscule gravitational effects will have to be incorporated into their design to reach the targeted performance of next-generation quantum devices. This research aims to develop currently missing mathematical tools describing gravitational effects in quantum systems used in quantum technologies, explore how they affect the notion and measurements of time, and provide ways to mitigate these effects and thus enable next-generation quantum devices. Knowledge from this research will be indispensable for harnessing quantum effects for practical applications in future quantum technologies brining economic benefit to Australia, and will enhance our understanding of the notion of time in quantum physics, which in turn will bring cultural benefits to Australian as well as global community.					
FT210100809 Haine, Dr Simon A	**Advanced Quantum Sensors for Next-Generation Sensing Applications** The aim of this theoretical physics project is to develop ultra-precise sensing capabilities for two main applications: ultrastable inertial sensors for improved navigation and gravimetry, and to search for signatures of quantum gravity. This project expects to improve the performance of quantum sensors via the use of machine optimisation, and may lead to much-needed experimental data to help guide one of the most challenging problems in theoretical physics: the quantisation of gravity. The expected outcomes of this project are enhanced quantum sensor design, leading to improved inertial sensing technology. This should provide benefits such as improved capabilities for minerals exploration and monitoring the movement of ground water.	206,271.00	188,811.00	188,811.00	174,758.00	758,651.00
	National Interest Test Statement Many technologies crucial for the environmental and economic wellbeing of Australia are currently limited by our ability to make precise measurements. One example is the precise measurement of gravitational fields, which currently limits our ability to search for minerals deposits without the need to excavate, and our ability to monitor underground water reserves. Another example is our ability to precisely measure accelerations and rotations, which will enable precise navigation in GPS-denied environments. This project aims to make significant breakthroughs in sensing capabilities. In particular, by developing inertial sensors with improved precision, this project may benefit the discovery of new mineral reserves to benefit our mining industry, and improve our ability to monitor the movement of ground water to aid the management of one of our most precious resources. This project also focusses on developing new inertial navigation capabilities that may benefit our military, and help to maintain the safety of Australia and its allies.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100812	**Exploring the Black Box of Archaeal Methane Metabolism**	171,965.00	179,955.00	178,215.00	178,715.00	708,850.00
Evans, Dr Paul N	This project aims to build on new discoveries about how ancient microorganisms belonging to the Archaea that process methane, a significant greenhouse gas. This project expects to generate new data about how these novel Archaea are able to generate/digest methane and other non-methane carbon substrates through metabolic pathways using an interdisciplinary approach. Expected outcomes of this Project include improved techniques to grow these ancient microorganisms, investigate how they process methane, and understand how they contribute to the global carbon cycle. This will provide significant benefits, such as understanding the how the cycling of methane and non-methane compounds by novel Archaea can be manipulated in anaerobic environments.					
	National Interest Test Statement Microorganisms that generate or consume methane are abundant in anaerobic environments, and are critical for the global cycling of this compound. However, the cycling of this and other carbon compounds by these anaerobic microorganisms is poorly understood. Anaerobic methane metabolising archaea are key in this process and there is a growing body of evidence to suggest that these microorganisms also utilise non-methane carbon substrates for their growth. This project aims to understand how these archaea process methane and other carbon substrates via carbon cycle, and understand their ability to sequester these compounds into biomass. Also, these unrecognised carbon flow patterns will significantly alter our view of nutrient cycling in these anaerobic environments. These outcomes align strongly with the National Research Priority Area 8, the improved accuracy and precision in predicting and measuring the impact of environmental changes caused by climate and local factors. This carbon capture could be of benefit to Australia based on the ability of these microorganisms to store carbon as biomass.					
	The University of Queensland	1,538,572.00	1,507,710.00	1,484,217.00	1,402,301.00	5,932,800.00
	Queensland	4,684,772.00	4,690,019.00	4,656,772.00	4,483,216.00	18,514,779.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
South Australia						
Flinders University						
FT210100264	**Molecular movies using time-resolved momentum spectroscopies**	180,705.00	180,705.00	180,705.00	180,705.00	722,820.00
Jones, Dr Darryl B	This project aims to use time-resolved momentum spectroscopies to take snapshots of chemical and physical processes as they evolve in time. This project expects to use these molecular movies to track the changes to electron motion after they have absorbed light. Expected outcomes of this project include understanding how the motion of electrons can drive physical processes and induce chemical changes. This will provide significant benefits through expanding knowledge that will assist in controlling chemical reactions and developing technologies with improved performance, such as sensors and solar cells.					
	National Interest Test Statement					
	This project contributes to Australia's national interest through its focus on Energy – one of Australia's key Science and Research Priorities. Understanding the evolution of chemical processes and electron motion in materials will assist in understanding the mechanisms of photo-initiated processes relating to photochemistry, energy generation in solar cells, and the efficiency and selectivity of photo catalytic processes. The anticipated goal of the project is to use this chemical knowledge to significantly benefit advanced manufacturing, where the creation of high performance optoelectronics devices requires an accurate understanding of how the electrons move within devices. Through knowledge of these processes, we can design new technologies with improved performance and function over existing technologies. This is essential for realising a competitive advantage in industrial applications and therefore providing economic and commercial benefit to the Australian community.					
FT210100448	**Strategic Friendship: Anglo-German Cooperation in the Asia-Pacific Region.**	237,370.00	237,370.00	237,370.00	232,370.00	944,480.00
Fitzpatrick, Prof Matthew P	This project aims to investigate the untold history of Anglo-German cooperation in the Asia-Pacific region through hitherto neglected German archival materials. These materials point to thriving and thick webs of mutual assistance in cultural, scientific, economic, military and political affairs that successfully weakened local sovereignty but ended abruptly with World War One. The project expects to produce a new history challenging century-long Anglophone understandings of Anglo-German antagonism in the Asia-Pacific region. Its benefits include providing new knowledge of the history of great power relations in the Asia-Pacific region and establishing an improved historical framework for understanding strategic cooperation in our region.					
	National Interest Test Statement					
	Australia is currently navigating between the increasing regional power of China, our largest trading partner, and the United States, our primary foreign affairs and defence ally. The need to understand the historical nature of this foreign policy situation is particularly urgent given the many predictions of conflict between the two. Testing the validity of such predictions of conflict is of intense national interest, given the effects such a conflict would have on Australia. Such great power conflicts in our region are not new, however, and this project tests historically the propensity for war between a rising and an established power in our region. It investigates a key earlier version of this conflict, namely Anglo-German rivalry in the Asia-Pacific region and Australia's response to it, as a precursor to the current situation. By analysing hitherto unused archival materials to test the conflict model, it seeks to offer a deeper understanding of strategic competition in the region, shedding important new light on the ways Australia, China and the United States might avoid conflict.					
	Flinders University	418,075.00	418,075.00	418,075.00	413,075.00	1,667,300.00

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
The University of Adelaide						
FT210100498	**Targeting chloroplasts to enhance crop salt tolerance**	201,000.00	199,000.00	201,000.00	201,000.00	802,000.00
Bose, Dr Jayakumar	Yield losses in crop plants due to increasingly saline soils are linked to the effects of salt on chloroplasts. By comparing chloroplast water- and salt-transport mechanisms of closely related salt-loving and salt-sensitive plants, this Fellowships aims to discover how chloroplasts maintain function in saline conditions. Novel biophysics and molecular techniques will be used to characterise transporters in model plants, and proof-of-concept complementation experiments aim to confer salt tolerance on sensitive plants. These fundamental insights are likely to lead to rapid, step-change improvements in salt tolerance, especially in agriculturally relevant crops, to benefit Australia's agri-industry and ensure food security in the future.					
	National Interest Test Statement					
	Salinity causes severe yield penalties and poses a major threat to food production, as most crop plants are salt-sensitive. Australia's annual crop losses due to salinity currently amount to $1.3bn, and salinity-affected arable land is expected to treble by 2050. Improving salt tolerance is thus a top priority to ensure food security, but the narrow genetic variability for salt tolerance within crop plants limits the success of traditional breeding methods. My research will identify mechanisms that allow naturally salt-loving plants to maintain yield in salty soils to create a fundamental breakthrough in our understanding of salt tolerance, and design new strategies to introduce target genes that confer salt tolerance into salt-sensitive crops. The expected step-change improvements in yield from saline soils will benefit plant breeders, farmers, and the broader agricultural industry by boosting Australian exports and the wealth of rural communities. Importantly, the advances will be critical to support food production in the face of increasing salinity due to climate change in our vast crop-growing areas.					
FT210100694	**Understanding working memory: from cells to brain stimulation**	240,746.00	243,851.00	243,396.00	243,446.00	971,439.00
Rogasch, Dr Nigel C	This project aims to understand the neural mechanisms of working memory, a fundamental cognitive function in humans, using a novel framework which combines non-invasive brain stimulation, neuroimaging, pharmacological and experimental manipulations, and biological modelling. Expected outcomes include a critical understanding of the cellular mechanisms underlying both neural activity and working memory ability in healthy individuals and a detailed knowledge of how to non-invasively interact with these mechanisms using brain stimulation. This will provide significant benefits such as the development of individually optimised brain stimulation protocols, enabling tailored approaches to reliably alter brain function and cognition.					
	National Interest Test Statement					
	The ability to retain information in short term memory underlies all aspects of daily living, including intelligence, emotion, and social behaviour. Short term memory ability is closely linked with learning and education in healthy people, whereas memory impairment strongly contributes to poor functional outcomes as people get older and in numerous brain disorders. This project will develop a detailed understanding of how the healthy brain stores short-term memories and will investigate how to alter both neural activity and short term memory ability using a form of non-invasive brain stimulation. The outcomes of this research will provide new tools for causally studying brain-behaviour relationships in healthy humans and more effective ways for improving memory over the normal human life course, with benefits for the Australian reserach, education, aged care, and health care sectors.					
FT210100789	**Pathways for Indigenous and Western knowledge into Environmental Policy**	249,890.00	280,156.00	258,525.00	250,321.00	1,038,892.00
Nursey-Bray, A/Prof Melissa J	The aim of this project is to identify the ways in which all knowledge, particularly Western and Indigenous knowledges can work together to inform environmental policy, with a focus on climate change adaptation. Using participatory methodologies and supported by an Indigenous led advisory group, the project will partner with Indigenous Ranger groups to interrogate three key knowledge management concepts: integration, co-production and co-existence. Based on communities of practice, in the Kati Thanda-Lake Eyre Basin, Australia, the Fellowship seeks to produce mechanisms of knowledge co-existence and maintenance that will contribute to stronger environmental policies and create spaces for Indigenous voices to be represented within them.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement Australian society continues to face impacts from wicked problems such as biodiversity loss and climate change: adapting to change will be crucial. Indigenous peoples have millennia old knowledge systems of the ancient continent that can play a significant role in building adaptive capacity and resilience to the challenges the whole of the Australian society will increasingly face this century. The project will provide a critical historical analysis of knowledge system integration in the past, and create a framework for co-production and co-existence of Indigenous and Western scientific knowledge systems. We will contribute ideas about how to appropriately integrate knowledge systems for sustainable futures and we will build Indigenous capacity to be part of policy making. Significant social, cultural and environmental benefits for Australian society are expected through increased capacity to use multiple knowledge systems to respond to severe risks, in a socially just way.					
FT210100810 Boden, Dr Scott A	**Deciphering the genetic regulation of inflorescence development in wheat** The project aims to identify genes and molecular processes that regulate inflorescence architecture in wheat, using state-of-the-art genetic resources to identify novel biological mechanisms that regulate the development of spikelets – reproductive branches that contain grain-producing florets. The research is highly significant as little is known about how spikelet and floret numbers are determined genetically in wheat, and new traits need to be identified to increase yields for the world's growing population. Project outcomes will include new insights into the biology that underpins grain production of wheat, with expected benefits enabling sustainable increases of yields by breeders and growers to help bolster global food security.	202,160.00	203,080.00	202,225.00	209,485.00	816,950.00
	National Interest Test Statement The yield of wheat is largely determined by the shape and structure of the ear, or 'inflorescence' – a cluster of flowers that can be modified to increase grain production. The Fellowship will focus on identifying the genes and molecular processes that regulate wheat inflorescence development. The knowledge and resources gained will help Australian and global breeders generate higher-yielding cultivars to benefit growers and consumers, as well as researchers of other major crops including barley, oats and rice. Outputs will have broad social and economic impacts: wheat is Australia's premier crop, worth $6.2 billion in 2018-19, and accounts for 20% of the calories and protein consumed globally. The outcomes will contribute to the global research effort to increase yield and maintain food security for the world's growing population, while reducing the environmental impact of agriculture. The project provides excellent training opportunities for students, who will acquire multi-disciplinary skills that will enhance their future employability and help strengthen Australia's leading capacity in wheat science.					
FT210100906 Glorie, Dr Stijn	**Breaking Gondwana: interplay between tectonics, climate and resources** The project aims to reconstruct 250 million years of landscape evolution in response to rifting and break-up of the Gondwana supercontinent, using the innovative approach of combining regional thermochronology with global plate tectonic models. From these reconstructions, the time-integrated record of exhumation and erosion at the continental margins will be revealed at an unprecedented scale. The main expected outcome will be a deep time archive of the relationships between tectonic forcing, continental erosion and the global climate, which may assist predictions and debate on future climate change. The outcomes will also provide economic benefits as they will inform on the exhumation and preservation of (critical) mineral resources.	230,000.00	230,000.00	230,000.00	204,060.00	894,060.00
	National Interest Test Statement The approach of integrating regional thermochronological data with numerical models to reconstruct landscapes and erosion rates is novel and the scientific outcomes that will be generated from this project will contribute to Australia`s standing as a leader in this field of research. The expected outcomes will allow an assessment on the role of plate-tectonic processes to continental erosion and climate variability through deep time to inform predictions and debate on long-term climate change. The project also has direct economic benefits to Australia as the outcomes will assist with the targeting of mineral resources, such as critical mineral commodities, along the highly prospective southern Australian margin. The project outcomes will constrain the exhumation level of the crust, which is a vital component for de-risking exploration in this frontier mineral exploration region. It is further anticipated that the unprecedented landscape evolution models will captivate the attention of the Australian public and provide lasting educational benefits.					
	The University of Adelaide	1,123,796.00	1,156,087.00	1,135,146.00	1,108,312.00	4,523,341.00
	South Australia	1,541,871.00	1,574,162.00	1,553,221.00	1,521,387.00	6,190,641.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
Tasmania						
University of Tasmania						
FT210100557	**The magnetisation of Earth's lithosphere: a new view from space**	242,343.00	239,926.00	235,206.00	233,023.00	950,498.00
Williams, Dr Simon	Earth's magnetic field is an invaluable resource for studying the structure and dynamics of our planet, yet the full nature of Earth's magnetisation remains poorly understood. This project will uncover the dominant sources of magnetisation close to Earth's surface using next-generation satellite data and recent theoretical advances. Expected outcomes include the development of innovative models of lithospheric magnetisation that will be used to gain crucial insights into the dynamic evolution of our planet's crust and uppermost mantle. The benefits of the project address both economic and environmental issues, unravelling the nature of structures that control both mineral systems and heat flow variations beneath the Antarctic ice sheet.					
	National Interest Test Statement					
	Earth's magnetic field sustains life on our planet, shielding us from solar radiation. This project will analyse observations from the newest generation of satellite technology to discover how different parts of the Earth contribute to the observed magnetic field. This is expected to deliver fundamental insights into the how parts of the planet are magnetised within continents and along tectonic plate boundaries. Likely benefits are scientific, economic and environmental. The project aims for an enhanced understanding of the lithospheric structures within the Australian continent which control the distribution of economically significant mineralisation; and, will map the geological structures that control variations in heat flow beneath the Antarctic ice sheet, a critical parameter in understanding how the world's largest ice sheet will evolve in coming decades.					
FT210100798	**Bridging the land–sea divide to ensure food security under climate change**	263,000.00	265,000.00	265,000.00	265,000.00	1,058,000.00
Blanchard, A/Prof Julia L	This project aims to comprehensively evaluate ocean-based food solutions to meet food security needs under climate change. It will resolve a critical blind spot in current plans that isolate land and sea food systems and neglect their interdependencies. Combining global models and data, it will assess the constraints of ocean-based food solutions by anticipating and accounting for land-sea links including: agricultural runoff, shared feed resources for farmed animals, and trade-offs for biodiversity and climate mitigation. It will deliver a major leap in our capacity to undertake holistic ecosystem assessment of future food production pathways. Benefits will include integrated food–biodiversity–climate policies for Australia and the world.					
	National Interest Test Statement					
	Ocean-based systems of food production will provide substantially more food in future, lowering greenhouse gas emissions more than land-based systems can. That assumption is untested. It calls for holistic evaluation that will take marine food production as part of the wider food system, not siloed away from agriculture on land. This project will explore the land–sea linkages that are missing from current climate-impact modelling for food sectors, but known to be highly relevant: marine pollution from land-based activities in agriculture, feed interdependencies, and climate feedbacks through the carbon cycle. It will incorporate these linkages into next-generation global ecosystem models to assess the sustainability of linked land–sea production pathways under climate change. This highly innovative cross-sectoral approach will give Australian and international policymakers unprecedented evidence and tools, to account for linked climate-change vulnerabilities involving both food security and biodiversity across land and sea – with rigorous assessment of solutions to tackle these grand 21st-century challenges.					
	University of Tasmania	505,343.00	504,926.00	500,206.00	498,023.00	2,008,498.00
	Tasmania	505,343.00	504,926.00	500,206.00	498,023.00	2,008,498.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
Victoria						
Deakin University						
FT210100278	**Understanding the determinants of age-related muscle wasting in females**	235,280.00	235,280.00	235,280.00	235,280.00	941,120.00
Lamon, Dr Severine	This project aims to investigate the fundamental mechanisms underlying age-related muscle wasting in females. Females live longer than males and are more susceptible to the consequences of muscle ageing. Yet, our current knowledge is overwhelmingly inferred from findings from male cohorts. By comprehensively mapping the functional, molecular and epigenetic mechanisms of ageing in female muscle, this project will generate new, fundamental knowledge that will allow a unique interpretation of previous research through a sex-specific lens. This knowledge will contribute to better inform sex-specific models of research and practice in the future, ultimately delivering economic and social benefits for Australia and international communities.					
	National Interest Test Statement					
	Older Australians account for an increasing proportion of the population. The ABS predicts that, by 2053, 8.3 million Australians will be aged 65-85 and 1.6 million Australians will be aged 85 and over. A majority of them will be females. Investigating the molecular and cellular origins of age-related muscle wasting in females is the next critical step to improve our understanding of the ageing process. This novel, fundamental knowledge will be necessary to better inform sex-specific models of research and practice in the future. By doing so, this project will also provide a chance to reduce disparities for disadvantaged and vulnerable groups, ultimately delivering “economic and social benefits for Australia and international communities”. It therefore aligns with the Australian National Women Health Strategy 2020-2030, specifically its “Healthy ageing” priority area that aims to “adopt a life course approach to healthy ageing; and better manage the varied needs of women as they age”.					
FT210100804	**Two-dimensional transition metal nitrides for energy applications**	221,690.00	219,630.00	206,630.00	239,796.00	887,746.00
Lei, Dr Weiwei	This project aims to develop novel nanomaterials for sustainable energy applications such as blue energy generation and energy storage. The focus is to explore novel 2D transition metal nitride nanomaterials and their advanced heterostructures with large specific surface area, high electrical conductivity and chemical stability. The expected outcomes include development of high-performance devices such as osmotic energy harvesting devices for blue energy generation and micro-supercapacitors for energy storage. This should promote the growth of sectors in advanced materials, sustainable energy generation, smart energy storage and manufacturing, bringing efficient energy generation and storage system benefits to the Australia and the world.					
	National Interest Test Statement					
	There is an urgent need for new technology and advanced materials for the continued development sustainable energy generation and storage capability. This project seeks to develop a highly versatile and innovative research platform for the fabrication of functional 2D nanomaterials and their advanced heterostructures with large specific surface area, high electrical conductivity and good chemical stability. These novel materials can be assembled into devices such as micro-supercapacitors for smart energy storage and high efficiency blue energy harvesting. The outcomes will enhance research and innovation in materials science, nanotechnology, and energy science, and lead to advances in the advanced materials industry and sustainable energy applications in Australia. It is anticipated that these outcomes will inspire new ideas in advanced nanomaterials, production of novel heterostructures, sustainable energy materials and industries, addressing the need for increased clean energy generation and diversification of advanced manufacturing in Australia.					
	Deakin University	456,970.00	454,910.00	441,910.00	475,076.00	1,828,866.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
La Trobe University						
FT210100271	**Multi-functional probes for global analysis of proteome stress in cells**	235,085.00	235,362.00	235,408.00	229,802.00	935,657.00
Hong, Dr Yuning	This project aims to create a suite of multi-functional chemical probes to identify damaged proteins that undergo unfolding or specific modifications in cells under stress. These probes will not only generate fluorescence responses to reflect on protein quality control capacity but allow associated proteins and their networks to be identified in complex cellular environments, which is difficult to achieve by current methods. The expected outcome is to deliver new methodology for a comprehensive understanding of the correlation between quality control machinery, stress responses and cell functions. This should provide significant benefits, including contributing to fundamental knowledge on the molecular causes of neurodegenerative diseases.					
	National Interest Test Statement					
	This project will deliver robust chemical probes to report on the integrity of protein quality control in cells, which will advance our understanding of fundamental aspects of protein folding in cell biology and its implications in pathological conditions such as viral infection, autoimmunune and neurodegenerative diseases such as Parkinson's and Alzheimer's. This innovative project will provide significant economic and commercial benefits to Australia through new technologies based on novel chemical compounds to assess cell stress and protein stability. Such technologies can be applied to the pharmaceutical industry for identifying drug targets for combating the above-mentioned diseases and conditions and as effective methods for quality control of protein-based pharmaceutical production including vaccines. The commercialisation of the technology will contribute to the sectors of biotechnology, pharmaceuticals and academia across the fields of chemical, cell and molecular biology in Australia and internationally.					
FT210100656	**The life-course implications of declining adolescent drinking**	217,911.00	218,496.00	223,551.00	226,958.00	886,916.00
Livingston, Dr Michael J	The project aims to identify ways to ensure that recent declines in adolescent drinking are maintained and reinforced as these cohorts age into young adulthood. It expects to generate new knowledge on the trajectories of youth drinking into young adulthood. Expected outcomes include new cross-national understandings of the predictors of heavy drinking in adulthood and an updated evidence base for the development of harm prevention policies and interventions by governments and NGOs. This should provide significant benefits to Australia via reductions in the negative health and social impacts of heavy drinking for these cohorts across their lives.					
	National Interest Test Statement					
	Excessive alcohol consumption contributes to a substantial amount of health and social harm in Australia, with social costs of over $14 billion per year. However, in recent years, there have been marked declines in adolescent drinking, such that recent generations of teenagers drink dramatically less than previous generations. This has the potential for long-lasting health and social benefits to Australian society via reductions in the harms associated with heavy drinking. By adopting cross-national comparison, it will demonstrate the impact of policy environment on adolescent drinking trends. This will provide an evidence base for the formulation of prevention strategies by Australian policy-makers to reinforce the reductions in drinking among young adults, with the potential to dramatically reduce the social and health impacts of alcohol for these and subsequent generations.					
	La Trobe University	452,996.00	453,858.00	458,959.00	456,760.00	1,822,573.00
Monash University						
FT210100097	**Enabling Automatic Graph Learning Pipelines with Limited Human Knowledge**	206,000.00	206,000.00	206,000.00	182,000.00	800,000.00
Pan, Dr Shirui	This project aims to develop an automatic graph learning system for complex graph data analysis. Machine learning for graph data commonly requires significant human knowledge from both domain professionals as well as algorithm experts, rendering existing systems ineffective and unexplainable. This project expects to design novel graph learning techniques which automatically infer graph relations, learn graph models, adapts existing knowledge to new domains, and provide explanations to the graph learning system. The research results should provide benefit to governments and businesses in many critical applications, such as bioassay activity prediction, credit assessment, and drug discovery and vaccine development in response to the pandemic.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement Australians are now facing ever-increasing graph data analysis requirements. Graph machine learning, which explores and captures complex relations inside data, provides essential techniques to meet the requirements. However, as graph learning systems require a huge amount of human effort and domain knowledge, existing systems are ineffective. This project will contribute to Australia's governments, businesses, and industries by developing a game-changing model for automatic and explainable graph learning from complex data. It can be readily applied to traffic flow prediction, enabling government departments to better control and plan transport services. Its potential future applications will benefit the pharmaceutical industry, which utilizes AI algorithms to speed up the process of new drug discovery and vaccine development in response to COVID-19. The developed explainable system will benefit financial institutes in understanding credit assessment systems for effective decision making. As this project will be beneficial for many businesses and industries, the potential return of the project is immense.					
FT210100183 Beck, Dr Ben	**Advancing cycling as an active transport mode using data driven approaches** This research program aims to provide the critical evidence that is needed to advance cycling as an active and sustainable mode of transport. Through interdisciplinary research and multi-national collaborations, the program will develop a world-leading data platform that will monitor, inform and evaluate cycling, and use this platform to provide the evidence that is needed to enhance cycling participation, safety and infrastructure. The outcomes of the research will revolutionise our ability to implement safe and connected cycling infrastructure in areas of greatest need, leading to reduced injury, greater equity and wider uptake of cycling as a mode of transport, thereby leading to substantial gains in population and environmental health.	243,515.00	243,403.00	243,025.00	232,524.00	962,467.00
	National Interest Test Statement Cycling has numerous health, environmental and social benefits, through factors such as reduced traffic congestion, reduced transport emissions and by promoting an active lifestyle. How safe someone feels when riding a bicycle is the major barrier to increased participation. Providing safe and connected cycling infrastructure (such as lanes that are physically separated from traffic) is critical to overcoming this barrier. However, there is a complete absence of detailed data on where and when people cycle and where we should implement infrastructure for the greatest gain. I will develop a world-leading data platform that will combine bicycle volume data (the number of cyclists on each road in a city) with injury and crash data, and subjective measures of safety, and use these data to understand the effectiveness of cycling infrastructure and identify areas where infrastructure is needed to enhance cycling. Overall, it is anticipated that this project will lead to the provision of safe and connected cycling infrastructure, resulting in reduced injury, reduced inequities and increased cycling participation.					
FT210100537 Segrave, A/Prof Marie T	**Domestic and Family violence and border-related harm** This project aims to explore how Australia's migration system intersects with the experience of domestic and family violence for temporary visa holders. By drawing on the accounts of former temporary visa holders via interviews in Australia, Thailand, Vietnam and India, and examining the migration system and processes evident in formal accounts including coronial findings and sentencing judgements, the project expects to generate new knowledge about connections between migration systems and domestic and family violence. This should provide significant benefits by laying the ground for reform and recommendations to support policy makers and stakeholders more broadly to create better conditions for women's safety.	259,484.00	256,065.00	259,203.00	274,668.00	1,049,420.00
	National Interest Test Statement Domestic and family violence is a significant problem in Australia, but migrant and refugee women are particularly vulnerable. Migration systems and women's temporary migration status appear to contribute to this vulnerability. This fellowship examines the potential impact of Australia's migration system on women's access to safety, through interviews with temporary migrant women who have experienced domestic and family violence, and key stakeholders in the area. The research will also examine how migration systems and border crossings may be used by perpetrators of domestic and family violence. The project will support the development of system responses that can enhance women's safety. The research will contribute to social, cultural and economic benefits for the Australian community, including temporary migrants, by offering evidence on where systems reform can contribute to Australia's commitment to preventing and reducing domestic and family violence for all women.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100593	**Epitaxial Stacking of Nanoporous Nanosheets for Next-generation Membranes**	265,000.00	265,000.00	265,000.00	265,000.00	1,060,000.00
Zhang, Prof Xiwang	The project aims to develop high-precision selective membranes which are urgently needed in Australian key industries for solute-solute separation by constructing vertically-aligned and chemically-tailorable nanochannels using two-dimensional porous nanosheets as building blocks. The project expects to generate advanced knowledge in the areas of nanosheet synthesis and functionalisation, membrane design and fabrication, selective transport of solutes and applications. The membranes developed in the project should make existing separation processes more effective and sustainable and advance emerging applications in pharmaceutical, dairy and mining industries, providing significant economic and environmental benefits to Australia.					
	National Interest Test Statement					
	Highly precise separating one solute from the other is critical in Australian key industries for producing high purity products and minimising waste generation, e.g. ingredient purification in pharmaceutical industry, whey protein recovery in dairy industry and valuable metal extraction in mining industry. However, current separation membranes have reached their intrinsic limits so that they are not able to effectively discriminate solutes, particularly those with similar physicochemical properties. By mimicking natural biological selective channels, the project aims to address this urgent challenge by creating high-precision selective membranes using advanced nanosheets with tailorable pore and chemical functionality. The project expects to advance the in-depth understanding of materials synthesis, membrane design principles and fabrication techniques, which are expected to form solid knowledge base to train next generation scientists and engineers in the development of next generation membranes for Australian industries, in particular, pharmaceutical, dairy and mining industries.					
FT210100786	**Bridging the gap between global mechanics and regional imaging in the lungs**	188,811.00	198,811.00	198,811.00	184,758.00	771,191.00
Dubsky, Dr Stephen	The detailed mechanics of breathing are not well understood, due to a lack of regional lung measurement techniques. This project aims to develop a powerful analysis tool to image in vivo mechanical properties of the lungs. The expected outcome of this project is a novel platform for investigation and understanding of lung function, enabling information previously only available for the whole lung to be calculated for local lung regions within the body. The image analysis methods developed are intended to enable respiratory researchers to investigate lung function in unprecedented detail, leading to new insights into the workings of this complicated and vital organ.					
	National Interest Test Statement					
	This project will deliver technology to allow ground-breaking insights into the workings of the lung. The powerful analysis methods and valuable knowledge generated will impact researchers, enabling a greater sophistication in lung studies and better models of the lung. Further into the future, better research tools and improved understanding of lung mechanics has the potential to provide improvements to respiratory medicine, leading to benefit for patients and clinicians through better diagnostics and treatments. This is particularly relevant in the post-pandemic era. Australia has for a long time been at the forefront of developing new technologies, and this has yielded great social, economic and cultural benefits. This project fits within this paradigm of Australian innovation, and if successful is sure to provide these downstream benefits as part of Australia's continued performance in this area.					
	Monash University	1,162,810.00	1,169,279.00	1,172,039.00	1,138,950.00	4,643,078.00
RMIT University						
FT210100669	**Exploring the bio-nano interface in plants to enhance crop growth**	206,000.00	206,000.00	211,000.00	187,000.00	810,000.00
Richardson, Dr Joseph J	This project aims to improve the delivery of nutrients and therapeutics to plants by understanding their interactions with nanomaterials. This will create new knowledge on the impact of air, water, and soilborne nanomaterials utilizing cutting-edge bio-nano characterization techniques, innovative lab testing, and high-throughput nanoparticle coating and screening. Expected outcomes of the project include 1) an understanding into how nanomaterial coating technologies impact nanomaterial properties, which will 2) shed light on how nanomaterials interact with plants, which leads to 3) breakthroughs in using nanomaterials to deliver nutrients, fertilizers, and pesticides to boost crop yields and productivity in Australian agriculture.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project will pioneer advanced manufacturing principles to generate a library of nanomaterials that enhance the growth, resistance, and overall yields of plants, all of which will promote Australian agriculture, and in turn the Australian economy and commercial industries. Additionally, this project will demonstrate how plants can mitigate damage from environmental nanomaterial contaminants like pollution and wastewater, which could shed light on the persistence of nanomaterials in the environment and lead to methods to improve air and water quality. Australian agriculture and related sectors account for over 10% of GDP, however improvements due to technological innovation have been trailing the gains seen in many established and modernizing countries. Therefore, cutting-edge research is needed to push agriculture gains to maintain the economic strength in the sector and insulate the sector from adverse environmental or biosecurity events.					
FT210100899 Foster, Dr Sarah A	**Redesigning apartment policy standards for health and wellbeing** This project aims to examine the impact of apartment design standards on residents' health and wellbeing. It seeks to (1) identify a refined set of evidence-informed quantifiable policy standards that protect residents' health and wellbeing; and (2) evaluate their uptake by industry and barriers to implementation. Many design standards are based on intuition and experience rather than empirical evidence, and little is known about whether the standards and thresholds stipulated are sufficient to support health. Expected outcomes include tailored policy-specific recommendations for design policy and the planning of apartment precincts. Benefits include the delivery of convivial, equitable, healthy and sustainable apartment housing.	233,266.00	233,784.00	234,039.00	234,057.00	935,146.00
	National Interest Test Statement This project will produce new knowledge to guide the content and implementation of apartment design policies, and the planning of apartment precincts. By understanding the design standards that make apartments an appealing and healthy living arrangement, and prioritising them in apartment design policies, this project has the potential to ensure apartment buildings include the design features that promote social, physical and mental health outcomes for residents. The project will help reduce social and health inequalities by facilitating the inclusion of healthy design standards in more affordable apartments. Further, by ensuring apartments include the design features that make them a viable and favoured housing choice, the project will contribute to environmentally sustainable development by reducing urban sprawl.					
	RMIT University	439,266.00	439,784.00	445,039.00	421,057.00	1,745,146.00
Swinburne University of Technology						
FT210100085 Albury, Prof Katherine M	**Digital and data literacies for sexual health policy and practice.** New digital practices present significant challenges for the fields of sexual health promotion and sexual healthcare provision. This Fellowship brings sexual health policy-makers and professionals into dialogue with young adult users of digital apps and social platforms, via participatory co-design methods. Outcomes include theoretical and applied frameworks for digital literacy and data literacy in the context of sexual health. Outputs include knowledge-translation resources for sexual health professionals that will help them better engage with young adult's everyday practices of digitally mediated intimacy, in the context of broader understandings of content moderation and regulation, platform governance, data privacy and data security.	285,370.00	288,276.00	286,326.00	278,326.00	1,138,298.00
	National Interest Test Statement Digital sexual health promotion and healthcare services have the potential to offer substantial benefits to young adults, particularly those who are under-reached by 'traditional' campaigns and clinical services. The COVID-19 pandemic has necessitated rapid and urgent uptake of digital technologies for healthcare, but sexual health workforces are unfamiliar with many of the new apps and platforms used for social connection, and lack training in digital and data literacy. As STI rates increase in Australia, effective approaches to digital literacy and data literacy for sexual health – that centre the needs and concerns of both the sexual health workforce and those at-risk of STIs – are vital. The proposed project will meet this urgent need.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100298	**Perovskite-Based Ferroelectrics for Solar Fuel Production**	247,646.00	247,646.00	222,640.00	219,540.00	937,472.00
Ma, Dr Tianyi	This project aims to develop perovskite-based ferroelectrics for photocatalytic carbon dioxide reduction to produce solar fuels. It is expected to reveal the relationship of ferroelectric polarisation and photocatalytic behaviour, thereby promoting solar energy utilisation and greenhouse gas reduction. Expected outcomes include delivery of a novel family of chemically and structurally controlled ferroelectrics and catalytic reaction prototypes for efficient carbon dioxide photoreduction, and in-depth understanding of structure-performance correlation to guide future polar catalysts design. This project should provide significant benefits in minimising fossil fuel consumption, increasing energy security, and expanding clean energy industry.					
	National Interest Test Statement					
	This project has significant benefits for Australia’s energy and environmental security, and economic growth. It will deliver highly efficient photocatalysts and reaction prototypes for carbon dioxide reduction, so as to relieve greenhouse effect and accelerate the development of large-scale carbon dioxide utilisation for clean fuels (such as methane, methanol and carbon monoxide) production, by making use of the abundant and clean solar energy. The project will promote R&D of new-generation carbon dioxide photoreduction catalysts and techniques, which are highly promising for commercialisation and industry-level application, and put Australia at the forefront of the utilisation of carbon dioxide and clean energy. Therefore, it will bring substantial environmental benefit to Australia and the world, as well as reap huge savings for the clean energy industry. This project will also generate new advanced knowledge in the fields of materials science, nanotechnology, catalysis, clean energy and relevant engineering, thereby strengthening Australia's national research capacity in energy materials and technology.					
FT210100806	**Laser nanoprinting of active graphene micro-tag for terahertz digital ID**	284,976.00	272,976.00	273,006.00	234,470.00	1,065,428.00
Jia, Prof Baohua	This project aims at harnessing the unique THz response of laser nanoprinted graphene metamaterials and developing disruptive micro-tag technology. Through actively tuning the structured metamaterials, THz micro-tags with ultrahigh data security and energy efficiency, low cost, flexibility and attachable to any object can be enabled. Such high performance graphene THz ID tags will be first of their kind and are expected to underpin every sector of our life including manufacturing, logistics, biomedicine, personal care, supply chain, retail and security. The outcomes will secure Australia’s international leading position in next generation tag and digitalisation technology and create significant social and economic benefits to Australians.					
	National Interest Test Statement					
	This project will deliver a wireless-charging graphene terahertz ID (THID) tag prototype supported by cryptography coding that can be flexibly integrated into any product or object. Such compact and low-cost graphene IDs will be first of their kind and expected to find broad applications in manufacturing, logistics, biomedicine, personal care, supply chain, retail and security. By combining THID with blockchain technology, secure transactions can be guaranteed through both unique hardware and software, providing double insurance on data security, making the supply chain predictive, transparent with improved tracing and tracking capability. These can help to build company success, customer satisfaction and community trust. This project can advance both scientific knowledge and innovative technologies in the fields of nanotechnology and energy efficiency, which form an indispensable foundation for digitisation. The outcomes will secure Australia’s international leading position in this fast-expanding field in the next decade and thus can create significant social and economic benefits to Australians.					
FT210100926	**A global urban atlas of nature-based solutions for climate resilient cities**	288,370.00	288,370.00	288,370.00	260,000.00	1,125,110.00
Frantzeskaki, Prof Niki	This project aims to systematically examine, map and provide a synthesis of the governance of nature-based solutions (NBS) in Australian and global cities. This project expects to generate new knowledge and a novel synthesis methodology about the global landscape of NBS governance, and explore the acceleration of urban transitions with NBS through a global urban atlas. The global urban atlas will inform policy agendas and identify how ecologically/climate challenged cities and regions can leverage NBS, and thus shift their governance approaches to be climate resilient in the future. This will benefit government and policy makers, and all people who live in these communities.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project explores how Australian and global cities can respond to climate change by developing urban climate innovations that support and restore nature. These nature-based solutions include green infrastructure, such as permeable surfaces, green walls/ roofs and street trees, and water sensitive design such as minimising stormwater entering waterways. This project contributes to the Government's Science and Research Priority "Environmental Change" and the knowledge needed for the implementation of Australia's Strategy for Nature. It will generate implementation options for future cities to adapt to and mitigate climate change and inform policy and planning with a view on plausible economic, environmental and social co-benefits. These climate innovations will support urban climate resilience allowing citizens to sustain a high quality of life and wellbeing in an urbanising planet.					
	Swinburne University of Technology	1,106,362.00	1,097,268.00	1,070,342.00	992,336.00	4,266,308.00
The University of Melbourne						
FT210100034 Flegg, A/Prof Jennifer A	**Advances in data integration modelling for infectious disease response** This project aims to develop powerful mathematical frameworks that integrate data from multiple sources to facilitate informed decisions in response to the threat of present, and future, infectious diseases. The project expects to generate new knowledge in mathematics by advancing the tools for incorporating multiple data sources into models of infectious diseases. The expected outcomes include enhanced capacity to predict spatiotemporal changes in transmission of infectious diseases. This project should provide significant benefits in the advancement of modelling techniques broadly applicable to infectious disease settings, which will be demonstrated for antimalarial drug resistance – a major threat to malaria elimination.	260,870.00	256,870.00	256,870.00	236,870.00	1,011,480.00
	National Interest Test Statement Australia needs to expand its capacity to respond to the threat of present and future infectious diseases. The Fellowship will advance informed infectious disease response by developing powerful mathematical frameworks that integrate data from multiple sources. The new mathematical methods developed will apply broadly to infectious disease settings, and my team will demonstrate their benefit for antimalarial drug resistance, which is a major threat to malaria elimination. The outcomes will directly contribute to national interest by improving our capacity to respond to significant global health challenges, addressing the Science and Research Priority for "Improved prediction, identification, tracking, prevention and management of emerging local and regional health threats". The advances will have significant bearing on Australia's relations with the region, enabling us to contribute to the malaria elimination targets, reinforcing our involvement in the Asia Pacific Leaders Malaria Alliance and Asia Pacific Malaria Elimination Network.					
FT210100065 Goodbourn, Dr Patrick T	**Perception: From Genes to Behaviour** Understanding how genes affect behaviour is inherently difficult because the human brain is extraordinarily complex. This project aims to map fundamental relationships between genes, brain, and behaviour by studying visual perception, where brain mechanisms can be characterised with high fidelity. The project expects to generate new knowledge in behavioural genetics using innovative, interdisciplinary approaches to integrate precise genetic, neural and psychophysical measurements. Expected outcomes of this project include a deeper understanding of our perceptual experience, and rich new experimental paradigms. This should provide significant benefits for future research attempting to disentangle complex gene–behaviour relationships.	226,422.00	226,392.00	226,372.00	226,382.00	905,568.00
	National Interest Test Statement It is clear that genetics play an important role in behaviour, but we know surprisingly little about how these relationships actually play out. This project aims to address a critical gap in knowledge by providing an integrated account of some fundamental relationships between genes, brain, and behaviour. It will demonstrate several new models for the discovery of such relationships, including a rapid, high-throughput screening tool for genetically modified animals, with a range of significant future applications in understanding more complex behaviours and traits. To achieve its aims, the project deliberately focuses only on normal variation in genetics and behaviour. However, while outside the scope of this project, the models it provides supply the basic-science groundwork for future applied studies in psychology, psychiatry, and other fields, where understanding the brain mechanisms relating genes to behaviour is a major bottleneck to progress in genetic medicine.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100113	**Electronic-vibrational spectroscopy: A new probe for structure and function**	220,705.00	220,705.00	220,700.00	202,946.00	865,056.00
Hall, Dr Christopher H	This project aims to solve a major challenge in ultrafast spectroscopy: to identify and quantify competing reaction pathways in complex photochemical systems. Ultrafast Spectroscopy provides information on excited-state processes of photochemical reactions, however, unravelling heterogeneous systems with competing parallel processes remains difficult. Multidimensional electronic-vibrational spectroscopy, sensitive to electronic dynamics and molecular structure, is expected to overcome this barrier. This new level of detail will profoundly enhance our understanding of energy and chemical conversion in complex systems and will reveal design targets for optimising next-generation light-energy harvesting, conducting, and emitting materials.					
	National Interest Test Statement					
	Australia has invested heavily in materials research to generate technological advancements in solar energy harvesting, energy transport, chemical synthesis, medicine, biotechnology, security and chemical sensing. Discoveries in these areas support the development of new industries, domestic technical knowhow, and advanced manufacturing, while also providing Australians jobs, access to new medical treatments and technological solutions to reduce our impact on our environment. Central to many of these technologies is the conversion of light and electrical energy into useful chemical states. The energy and chemical conversion processes at the core of these technologies are challenging to study with the current investigative techniques. This project will develop a new tool, unique internationally, that can resolve the chemical species involved in light-driven chemical reactions. The insight gained will identify opportunities for advancement in the material sciences.					
FT210100193	**Purinergic signalling in placentation and vascular adaptation in pregnancy**	264,300.00	269,800.00	267,300.00	269,800.00	1,071,200.00
Hannan, A/Prof Natalie	Our traditional understanding of purinergic signalling in the placenta is significantly outdated and incomplete. The placenta is critical for reproduction in all eutherian mammals, delivering critical nutrition and oxygen to the developing fetus. This project aims to define the role of purinergic signalling as a critical mechanism driving placentation and angiogenesis. This is the first study of its kind and will use sophisticated models to improve our fundamental understanding and ability to manipulate mammalian reproduction via the purinoreceptors. This proposal builds on my skills and expertise; improving our knowledge of the processes driving placental and vascular morphogenesis and offers important discoveries for reproductive science.					
	National Interest Test Statement					
	This project will advance fundamental knowledge about the role of purinergic signalling pathways in placental development and function. It will generate critical knowledge for applied research that may be used in future to improve reproductive outcomes in all eutherian mammals. Benefits include improved breeding of endangered species, aid in livestock breeding and production of economically valuable domestic animals, and improved health care and fertility control for domesticated pets and feral animals. Further potential benefits for human health also exist. Findings will thus generate potential economic, health and environmental benefits, nationally and internationally. Outcomes from this research will further enhance and consolidate Australia’s excellent standing as leaders in reproductive biology and strengthen national and international collaborations. The project also provides an outstanding training opportunity for mentoring emerging researchers.					
FT210100256	**Using Abstract Networks to Study Symmetry**	205,000.00	205,000.00	205,000.00	205,000.00	820,000.00
Robertson, Dr Marcy D	An operad is a mathematical tool for packaging the connection between discrete blocks of information. In other words, an operad is a type of network, particularly suited for approaching complex problems by breaking them into smaller, manageable packets. This project aims to reimagine classical objects in geometry and topology such as Teichmüller space as variations of infinity operads. This reimagining will ensure new insights into key objects across three areas of mathematics: algebraic number theory (the mathematics of modern encryption), the representation theory of quantum groups and topological quantum field theories.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project advances fundamental research in pure mathematics, particularly geometry and algebraic number theory. Outcomes will offer significant potential downstream applications and contribute to the national interest through the exchange of specialised skills crucial to a new economic landscape. When translated to industry, particularly finance and engineering, advances in this research field are in high demand because it is driving changes in modern data science, providing innovative techniques for handling the increasingly large data sets in these industries. It supports the transfer of skills through training PhD students able to lead work in these areas of increasing social and economic importance. The research will contribute to advances in science in a field of global importance not yet well-represented in Australia. It aligns with the national strategy to build Australia's scientific capacity in mathematics through research training and dissemination of findings, providing the foundations for future translation and impact.					
FT210100364 CHENG, Dr CHI	**Atomically thin membranes to transform chemical separations** Energy-efficient chemical separation is at the heart of modern resource and manufacturing industries, central to a prosperous and sustainable Australia. This project aims to develop next generation membrane technologies to transform chemical separations by employing recent breakthrough in materials discovery and nanofluidics. Expected outcomes include new fundamental understandings on sub-continuum transport physics and new atomically thin membranes that enable energy-efficient separations for processing challenging streams beyond water purification. This project aims to position Australia at the forefront of sustainable separation technology and make the local resource and manufacturing industries more sustainable and globally competitive.	210,000.00	205,000.00	200,000.00	180,000.00	795,000.00
	National Interest Test Statement Chemical separations using thermal based processes (e.g. distillation) are staggeringly energy intensive, accounting for 10-15% of the world’s total energy consumption. Several of Australia's leading industries currently rely on such energy intensive separations, including mining or metal extraction, food processing, oil and gas refining, and pharmaceutical processing. The current project aims to develop alternative, next-generation membrane separation technologies with dramatically improved energy efficiency. The use of two-dimensional materials and advances in nanofluidics will allow membranes to be used for separations previously not possible (e.g. molecular separation in challenging organic liquids). It is expected that these technologies can potentially replace many costly and energy intensive thermal separation process. By improving sustainability and engendering cost savings in Australia’s high polluting industries, the current project has clear environmental and economic benefits to the nation.					
FT210100405 Hall, Dr Jack	**Integral transforms and moduli theory** This project is in algebraic geometry, a branch of pure mathematics. An overarching goal is a better understanding of the algebra underlying the sophisticated geometries that arise in the classification problems that are pervasive in mathematics and its applications to physics. This new knowledge will then be applied to further elucidate the geometry of these spaces. Expected outcomes of this project include major progress in our understanding of derived categories of algebraic stacks via the Fourier-Mukai transform. The benefit will be to enhance the international stature of Australian science.	205,000.00	205,000.00	205,000.00	215,000.00	830,000.00
	National Interest Test Statement This project will advance fundamental research in pure mathematics and specifically in the field of algebraic geometry. Mathematics is the language of modern science, computing, and engineering. Advances in pure mathematics have historically led to transformative technologies (e.g., research in logic led to computers). Algebraic geometry and moduli theory form the basis of modern cryptography. New fundamental research in these areas is essential for strengthening national cybersecurity and protecting Australia’s economic and social interests. The proposed research will contribute to these aims and bring further benefits by increasing Australia's capacity to train in algebraic geometry and moduli theory. Outcomes from this research will further enhance the international reputation of Australia as a leading centre for research in mathematics, algebraic geometry, and moduli theory. This proposal will cement Australia's future as a major centre for research in these areas which are increasingly vital to securing Australia’s national interests.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100512	**Indigenous solutions to global challenges in the Pacific Islands**	174,455.00	174,276.00	170,285.00	160,705.00	679,721.00
Farbotko, Dr Carol	The global COVID 19 pandemic represents a unique opportunity to understand the nature and potential of Indigenous sustainable development in Pacific Island communities, where Indigenous practices have been central in responses to closed borders and industry downturns. This project proposes to analyse the efficacy and cultural value of new, pandemic-era Indigenous sustainable development initiatives in sustaining island communities. It aims to culminate in a novel geographic theory of Indigenous sustainable development, and to identify new opportunities to support the expansion of Indigenous sustainable development. This should better enable the Pacific Islands region to respond to climate change, pandemics and other global challenges.					
	National Interest Test Statement					
	This project should support Australia's international development policy to advance stability and economic recovery from the pandemic in the Pacific Islands region. This project will deliver new knowledge of how Indigenous initiatives support well-being in the Pacific Islands and demonstrate how Indigenous sustainable development can be advanced. This knowledge delivery aligns the project closely with Australia's priorities to foster poverty reduction and sustainable growth in the region, as outlined in the Department of Foreign Affairs' Partnerships for Recovery: Australia's COVID19 Development Response. While upholding the rights of Indigenous people in the Pacific Islands to their knowledge sovereignty, the research should also assist Australia in building effective post-pandemic development programs that are closely attuned to the new ways in which Indigenous sustainable development in the Pacific Islands has been transformed in the pandemic era, likely making the investments of all stakeholders more cost-effective.					
FT210100514	**Universal structures in stringy extra dimensions**	170,705.00	167,705.00	167,705.00	167,705.00	673,820.00
Knapp, Dr Johanna	The project aims to study properties of extra dimensions in string theory by means of techniques from supersymmetric gauge theory. This new approach makes it possible to study areas in the landscape of stringy extra dimensions that have not been accessible before. The project expects to uncover new universal features. This will have significant impact on string theory and mathematics. Expected outcomes of this project include answers to conceptual questions in string theory, new types of extra dimensions, and new methods to compute quantum corrections in string theory. This should provide significant benefits, such as interdisciplinary collaborations at the national and international level and a strengthening of string theory in Australia.					
	National Interest Test Statement					
	This project advances fundamental research in mathematical physics, specifically in the field of string theory. Exploratory research of this nature has the potential to bring significant national benefits that can arise from interactions between fundamental science and commercial activities. Data science, for example, relies on a wide range of advances in fundamental science and is a significant future industry in Australia. The proposed research has long-term potential for translation into new technologies, such as machine learning and cryptography. These are vital areas to develop and are essential to securing Australia's national interest. They also bring substantial economic and commercial benefits. The participation of PhD and graduate students in this research will contribute to the training of a new generation of Australian researchers in mathematical physics. These skills are required across a range of labour markets, including quantitative finance, business consulting, and data science.					
FT210100543	**Improving predictions of species distribution dynamics**	200,740.00	207,905.00	207,740.00	207,740.00	824,125.00
Guillera-Arroita, Dr Gurutzeta	This project aims to mainstream methods for improved prediction of species distributions under the impacts of environmental change. This is important because these predictions are commonly used to guide environmental decisions, but the standard modelling methods used to produce them have critical limitations. This project intends to (i) make key statistical developments to methods for modelling dynamics of species distributions and (ii) translate the methods into practice, through guidelines, tools and training, engagement with users and case studies addressing species of current concern. This should provide significant benefits because it will enable better decisions and more effective and cost-efficient management actions.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
	National Interest Test Statement This project aims to deliver and mainstream methods for improved spatial prediction of species occurrence, in the face of environmental change. With these predictions now routinely used in practice, this project will directly help all who need tools for reliable decisions: land managers, conservation practitioners, risk assessors and biosecurity professionals. Better predictions mean better decisions, and ultimately gains to biodiversity, health and saved dollars. This project has therefore potential for widespread benefits, in Australia and abroad. It will advance techniques and engage with practitioners for their uptake through case studies, training, practical tools and guidelines. The work responds to a Practical Challenge in the Australian Government's Science and Research Priorities, improving prediction of environmental change impacts, and will contribute to research training in this area. It will also further strengthen Australia's international reputation in species distribution modelling research and provide new insights into Australian species of conservation concern.					
FT210100652 Vazire, Prof Simine	**Evaluating the Quality of Scientific Research in Psychology** Buttressing public trust in science has never been more important, yet many sciences are experiencing a crisis of confidence. The current system of relying on journal prestige to calibrate our confidence in individual research findings has created corrupt incentives for scientists, and risks undermining public trust in science. Thousands of scientists and institutions around the world have indicated that research evaluation needs an overhaul by signing the Declaration on Research Assessment. One solution is to create a public, transparent, and valid process for producing and sharing expert evaluations of individual papers. This project aims to launch this reform in psychology, and partner with PREreview to help it spread to other fields.	264,714.00	264,714.00	264,564.00	265,805.00	1,059,797.00
	National Interest Test Statement Buttressing public trust in science has never been more important, with the intensifcation of climate-related disasters such as bushfires, the threat of global pandemics, and the rise of political extremism. The social, behavioural, and life sciences have much to contribute to these crises, but it is difficult for policmakers, businesses, and members of the public to evaluate the trustworthiness of individual findings. By providing expert evaluations of the quality of scientific findings, this project will enhance the impact and value of original research in these fields. For example, policymakers will have a more secure basis for deciding which scientific findings are credible and can form the basis of new policy in areas ranging from mental and physical health to occupational behaviour, forensics, and educational psychology. This has the potential to significantly bolster the public value of science.					
FT210100728 Atapattu, Dr Saman U	**Smart Wireless Radio Environments for the 6G Era** This project aims to revolutionise radio signal propagation and information transfer by developing "smart" wireless radio environments. Using Reconfigurable Intelligent Surface (RIS), the smart wireless network can transmit information without generating new signals but recycling the incoming signal. However, as an emerging technology, fundamental analysis – in terms of rate, reliability, and efficiency – is needed to understand the performance of RIS-empowered wireless networks. Expected outcomes include new communication-theoretic models and the enabling technologies to realise them in practice. These smart environments have the potential to offer "greener" and more "seamless wireless connectivity" for the future wireless network.	194,000.00	194,000.00	194,000.00	179,705.00	761,705.00
	National Interest Test Statement Australia's Tech Future sets out to deliver a strong, safe and inclusive digital economy. This requires key technology and regulatory reforms in telecommunications, and network infrastructure that supports an advancing digital economy. Over 70 per cent of all businesses in Australia have identified mobile internet and access to secure, high-speed and inexpensive telecommunications and mobile networks as extremely important for their businesses. This project aims to advance the development of Smart Wireless Radio Environments empowered by cost effective Reconfigurable Intelligent Surfaces, which can be integrated into the existing infrastructure such as along the walls of buildings in mega-cities and shopping malls. Seamless connectivity and improved energy efficiency are guaranteed while reducing energy consumption, and consequent carbon emissions.					
	The University of Melbourne	2,596,911.00	2,597,367.00	2,585,536.00	2,517,658.00	10,297,472.00
	Victoria	6,215,315.00	6,212,466.00	6,173,825.00	6,001,837.00	24,603,443.00

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
Western Australia						
Curtin University						
FT210100050	**Multi-hazard resilient hybrid modular structures**	224,540.00	224,540.00	224,540.00	199,540.00	873,160.00
Chen, Dr Wensu	This project aims to develop the next generation of multi-hazard resilient modular construction methods for efficient, affordable and sustainable buildings. New demountable modular connections will be developed and the response of hybrid modular buildings to multiple hazards such as wind, earthquake, blast and impact will be investigated through a combination of experimental, numerical, and analytical studies. The project will develop knowledge of the structural behaviour of hybrid modular buildings, and expects to deliver design methods and robust simplified models for building design purposes. This project will advance construction techniques and practices for resilient hybrid modular buildings.					
	National Interest Test Statement					
	Modular construction has great potential to enhance building construction practice. It can reduce construction time by 60%, landfill waste by 70% and, through design for disassembly and reuse, result in 88% reduction in global warming potential and reduced ozone and fossil fuel depletion over the building lifecycle. Applications are currently restricted due to lack of knowledge on the structural behaviour, which has led to over-conservative design practices and avoidance of this approach. This project builds knowledge of the structural behaviour of hybrid modular buildings to enable widespread applications. This approach can then be applied to create affordable, rapid and resilient infrastructure, greatly benefitting the construction industry, economy and society. The development of multi-hazard resilient modular infrastructure should reduce the risk associated with extreme events and de-risk and add value to Australian manufactured buildings. Moreover, the developed technology can extend the service life of structures which may be subjected to increasingly adverse natural hazards due to climate change.					
FT210100063	**Impact craters as probes into planetary crusts and prospect for resources**	224,540.00	224,540.00	224,540.00	224,540.00	898,160.00
Miljkovic, Dr Katarina	The project aims to investigate the structure of earth’s crust in Australian impact crater sites, impact crater morphologies on Mars, and expand our understanding of the origins of our solar system. The project could transfer knowledge from exploration to exploitation at impact crater sites, on and off Earth. The outcomes include placing constraints on potential economic deposits (such as precious metals, hydrocarbons, water) in Australia and the presence of water on Mars. The project could provide significant national economic benefits when applied in practice to discovering resources hidden in the Australian cratering record. Internationally, Australia would participate in future space exploration endeavours.					
	National Interest Test Statement					
	This project bridges the gap between observations and modelling, and transfers knowledge from exploration to exploitation at impact crater sites, on and off Earth. About a third of terrestrial impact craters are associated with economic deposits. However, no Australian impact crater has yet been confirmed as a source of an economic deposit. The outcomes of this project will aid in uncovering valuable natural resources hidden in the Australian cratering record, that could potentially be worth billions of dollars. Furthermore, this project places Australia at the forefront of international space exploration. It builds on the existing international participation in the NASA Sight mission, as the only Australian team. It can also provide valuable contributions to the NASA Artemis program, an international initiative in which the Australian Space Agency is a member, to enable sustainable human presence beyond Earth’s orbit.					

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100506	**A Bayesian Approach to Distributed Estimation for Multi-Object Systems**	242,423.00	256,476.00	256,476.00	256,476.00	1,011,851.00
Vo, Prof Ba Tuong	This project aims to develop new signal processing techniques that facilitate autonomous technologies for environmental perception, with the ability to efficiently process large data volumes from multiple sensing modalities. Rapid advances in sensors and networks have led to a digital data deluge, from which extracting useful information presents new technological challenges and opportunities. To address this development, this project seeks to develop new distributed solutions for statistical estimation, which are specifically designed for dynamic systems with multiple object states, and are inherently scalable and robust. The potential benefits include new technologies for smart cities, autonomous infrastructure, and digital productivity.					
	National Interest Test Statement					
	This project aims to develop new algorithmic technologies that facilitate the future growth of smart cities, autonomous infrastructure, and digital productivity. Australia has made significant investments in its National Broadband Network, and is now embarking on a national rollout of 5G cellular networks. Such networks are driving the uptake of the Internet-of-Things, a global network of people, data, processes and devices, offering a platform for turning information into productivity. The current Industry 4.0 era is increasingly embracing the digitally connected economy, and Australia's continued economic prosperity is coupled to its ability to capitalize on enabling digital technologies. Through leveraging locally grown expertise, this project seeks to deliver new autonomous systems, that assist people and businesses to exploit the data and network deluge. Potential application areas include autonomous mining, intelligent transport networks with self-driving cars, assessing environmental change with drone swarms, and tracking emerging health threats with integrated government systems.					
FT210100509	**2D nanomaterial heterostructures for photocatalytic hydrogen production**	188,766.00	194,297.00	194,297.00	184,355.00	761,715.00
Jia, Dr Guohua	This project aims to develop two-dimensional (2D) nanomaterial heterostructures as photocatalysts for hydrogen production from the liquid carrier of methanol. In addition to transformational photocatalytic technology to utilise Australian raw resources, this project expects to generate new knowledge in the areas of photochemistry, materials science and nanotechnology. These should not only expand the applications of 2D nanomaterials to a new domain of photocatalysts, but also may eventually lead to new industry advances in 2D nanomaterials for a 'hydrogen economy'.					
	National Interest Test Statement					
	The development of a 'hydrogen economy' is attractive in a resource-rich country like Australia but difficulties linked to the infrastructure for its storage and transportation are the key issues for widening hydrogen utilisation as a new energy carrier. The successful development of photocatalytic hydrogen production from methanol using 2D nanomaterial heterostructures as photocatalysts could bring considerable economic benefits to Australia's energy sector. The outcomes from this project should enable the development of new materials and applications not available in the current market, and put Australia at the forefront of hydrogen technology. The research is expected to result in a new class of cost-effective photocatalysts and lay the groundwork for other energy-related and nanotechnology applications including photodetectors, and chemical- or bio-sensors, further stimulating the development of future sustainable energy options.					
FT210100857	**Narrative, Technologies and Wirlomin Moorditj-abiny**	288,370.00	259,522.00	273,370.00	273,370.00	1,094,632.00
Scott, Prof Kim J	The project aims to investigate how digital technologies in combination with on-Country camps may consolidate, enhance and help share a specific Aboriginal heritage. The project will generate new knowledge by workshopping select archival Noongar language, story and song material with its home community so as to enable an Indigenous-led articulation of identity and belonging. Expected outcomes include improved cross-generational transmission, empowerment of the appropriate Noongar community, social cohesion and the generation of transformative narratives as well as publication. Benefits include community well-being, a potentially refined integration of 'nature' and 'culture', and modelling of Reconciliation strategies.					
	National Interest Test Statement					
	Regional Aboriginal heritages have the potential to make important contributions to understanding the natural environment and a shared sense of identity. They can provide benefits to the economy – particularly through tourism and the arts - and are vital to Reconciliation and successful efforts to 'Close the Gap'. Using digital technologies, archival material and on-country experiences this project will consolidate, enhance and develop sustainable ways of sharing Aboriginal heritage. The project builds on a successful record of documentation, publication, performance and community development. By extending and refining this work, along with the continuing cultivation of both new and long-standing relationships between local Aboriginal and non-Aboriginal people, the project aims to provide a model that can be applied in other areas.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
(Columns 1 and 2)	(Column 3)	2021-22 (Column 4)	2022-23 (Column 5)	2023-24 (Column 6)	2024-25* (Column 7)	(Column 8)
FT210100873	**Understanding the enigma of the most energetic particles in the Universe.**	268,370.00	268,370.00	268,370.00	268,370.00	1,073,480.00
Brown, A/Prof Anthony M	By combining an innovative Unmanned Aerial Vehicle (UAV)-based calibration technique with the unparalleled sensitivity of future gamma-ray and radio telescope arrays, this project will study astronomical particle accelerators and Dark Matter with unprecedented accuracy. This will afford us a unique view of the Universe' most energetic processes and allow us to study the laws of physics inaccessible to us in the lab. In the context of interdisciplinary research, the UAV innovation created will also be leveraged against key applications of remote sensing. With these two goals, this project will demonstrate the capabilities of novel Australian technology whilst providing Australia with a unique science use-case in high-energy astrophysics.					
	National Interest Test Statement This project will create an Unmanned Aerial Vehicle (UAV)-based calibration system for telescope arrays. While initially aimed at gamma-ray telescope arrays, the flexibility of the UAV approach allows us to calibrate other telescope arrays such SKA, a multi-billion dollar project that Australia is heavily invested in. As such, adapting the UAV-based calibration approach to SKA will increase the scientific return from financial commitments already made, and increase Australia's visibility in these experiments. This project will optimise the UAV performance for scientific research (rather than the current norm of them being optimised for photography). This optimisation will be required to realise the full potential of the technique, allowing for the most accurate data possible. However, this optimisation will also allow us to conduct very accurate aerial surveys. Combining this scientific survey capability with machine learning data analytics will open up a plethora of exciting remote sensing possibilities, from septoria pathogen identification in Australian wheat fields, to monitoring Australian flora.					
	Curtin University	1,437,009.00	1,427,745.00	1,441,593.00	1,406,651.00	5,712,998.00
The University of Western Australia						
FT210100268	**Robust and Explainable 3D Computer Vision**	275,000.00	288,000.00	288,000.00	275,000.00	1,126,000.00
Mian, Prof Ajmal S	Computer vision is increasingly relying on deep learning which is fragile, opaque and fails catastrophically without warning. This project aims to address these problems by developing new theory in graph representation of 3D geometric and image data, hierarchical graph simplification and novel modules designed specifically for deep learning over geometric graphs. Using these modules, it aims to design graph convolutional network architectures for self-supervised learning that are robust to failures and provide explainable decisions for object detection and scene segmentation. The outcomes are expected to advance theory in robust deep learning and benefit 3D mapping, surveying, infrastructure monitoring, transport and robotics industries.					
	National Interest Test Statement This research will enable Australia to get a share of the tremendous economic market in automatic computer vision, a vital component of Artificial Intelligence. It will have commercial and social benefits in three application domains. The first one includes cost effective 3D mapping, surveying, city planning and infra structure monitoring. The second one is robotics, as the outcomes of this project will equip robots with eyes making them fully autonomous and enabling them to make intelligent decisions beyond navigation. Autonomous robots can improve elderly care and productivity in high risk environments. The final application domain is autonomous navigation in general that is useful for autonomous driving and drones. Autonomous driving can potentially revolutionize the global transportation industry and especially in Australia where road transportation is a major means of inter-state freight. Autonomous vehicles can potentially improve road safety, make people and cargo movement more efficient, make more liveable city environments and allow access to transport services for those unable to drive.					
FT210100902	**Unravelling the secrets of the rhizosphere of crops**	200,705.00	200,705.00	200,705.00	184,575.00	786,690.00
Chen, Dr Yinglong	Phosphate is one of the most important limiting nutrients for crop growth and production. Plant acquisition of soil phosphate largely depends on root proliferation to accelerate soil exploration, and on phosphate bioavailability mediated by root exudates and rhizosphere microorganisms. Central to this is the need for a better understanding of the complex biogeochemical interfaces in the rhizosphere. This project explores recently developed non-destructive imaging, isotope, and metabolism techniques to generate a systematic research tool in tracking rhizosphere interactions and imaging phosphate dynamics from macroscale to nanoscale levels. This study will provide new opportunities to improve crop nutrient use efficiency and crop production.					

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

Minister's Approval for ARC Future Fellowships for Funding Commencing in 2021 Schedule

Approved Organisation, Leader of Approved Research Program	Approved Research Program	Estimated and Approved Expenditure ($)			Indicative Funding ($)	Total ($)
		2021-22	2022-23	2023-24	2024-25*	
(Columns 1 and 2)	(Column 3)	(Column 4)	(Column 5)	(Column 6)	(Column 7)	(Column 8)
	National Interest Test Statement					
	Australian wheat production during the 2019/2020 season totalled 15.17 million tonnes - the lowest since 2008, due to unfavourable seasonal conditions in early spring in most cropping regions. Significant further improvements in efficiency of production are needed to maintain the profitability of Australia's agricultural industry in the future. This project will establish a basis of efficient structure and function of root systems for capturing phosphate as a major adaptation strategy required in agricultural regions in Australia. Specifically, this project will (1) contribute to sustainable crop production in Australia by improving nutrient uptake efficiency, (2) enhance understanding of the mechanisms underlying the complex root-microbe-mineral nutrients interactions in adaptation to heterogeneous soil environments, and (3) increase our ability to link genome and the phenotype to enhance breeding for inclusion of root traits underlying adaptation to specific environments.					
	The University of Western Australia	475,705.00	488,705.00	488,705.00	459,575.00	1,912,690.00
	Western Australia	1,912,714.00	1,916,450.00	1,930,298.00	1,866,226.00	7,625,688.00
		23,397,494.00	**23,506,992.00**	**23,435,149.00**	**22,681,043.00**	**93,020,678.00**

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