



Australian
Academy of
Science

SCIENCE
at the SHINE DOME 2022

PROGRAM 22–24 NOVEMBER



Reach with impact



What causes COVID-19 variants? How is Australia battling imported red fire ants? How can our government embed science more deeply in its responses to crises?

From fact-checked explainers of complex issues, to breaking news videos, and highlighting the real-world impact of its Fellows here and abroad—the Academy’s expert communications team is producing trusted scientific content for the broad community, mainstream media and targeted audiences.

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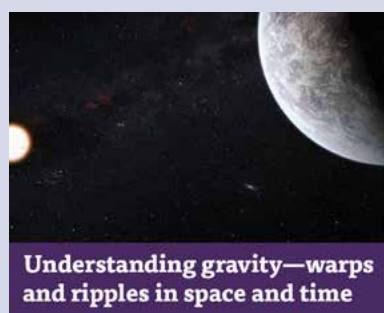
you let us know, the better we can maximise its impact.

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PRESIDENT'S WELCOME



Welcome back to Science at the Shine Dome. It's been three years since we last hosted researchers in person here for the flagship event of the Australian Academy of Science. We're delighted so many of you have chosen to join us for this unique celebration of scientific excellence at the home of Australian science.

One reason for this three-year hiatus is of course the COVID-19 pandemic, which propelled us all into a world of work-from-home, social distancing, and staying home to save lives. It has been an especially tough three years for many in the sector, grappling with interrupted research programs, increased workloads and the general pressure of living through unprecedented times. I acknowledge how difficult this has been.

Yet the pandemic has emphasised the importance of science in our collective response to complex challenges. The Academy was pleased to contribute to the COVID-19 response through timely scientific advice delivered via the Rapid Research Information Forum, engaging and fact-checked content via social media, and our COVID-19 news and resources hub. Thank you to everyone across the Academy's networks who contributed to these endeavours.

COVID-19 aside, there have been other major shifts and changes over the past three years.

We experienced several extreme weather events, from the catastrophic Black Summer bushfires of 2019–20, to devastating floods over the last two years. These events are symptoms of yet another challenge—climate change—where collective scientific action will be essential for navigating through complexity and uncertainty.

Here in Canberra, a violent hailstorm in early 2020 badly damaged both the Shine Dome and Ian Potter House, the headquarters of the Academy's secretariat. The roof tiles of the Shine Dome were pockmarked by large hailstones, and the entire roof has been resurfaced with new copper. Ian Potter House has also undergone complete refurbishment and Academy staff were pleased to return to this historic building last month.

I began my four-year term as President of the Academy in May this year, the same month that Australians elected a new government. The Academy has been forging relationships with new ministers as we continue to bring science to the service of the nation, through independent and authoritative scientific advice.

I see my role as being a champion for the cause of science and scientific excellence. As a nation, we must adequately invest in research and development to tackle challenges known and unknown—including climate change and future pandemics. We must also invest in people. Nurturing the next generation of young scientists from diverse backgrounds is one of my priorities. My hope is that the last three years will be a turning point—a chance to reinvigorate and appropriately value the science system, and a catalyst for a just transition from a resource-based economy to a knowledge- and technology-based one.

So, it is a pleasure to celebrate scientific excellence with you over these three days. Enjoy your time together—there are few, if any, science events that bring together so many from different fields, backgrounds and career stages. Make the most of the new connections, conversations and presentations through the event app and online—you'll be able to catch up on anything you missed. With three years of newly elected Fellows in attendance, alongside inspiring awardees, this program is overflowing with networking and learning opportunities.

Finally, I would like to thank our donors, event partners and sponsors. Their support is instrumental in bringing Science at the Shine Dome 2022 to life, and enabling us to deliver both an online and in-person experience. Thank you also to the many organisations who have sponsored EMCRs to attend. Partnerships are deeply important to the Academy, with many of our core activities only possible with the support of likeminded organisations and individuals.

Have a wonderful few days here at the Shine Dome in our national capital, celebrating our nation's remarkable scientific talent.

Professor Chennupati Jagadish
AC PresAA FEng FTSE

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PROGRAM

Colour coding in the program matches the lanyards worn by delegates.
Delegates are welcome at every session unless restrictions apply.

■ New Fellows ■ EMCRs ■ Awardees ■ Event partners

Tuesday 22 November 2022

9.00am	Main Foyer	Registrations
	Arrival tea/coffee	Dorothy Hill Room
9.45am	Ian Wark Theatre	Welcome MC Anna-Maria Arabia
9.50am		Welcome to Country Aunty Violet Sheridan
10.00am		President's Address Professor Chennupati Jagadish AC PresAA FEng FTSE
10.05am– 11.30am		New Fellows 2020 Admission Ceremony
		Professor Tim Bedding FAA , The University of Sydney
		Dr Annabelle Bennett AC FAA , Bond University
		Dr Wenju Cai FAA , CSIRO Oceans and Atmosphere
		Professor Peter Currie FAA , Monash University
		Professor Aurore Delaigle FAA , The University of Melbourne
		Dr Cathy Foley AO FAA FTSE , Office of the Chief Scientist
		Professor Gary Froyland FAA , UNSW Sydney
		Professor Kevin Galvin FAA FTSE , The University of Newcastle
		Professor Kate Jolliffe FAA , The University of Sydney
		Professor Ping Koy Lam FAA , A*STAR (Agency for Science, Technology and Research)
		Professor Ryan Lister FAA , The University of Western Australia
		Professor Justin Marshall FAA , The University of Queensland
		Professor Harvey Millar FAA , The University of Western Australia
		Professor Lidia Morawska FAA , Queensland University of Technology
		Professor Robyn Owens FAA , The University of Western Australia
		Professor Ian Paulsen FAA , Macquarie University
		Dr Simon Poole AO FAA FTSE , Cylite Pty Ltd
		Professor Andrew Roberts AM FAA FAHMS , Walter and Eliza Hall Institute of Medical Research
		Professor Alan Rowan FAA , The University of Queensland
		Dr Jenny Stauber FAA FTSE , CSIRO Land and Water
11.30am	Lunch	Jaeger Room/Dorothy Hill Room/Marquee
	Main Foyer	Group photo of New Fellows elected in 2020 (meet in main foyer)
	Becker Room	Portraits of New Fellows
	Dorothy Hill Room	EMCRs meet and greet

12.45pm	Ian Wark Theatre	President's Address	Professor Chennupati Jagadish AC PresAA FREng FTSE
12.50pm– 2.15pm		New Fellows 2021 Admission Ceremony	
		Professor Steven Chown FAA , Monash University	
		Professor Arthur Christopoulos FAA FAHMS , Monash University	
		Dr Greg Clark AC FAA FTSE , The Australian National University	
		Professor Brendan Crabb AC FAA FAHMS , Burnet Institute	
		Professor Mark Dawson FAA FAHMS , Peter MacCallum Cancer Centre	
		Professor Yihong Du FAA , The University of New England	
		Professor Robin Gasser FAA , The University of Melbourne	
		Professor Glenda Halliday FAA FAHMS , The University of Sydney	
		Professor Rob Hyndman FAA FASSA , Monash University	
		Professor Dorrit Jacob FAA , The Australian National University	
		Professor Barbara Nowak FAA , University of Tasmania	
		Professor Andy Pitman AO FAA , UNSW Sydney	
		Professor Barry Pogson FAA , The Australian National University	
		Professor Ian Reid FAA FTSE , The University of Adelaide	
		Professor Alison Rodger FAA , Macquarie University	
		Professor John Sader FAA , California Institute of Technology	
		Professor Margaret Sheil AO FAA FTSE , Queensland University of Technology	
		Professor Svetha Venkatesh FAA FTSE , Deakin University	
		Professor Hala Zreiqat AM FAA FTSE FAHMS , The University of Sydney	
2.15pm	Afternoon tea	Jaeger Room/Dorothy Hill Room/Marquee/Gelato cart	
	Main Foyer	📸 Group photo of New Fellows elected in 2021 (meet in main foyer)	
	Becker Room	📸 Portraits of New Fellows	
3.10pm	Ian Wark Theatre	President's Address	Professor Chennupati Jagadish AC PresAA FREng FTSE
3.15pm– 4.45pm		New Fellows 2022 Admission Ceremony	
		Professor Matthew Bailes FAA , Swinburne University of Technology	
		Professor Kathy Belov AO FAA , The University of Sydney	
		Professor Marcela Bilek FAA , The University of Sydney	
		Professor Stuart Bunn FAA , Griffith University	
		Professor Tom Calma AO FAA FASSA , University of Canberra	
		Professor Jonathan Carapetis AM FAA FAHMS , Telethon Kids Institute	
		Dr Beth Fulton FAA FTSE , CSIRO Oceans and Atmosphere	
		Professor Catherine Greenhill FAA , UNSW Sydney	
		Professor Michelle Haber AM FAA FAHMS , Children's Cancer Institute	
		Professor Peter Høj AC FAA FTSE , The University of Adelaide	
		Professor Tim Hughes FAA FAHMS , South Australian Health and Medical Research Institute	
		Professor Lei Jiang FAA , Chinese Academy of Sciences	
		Professor Peter Langridge FAA FTSE , The University of Adelaide	
		Dr Janice Lough FAA , Australian Institute of Marine Science	
		Professor Naomi McClure-Griffiths FAA , The Australian National University	
		Professor Sarah Medland OAM FAA FAHMS FASSA , QIMR Berghofer Medical Research Institute	
		Professor Ute Roessner AM FAA , The Australian National University	
		Professor Craig Simmons FAA FTSE , The University of Newcastle	
		Professor Kate Smith-Miles FAA , The University of Melbourne	
		Professor Huijun Zhao FAA FTSE , Griffith University	
		Professor Albert Zomaya FAA , The University of Sydney	
6.00pm– 8.00pm	Soiree (cocktail function) , Marquee in the grounds of Ian Potter House. Enter soiree via main entrance of Ian Potter House.		

Wednesday 23 November

8.30am	Main Foyer	Registrations open
	Arrival tea/coffee	Jaeger Room/Dorothy Hill Room
9.00am	Ian Wark Theatre	Welcome MC Anna-Maria Arabia
9.05am		President's Address Professor Chennupati Jagadish AC PresAA FREng FTSE
9.15am		Platinum Event Partner Address Professor Tanya Monro AC FAA FTSE, Department of Defence
9.20am– 11.15am		New Fellows 2022 Presentations (10 minutes + 2-minute Q&A) Professor Kathy Belov AO FAA , The University of Sydney <i>Accelerating species recovery using immunogenetics</i> Professor Marcela Bilek FAA , The University of Sydney <i>Expanding the frontiers of biomedicine and space with plasma</i> Professor Stuart Bunn FAA , Griffith University <i>What sustains freshwater biodiversity in our rivers and wetlands?</i> Professor Tom Calma AO FAA FASSA , University of Canberra <i>Discovery is the first step—advocacy is the next</i> Professor Jonathan Carapetis AM FAA FAHMS , Telethon Kids Institute, <i>Strep, hotels and the gap</i> Dr Beth Fulton FAA FTSE , CSIRO Oceans and Atmosphere, <i>The future is blue</i> Professor Catherine Greenhill FAA , UNSW Sydney, <i>Short stories about random hypergraphs</i>
11.15am	Morning tea	Jaeger Room/Dorothy Hill Room/Marquee
	Main Foyer	Group photo of New Fellows elected in 2022 (meet in main foyer)
	Becker Room	Portraits of New Fellows
11.45am	Ian Wark Theatre	Platinum Event Partner Address Professor Bronwyn Fox, CSIRO
11.50am– 1.30pm		New Fellows 2022 Presentations (10 minutes + 2-minute Q&A) Professor Michelle Haber AM FAA FAHMS , Children's Cancer Institute <i>Molecular targeted therapies and precision medicine for children with cancer</i> Professor Peter Høj AC FAA FTSE , The University of Adelaide <i>In the quest to strengthen research and its application for societal benefit, are we on the right track or is there a better way?</i> Professor Tim Hughes FAA FAHMS , South Australian Health and Medical Research Institute, <i>Closing in on the target in chronic myeloid leukaemia</i> Professor Lei Jiang FAA , Chinese Academy of Sciences, <i>Bioinspired super-wettability systems</i> Emeritus Professor Peter Langridge FAA FTSE , The University of Adelaide <i>The challenges of increasing the yield stability of wheat</i> Dr Janice Lough FAA , Australian Institute of Marine Science <i>A changing climate for coral reefs—tales from coral skeletons</i>
1.30pm	Lunch	Jaeger Room/Dorothy Hill Room/Marquee/Gelato cart
	Main Foyer	Group photo of EMCRs (meet in main foyer)
	Becker Room	Portraits of New Fellows
2.30pm	Ian Wark Theatre	Major—Diversity and Inclusion Partner Address University of Queensland
2.35pm– 4.45pm		New Fellows 2022 Presentations (10 minutes + 2-minute Q&A) Professor Naomi McClure-Griffiths FAA , The Australian National University <i>Exploring the Milky Way and the Magellanic Clouds with Australia's radio telescopes</i> Professor Sarah Medland OAM FAA FASSA FAHMS , QIMR Berghofer Medical Research Institute <i>What have we learned from a decade of large-scale collaborative meta-analysis in neuroimaging genetics?</i> Professor Ute Roessner AM FAA , The Australian National University <i>Friend or enemy: The biochemical basis of plant root-microbe interactions</i> Professor Craig Simmons FAA FTSE , The University of Newcastle <i>Modelling groundwater: Maths and physics get down and dirty</i> Professor Kate Smith-Miles FAA , The University of Melbourne <i>'Stress-testing' algorithms to develop trust</i> Professor Huijun Zhao FAA FTSE , Griffith University <i>Photo-electro-catalysis for analytical applications</i> Professor Albert Zomaya FAA , The University of Sydney <i>Edge computing: Empowering the next digital transformation</i> Professor Matthew Bailes FAA , Swinburne University of Technology <i>The discovery of fast radio bursts, new extragalactic messengers</i>
6.00pm	Coaches	from Peppers Gallery, QT Canberra and Mantra on Northbourne to Parliament House for Gala Dinner
6.30pm– 10.30pm	Gala Dinner	Great Hall, Australian Parliament House

Thursday 24 November

8.00am– 9.00am	Jaeger Room	Supporters and Awardees Breakfast (invitation only)
8.45am	Main Foyer	Registrations
	Arrival tea/coffee	Dorothy Hill Room
9.15am	Ian Wark Theatre	Welcome MC Anna-Maria Arabia
9.20am		President's Address Professor Chennupati Jagadish AC PresAA FREng FTSE
9.25am		Major Event Partner Address Dr Penny Martens, UNSW
9.30am		2020 Macfarlane Burnet Lecture Professor Marilyn Renfree AO FAA FRS, The University of Melbourne, <i>Marsupials: Microchip miracles</i>
10.50am		2022 Macfarlane Burnet Lecture Professor Steve Simpson AC FAA FRS, The University of Sydney, <i>An inordinate fondness for locusts</i>
10.40am	Morning tea	Jaeger Room/Dorothy Hill Room/Marquee
	Becker Room	Portraits of Awardees
11.20am	Ian Wark Theatre	Major Event Partner Address Dr Mark Hoggard, Australian National University
11.25am		2022 Ruby Payne-Scott Lecture Dr Liz Dennis AC FAA FTSE, CSIRO, <i>Understanding plant growth and development</i>
12.00pm		Medal Presentations for 2022 Awardees
		Inaugural David Vaux Research Integrity Fellowship Award 2023 Professor David Vaux AO FAA FAHMS, Walter and Eliza Hall Institute of Medical Research
		David Craig Medal 2022 Professor Christopher Barner-Kowollik FAA, Queensland University of Technology
		Mawson Medal and Lecture 2022 Professor Andrew Roberts, The Australian National University
		Suzanne Cory Medal 2022 Professor Georgia Chenevix-Trench FAA, QIMR Berghofer Medical Research Institute
		Gustav Nossal Medal 2022 Professor Rebecca Guy (<i>not in attendance</i>), UNSW Sydney
		Nancy Millis Medal 2022 Professor Vanessa Peterson, ANSTO
		Anton Hales Medal 2022 Associate Professor Jenny Fisher, University of Wollongong
		Christopher Heyde Medal 2022 Dr Francis Hui, The Australian National University
		Dorothy Hill Medal 2022 Dr Samintha Perera, The University of Melbourne
		Fenner Medal 2022 Professor Chris Greening, Monash University
		Frederick White Medal 2022 Professor Kerrylee Rogers, University of Wollongong
		Gottschalk Medal 2022 Dr Alisa Glukhova (<i>not in attendance</i>), Walter and Eliza Hall Institute of Medical Research
		John Booker Medal 2022 Associate Professor Annan Zhou, RMIT University
		Le Fèvre Medal 2022 Associate Professor Yuning Hong, La Trobe University
		Pawsey Medal 2022 Dr Keith Bannister, CSIRO
		Ruth Stephens Gani Medal 2022 Dr Loïc Yengo, The University of Queensland
1.10pm	Lunch	Jaeger Room/Dorothy Hill Room/Marquee
	Jaeger Room	Poster session
	Main Foyer	Group photos of 2022 Awardees (meet in main foyer)
	Becker Room	Portraits of Awardees
2.00pm– 4.00pm	Ian Potter House Marquee	Indigenous Knowledges Workshop
4.30pm	Coaches to airport, outside main entrance of Shine Dome	



Supporting great science and industry partnerships

We're working with universities, industry and government to build new industries for Australia such as hydrogen.

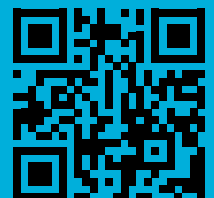


We're also delivering programs to build the capability of Australia's researchers and SMEs to unlock industry collaboration and deliver solutions from science.

With strong and established relationships across the research community, CSIRO is uniquely positioned to help Australia innovate.

Let's connect.

Australia's National Science Agency



NEW FELLOWS 2020



Professor Tim Bedding FAA
The University of Sydney



Professor Tim Bedding is an astrophysicist, mainly working in the field of astroseismology. He studies the oscillations of stars to understand their internal properties. Professor Bedding was an undergraduate and postgraduate student at the University of Sydney. After a PhD in astrophysics, he was a postdoctoral research Fellow at the European Southern Observatory, before returning to the School of Physics at the University of Sydney as a lecturer in 1995. He was promoted to Professor in 2007 and served as Head of School from 2012 to 2018. Professor Bedding received the university's Excellence in Teaching Award in 1999 and was appointed as a Payne-Scott Professor in 2019.



Dr Annabelle Bennett AC FAA
Bond University



The Honourable Dr Annabelle Bennett is a retired Judge of the Federal Court of Australia who specialised in intellectual property. She is currently Chancellor of Bond University; the chair of the Australian Nuclear Science and Technology Organisation (ANSTO); an arbitrator of the Court of Arbitration for Sport; member of the Board of Directors of the Garvan Institute; and Independent Chair of Gardior Pty Ltd. She has also served as a commissioner with the NSW Law Reform Commission and as a royal commissioner into National Natural Disaster Arrangements. Dr Bennett was recently appointed to the Australian Government panel to undertake an independent review of the operation of Australian carbon credit units.



Dr Wenju Cai FAA
CSIRO Oceans and Atmosphere



Dr Wenju Cai, a CSIRO Chief Research Scientist, specialises in global climate variability and climate change, and their impact on Australia. With over 25 years of research and leadership experience, his interest spans from the dynamics, mechanism and impact of climate variability in both the tropics and Southern Ocean, through to climate change detection and attribution, and to impacts of individual forcing factors of increasing carbon dioxide, increasing anthropogenic aerosols, and stratospheric ozone depletion. In particular, he specialises in conceptual nonlinear frameworks for strong El Niño, La Niña, and the Indian Ocean dipole, uncovering their nonlinear dynamics and global impact. His research has projected an increased frequency of tropical climate extremes. Dr Cai's service to scientific communities includes contributing to IPCC reports, serving as Co-Chair of the World Climate Research Programme CLIVAR Pacific Panel (2009–15), and as a member (2016–18) and Co-Chair (2019–present) of the CLIVAR Scientific Steering Group.



Professor Peter Currie FAA
Monash University



Professor Peter Currie received his PhD in *Drosophila* genetics from Syracuse University, New York, US. He undertook postdoctoral training in zebrafish development at the Imperial Cancer Research Fund (now Cancer Research UK) in London, UK. He has worked as an independent laboratory head at the UK Medical Research Council Human Genetics Unit in Edinburgh, UK and the Victor Chang Cardiac Research Institute in Sydney, Australia. In 2016 he was appointed Director of Research of the Australian Regenerative Medicine Institute at Monash University. He is currently a Senior Principal Research Fellow with the National Health and Medical Research Council in Australia. Professor Currie is a developmental evolutionary and stem cell biologist who studies the genetic basis of skeletal muscle stem cell action during development, evolution, regeneration, and disease. His key discoveries utilise several models, chiefly the zebrafish, to define the genetic and evolutionary basis for muscle formation and growth throughout vertebrate phylogeny.



Professor Aurore Delaigle FAA
The University of Melbourne



Professor Aurore Delaigle is a professor of statistics at the University of Melbourne. Previously, she held a Future Fellowship and a Queen Elizabeth Fellowship, also at the University of Melbourne. Before moving to Melbourne in 2007, she held positions at the University of California at Davis and at San Diego, and at the University of Bristol. Professor Delaigle's main research interests include nonparametric estimation, measurement errors, deconvolution problems and functional data analysis. She is particularly interested in developing new methods for indirectly and imperfectly observed data. Professor Delaigle is co-editor-in-chief of the *Journal of the Royal Statistical Society: Series B*.



Dr Cathy Foley AO FAA FTSE
Office of the Chief Scientist



Dr Cathy Foley commenced as Australia's ninth Chief Scientist in January 2021 after an extensive career at Australia's national science agency, the CSIRO. Dr Foley is an internationally recognised physicist with major research achievements in superconductors and sensors which led to the development of the LANDTEM™ sensor system to locate valuable deposits of minerals deep underground, resulting in discoveries and delineation of minerals worth more than \$6 billion. Dr Foley's scientific excellence and influential leadership have been recognised with numerous awards and fellowships, including an Order of Australia for service to research science and to the advancement of women in physics. Dr Foley is an inspiration to women in STEM across the globe and is committed to tackling gender inequality and barriers to diversity in the science sector to embrace the full human potential of all.



Professor Gary Froyland FAA
UNSW Sydney



Professor Gary Froyland obtained his undergraduate and postgraduate degrees from the University of Queensland and the University of Western Australia, followed by postdoctoral Fellowships at the University of Tokyo and the University of Paderborn. He was a senior scientist at BHP Billiton for three years before taking up his current position at the University of New South Wales. Professor Froyland has had a major influence on the field of dynamical systems and ergodic theory, in addition to having made sustained contributions to discrete optimisation. In particular, he is a world authority on the transfer operator analysis of complex fluid flow, with his discoveries having reshaped the study of ocean gyres and eddies. He is an elected Fellow of the Society for Industrial and Applied Mathematics, has held several prestigious international visiting professorships, and will deliver a keynote address at the upcoming quadrennial International Congress on Industrial and Applied Mathematics in 2023.



Professor Kevin Galvin
FAA FTSE

The University of Newcastle



Professor Kevin Galvin is the inventor of the reflux classifier used in gravity separation of fine particles. With more than 180 installations around the world, the technology has been used to beneficiate a broad range of minerals including iron ore, mineral sands, potash, chromite, lithium, and manganese. New innovative systems are emerging including the reflux flotation cell and a novel agglomeration technology. Based at the University of Newcastle, Professor Galvin is also a Fellow of the Australian Academy of Technological Sciences and Engineering and previous recipient of numerous awards including the Clunies Ross Award. He is Director of the ARC Centre of Excellence for Enabling Eco-Efficient Beneficiation of Minerals.



Professor Kate Jolliffe FAA
The University of Sydney



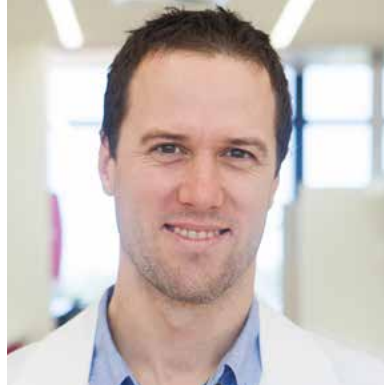
Professor Kate Jolliffe received her BSc in 1993 and PhD in 1997 from the University of New South Wales. She held positions at Twente University, the Netherlands; the University of Nottingham, UK; and the Australian National University, before taking up an Australian Research Council Queen Elizabeth II Fellowship at the University of Sydney in 2002. She currently holds the position of Payne-Scott Professor at the University of Sydney. She has been awarded the Beckwith (2004), Biota (2006), Birch (2017), H.G. Smith (2018) and Margaret Shiel (2021) medals of the Royal Australian Chemical Institute. Her research interests are in the areas of supramolecular, peptide, and organic chemistry.



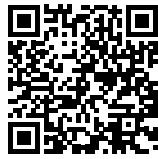
Professor Ping Koy Lam FAA
A*STAR (Agency for Science –
Technology and Research)



Professor Ping Koy Lam is an internationally renowned experimental physicist working on using quantum phenomena for technological applications. His research field is in quantum information and metrology, where he has made significant contributions in using bright laser fields to generate quantum states of light, encrypt information, and perform precision measurements. His research also focuses on inter-connecting quantum platforms, such as mapping quantum information between atomic, mechanical, and photonic systems. Professor Lam was awarded the Australian Institute of Physics Alan Walsh Medal in 2014 in recognition of his contribution to Australian industry. He is currently the Chief Quantum Scientist at A*STAR in Singapore and a professor at the Australian National University.



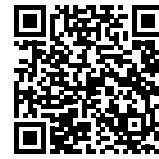
Professor Ryan Lister FAA
The University of Western Australia



Professor Ryan Lister is a molecular biologist who studies genome regulation, the epigenome, and cell identity in plants and animals at the University of Western Australia (UWA) and the Harry Perkins Institute of Medical Research. After receiving his PhD from UWA in 2005, Professor Lister undertook postdoctoral studies at the Salk Institute for Biological Studies where he developed and applied new genomics techniques to map the epigenome and transcriptome of plants and humans. Having returned to Australia in 2012, Professor Lister's research is focused on understanding the role of the epigenome in regulating cell identity, and developing molecular tools to manipulate the epigenome and gene activity to control cell functions.



Professor Justin Marshall FAA
The University of Queensland



Professor Justin Marshall's principal aim is to understand how other animals perceive their environment. He says that as arrogant humans, we often assume we are the pinnacle of evolution, however—certainly in sensory terms—this is far from true. By taking an approach based around visual ecology that includes physiology, anatomy, behaviour and neural integration, Professor Marshall hopes to decode the 'languages' of colour and polarisation. Much of his work focuses on coral reef animals, causing him to become acutely aware of man's negative influence on this environment. To raise awareness among the public and help correct this, he founded CoralWatch 20 years ago. It is now the world's largest citizen-science-based coral health and climate change assessment program.



Professor Harvey Millar FAA
The University of Western Australia



Professor Harvey Millar’s research focuses on mitochondrial function in plants, their role in metabolism, and the energy efficiency of plant function. His team also analyses the protein composition of plants to address questions in fundamental plant science related to the subcellular compartmentation of plant cells and in applied contexts of the protein composition in cereal grains. He obtained his PhD from the Australian National University in 1997 and has worked at the University of Western Australia in Perth since 2000, where he has led an ARC Centre of Excellence in Plant Energy Biology (2014–2021) and is now an ARC Australian Laureate Fellow (2021–present).



Professor Lidia Morawska FAA
Queensland University of Technology



Professor Lidia Morawska is a Distinguished Professor at Queensland University of Technology, the director of the International Laboratory for Air Quality and Health—which is a collaborating centre of the WHO—and holds a position of Vice-Chancellor Fellow at the Global Centre for Clean Air Research, University of Surrey. Professor Morawska is a physicist and conducts fundamental and applied research in the interdisciplinary field of air quality and its impact on human health and the environment, with a focus on the science of airborne particulate matter. An author of more than 1,000 publications, Professor Morawska has been involved at an executive level with a number of relevant national and international professional bodies, and is the recipient of numerous scientific awards.



Professor Robyn Owens FAA
The University of Western Australia



Professor Robyn Owens is an Emeritus Professor in the Australian university sector and the former Deputy Vice-Chancellor (Research) of the University of Western Australia (UWA). She has over 30 years’ experience working as a teacher, researcher, and university leader, focusing on strategy and national policy. Professor Owens was trained in mathematics at UWA, Oxford University, and the University of Paris. Her research was primarily in computer vision, where she contributed to both theoretical and applied aspects of feature recognition in images and image understanding. Her work has been acknowledged with several national and international awards, including the 2010 UK Rank Prize. Professor Owens is a graduate of the Australian Institute of Company Directors and the Vincent Fairfax Ethical Leadership Program. She currently chairs the Governing Board of the Australian Earth-System Simulator (ACCESS-NRI) and sits on the senate of Murdoch University and several research-related advisory boards.



Professor Ian Paulsen FAA
Macquarie University



Professor Ian Paulsen is a Distinguished Professor at Macquarie

University and the director of the ARC Centre of Excellence in Synthetic Biology. He is also the director of the Australian Genome Foundry and a former ARC Laureate Fellow. He is a global leader and internationally recognised in the fields of multidrug efflux pumps, membrane transporters, microbial genomics, and synthetic biology. He is part of the Yeast 2.0 international consortium to build the world's first synthetic yeast. Professor Paulsen is an ISI highly cited researcher, and Thomson Reuters has identified him as one of the world's 3,000 most influential scientific minds.



Dr Simon Poole AO FAA FTSE
Cylite Pty Ltd



Dr Simon Poole is internationally recognised as a leading entrepreneur and technologist.

He has an outstanding track record in photonics, built over 40 years as a research leader and as an experienced start-up/early-stage CEO. The previous two companies he founded (Indx, Engana) have generated over \$2 billion in export revenues to date. His success as an entrepreneur has led to a number of awards, including the prestigious Clunies Ross Award from the Australian Academy of Technological Sciences and Engineering in 2013. In 2016 he was awarded the Charles Todd Medal by the Telecommunications Society of Australia, and he was made an Officer of the Order of Australia for his contribution to photonics in Australia in 2018. Along with colleagues from Finisar Australia, he was awarded the Prime Minister's Prize for Innovation in 2018.



Professor Andrew Roberts AM FAA FAHMS

Walter and Eliza Hall Institute of Medical Research



Professor Andrew Roberts is cancer theme co-leader at the Walter and Eliza Hall Institute of

Medical Research, a clinical haematologist at Royal Melbourne Hospital, and the Metcalf Chair of Leukaemia Research at the University of Melbourne. A past-president of the Haematology Society of Australia and New Zealand, he is currently a director of the Australasian Leukaemia and Lymphoma Group and the Victorian Comprehensive Cancer Centre, as well as chairing the Life Saving Drug Program Expert Panel for the Australian Government. His laboratory and clinical research pioneered the way for venetoclax, the first in a new class of targeted anti-cancer drugs, to become a routine treatment for selected leukaemias. With colleagues, he has received multiple awards, including the 2019 Prime Minister's Prize for Innovation.



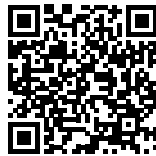
Professor Alan Rowan FAA
The University of Queensland



Professor Alan Rowan is Director at the Australian Institute for Bioengineering and Nanotechnology at the University of Queensland and performs his research at the interface of chemistry and biology. With a PhD and first-class honours in chemistry from the University of Liverpool, Professor Rowan joined the University of Nijmegen in the Netherlands, where he became a professor, established a new group in molecular materials, and studied the relationship between molecular assembly and functional properties. Professor Rowan was awarded the RSC Soft Matter and Biophysics Prize in 2014 and an Australian Research Council Laureate Fellowship in 2017. His seminal contributions and expertise in functional materials, biomimetic processive catalysis, synthetic extracellular materials, and single enzyme kinetics have been widely published in the world's most prestigious scientific journals. He has been awarded nine patents in the areas of nanomedicine and nanomaterials and has been involved in the start-up of five companies.



Dr Jenny Stauber FAA FTSE
CSIRO Land and Water



Dr Jenny Stauber, formerly Deputy Chief of CSIRO Land and Water, is an aquatic ecotoxicologist with expertise in the bioavailability and toxicity of contaminants in marine and freshwater systems, environmental risk assessment, downstream impacts of mining, and the derivation of toxicant water and sediment quality guidelines. She is an Adjunct Professor at La Trobe University and a Visiting Professor at South China Normal University, Guangzhou, China. She is a member of a large number of national and international expert advisory panels on areas as diverse as chemical contaminants, reef water quality, mining, coal seam gas, chemicals risk assessment, and water quality guidelines.

Absent new Fellows Also elected in 2020, but unable to join us for the new Fellows' ceremonies, are:

Associate Professor Lee Berger FAA

Professor Linda Blackall FAA

Dr Andrew Cuthbertson

AO FAA FTSE FAHMS

Professor Adèle Green

AC FAA FAHMS

Professor Jane Langdale CBE FAA FRS
(Corresponding Member)

Emeritus Professor Erwin Neher

FAA NOBEL LAUREATE

(Corresponding Member)

NEW FELLOWS 2021



Professor Steven Chown FAA
Monash University



Professor Steven Chown is Professor of Biological Sciences at Monash University. His research concerns biodiversity variation through space and time, and the conservation implications of environmental change, including the means to mitigate it. For many years he has represented the international Scientific Committee on Antarctic Research, of which he was also President (2016–2021), at the Antarctic Treaty Consultative Meetings, providing scientific advice on a broad range of policy matters. Professor Chown is an International Honorary Member of the American Academy of Arts and Sciences. He has received numerous awards including the French Republic's Medal of the 30th Anniversary of the Madrid Protocol.



Professor Arthur Christopoulos FAA FAHMS
Monash University



Professor Arthur Christopoulos is Professor of Analytical Pharmacology and Dean of the Faculty of Pharmacy and Pharmaceutical Sciences, Monash University. His research focuses on novel mechanisms of drug action at G protein-coupled receptors, the largest drug target class for all current medicines. His work sits at the interface of chemistry and biology and has been applied to fundamental and translational studies encompassing mental illness, cardiovascular disease, obesity, diabetes, and chronic pain. Professor Christopoulos has more than 350 publications and has delivered more than 180 invited presentations. He has served on the editorial board of eight international journals, consults for or has spun out numerous companies, and is a Councillor of the International Union of Basic and Clinical Pharmacology. He has also been the recipient of major national and international awards and is currently a Clarivate Analytics highly cited researcher in both pharmacology and toxicology, as well as in biology and biochemistry.



Dr Greg Clark AC FAA FTSE
The Australian National University



Dr Greg Clark was a research physical scientist who gradually moved into corporate business in the fields of IT, communications, media, and space. In these roles he had, as a senior executive, responsibility for technology and technology delivery around the world. He also had profit and loss responsibility for more than 40 small companies and start-ups owned by these larger companies. He has been involved privately in a number of start-ups, and been a board member on a number of banks and financial institutions. He has a major interest in policy decisions at many levels and in student education.



Professor Brendan Crabb
AC FAA FAHMS

Burnet Institute



Professor Brendan Crabb is an infectious disease researcher, Director and CEO of the Burnet Institute, and Chair of the Australian Global Health Alliance and the Pacific Friends of Global Health. He serves on the international advisory boards of the Sanger Institute (UK) and WHO's Malaria Vaccine Advisory Committee (Geneva). He is also a Fellow of the Australian Academy of Health and Medical Sciences. His passion is to use science and innovation to improve the health of all peoples, and especially to contribute to a more equitable Australia, region, and wider world.

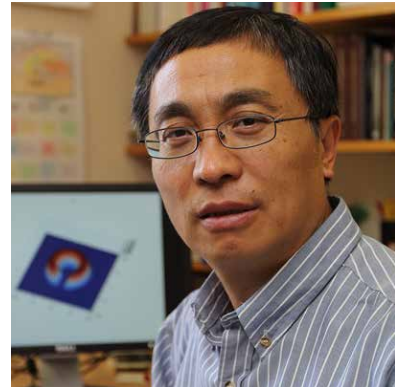


Professor Mark Dawson
FAA FAHMS

Peter MacCallum Cancer Centre

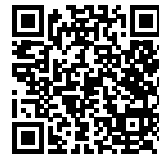


Professor Mark Dawson is a clinician-scientist and an associate director at the Peter MacCallum Cancer Centre. His research interest is studying epigenetic regulation in normal development and cancer. His research has helped identify several first-in-class epigenetic therapies resulting in various clinical trials across the world. He is a professor at the University of Melbourne, the Sir Edward Dunlop Fellow for the Cancer Council of Victoria and a Howard Hughes Medical Institute (HHMI) International Scholar. In recognition of his research achievements, he has been elected to the Australian Academy of Health and Medical Sciences and as an EMBO member. He has received several prestigious awards including the McCulloch & Till Award from the International Society of Experimental Haematology, the Jacques Miller Medal from the Australian Academy of Science, and the Prime Minister's Prize for Life Scientist of the Year in 2020.



Professor Yihong Du FAA

The University of New England



Professor Yihong Du obtained his PhD in 1988 from Shandong University, China.

After spending two years at Shandong University as a lecturer (1988–90), and one year at Heriot-Watt University, UK, as a visiting fellow (1990–91), he joined the University of New England in 1991, and worked as a postdoctoral research fellow (1991–92) with Professor Edward Norman Dancer FAA on an ARC-supported project. Professor Du became a lecturer in 1993 and was promoted to professor in 2008. Professor Du's research focuses on nonlinear partial differential equations arising from applications in other sciences, such as biology, invasion ecology, and chemical reaction theory.



Professor Robin Gasser FAA
The University of Melbourne



Professor Robin Gasser is an eminent veterinary scientist. His fundamental research has generated deep knowledge and understanding of the biology of parasites, their interactions with their hosts, and the diseases they cause, by applying and integrating a range of advanced technologies to explore their genomes and function. His achievements include the identification of a range of novel targets for antiparasitic drug development. He has used this extensive fundamental research to underpin the development of innovative methods for the diagnosis, treatment, and control of socioeconomically important parasitic diseases of animals and humans for subsequent translation and commercialisation.



Professor Glenda Halliday FAA FAHMS
The University of Sydney



Professor Glenda Halliday received a BSc Hons and PhD from the University of New South Wales (UNSW) in 1981 and 1985 respectively. Her PhD project comparing the dopamine systems in rodents, cats, non-human primates, and human brains cemented her curiosity for knowing more about the brain. She moved to Flinders University in South Australia to work on Parkinson's disease, starting the first brain donor program in Australia. In 1988 she returned to UNSW as an ARC Queen Elizabeth II Fellow to work on central autonomic systems. She received an NHMRC research Fellowship to work on human brain neuropathology at the University of Sydney in 1990. She returned to her passion for Parkinson's disease in 1993, joining Neuroscience Research Australia, and starting the Sydney Brain Bank in 2008. In 2016 she returned to the University of Sydney to clinically translate her research findings through the ForeFront research team.



Professor Rob Hyndman FAA FASSA Monash University



Professor Rob Hyndman is Professor of Statistics in the Department of Econometrics and Business Statistics at Monash University. From 2005 to 2018 he was the editor-in-chief of the *International Journal of Forecasting* and a director of the International Institute of Forecasters. Professor Hyndman is the author of more than 200 research papers and five books in statistical science. He is also an elected Fellow of the Academy of the Social Sciences in Australia. In 2007, he received the Moran Medal from the Australian Academy of Science for his contributions to statistical research, especially in the area of statistical forecasting. In 2021, he received the Pitman Medal from the Statistical Society of Australia.



Professor Dorrit Jacob FAA
The Australian National University



Professor Dorrit Jacob is a geochemist and mineralogist working in two

fields of research. Firstly, she studies minerals formed by organisms to understand how these archive information about past environmental conditions. She also studies diamonds, their inclusions and their host rocks from the deep Earth's mantle that carry information on the evolution of our planet. She is the director of the Research School of Earth Sciences at the Australian National University.



Professor Barbara Nowak FAA
University of Tasmania



Professor Barbara Nowak is a professor at the Institute for Marine and Antarctic

Studies and Deputy Associate Dean Research at the College of Science and Engineering at the University of Tasmania. She is an Honorary Professor at the School of Science within the College of Science, Engineering and Health at RMIT University, and Honorary Professor of Wildlife Medicine and Health at Science and Technology, Department of Bioscience, at Aarhus University Denmark. Her research on the effects of environmental factors on fish diseases has substantially advanced understanding of fish health and contributed to sustainable aquaculture. Professor Nowak has published more than 300 papers and supervised more than 50 PhD students. She has received numerous awards for her research and supervision.



Professor Andy Pitman AO FAA
UNSW Sydney



Professor Andy Pitman is a professor in climate science at the University of New

South Wales. He is Director of the ARC Centre of Excellence for Climate Extremes. He has 35 years' experience, and broad interests, extending across climate modelling, climate change, and climate extremes. He has been a lead author on the Intergovernmental Panel on Climate Change, winning the Nobel Peace Prize in 2007. He was a review editor of the 2013 report. He has had multiple senior advisory roles in climate science for state and federal government, as well as senior national roles in e-research infrastructure strategy. He was elected to the American Meteorological Society in 2016 and is a Fellow of the Australian Meteorological and Oceanographic Society.



Professor Barry Pogson FAA
The Australian National University



Professor Barry Pogson's research has revealed crucial pathways by which communication

between different parts of a plant cell influence growth, development, photosynthesis, and tolerance to drought. He achieved these understandings by dissecting genetic and metabolic networks that regulate how the site of photosynthesis—the chloroplast—communicates the impacts of changing environmental conditions. His research has enabled new insights into the evolution and function of retrograde signalling networks in gene expression, photosynthesis, leaf development and even water loss during droughts. Professor Pogson has actively sought the translation of basic research into beneficial outcomes and mentors the next generation of leaders in science, policy, and industry.



Professor Ian Reid FAA FTSE
The University of Adelaide



Professor Ian Reid is a professor of computer science at the University of Adelaide. He is a

Fellow of the Australian Academy of Technological Sciences and Engineering, former Rhodes Scholar, and held an Australian Laureate Fellowship 2013–18. He was the deputy director of the Australian Centre for Robotic Vision 2014 – 2021. His research interests range across computer vision and are currently focused on life-long visual learning, and developing high-level representations for image and video understanding, especially those that can be computed and queried sufficiently rapidly to enable real-time robotic decision making and control. He has made landmark contributions in areas such as active vision, visual SLAM, visual geometry, human motion capture, and intelligent visual surveillance.



Professor Alison Rodger FAA
Macquarie University



Professor Alison Rodger was born in Scotland and educated in England, New

Zealand, and Australia. She obtained a BSc with University Medal, PhD, and DSc from the University of Sydney. After her PhD she was Beatrice Dale Fellow at Newnham College, Cambridge, and Unilever and Samuel and Violette Glasstone Fellow at Oxford. She moved to the University of Warwick where she developed innovative centres for cross-discipline doctoral training and was Head of Chemistry. At Macquarie University, she has been Head of Molecular Sciences and an ARC Training Centre. Her research focuses on developing spectroscopies to determine how the structure and arrangement of biomolecules impact their function.



Professor John Sader FAA
California Institute of Technology



Professor John Sader is an applied mathematician with interests across a broad range of areas, including colloid science, plasmonics, fluid mechanics, mass spectrometry, and atomic force microscopy. His research focuses on collaboration with experimentalists and over the past three decades has included visiting positions at the California Institute of Technology, Trinity College Dublin, and the University of Delaware. Having completed his PhD in electrical engineering from the University of New South Wales, Professor Sader joined the University of Melbourne in 1992 as a research Fellow, progressing to Professor of Applied Mathematics. He has published more than 180 international refereed journal papers with more than 240 collaborators from 66 institutions worldwide. Professor Sader has developed experimental methods for the atomic force microscope, including the Sader Method for cantilever calibration, which are implemented in commercial atomic force microscopes.



Professor Margaret Sheil AO FAA FTSE
Queensland University of Technology



Professor Margaret Sheil is the Vice-Chancellor of Queensland University of Technology, an academic in chemistry, has held senior roles at the University of Wollongong and University of Melbourne, and was CEO of the Australian Research Council. She is also a Fellow of the Australian Academy of Technological Sciences and Engineering, the Royal Australian Chemical Institute, and the Australian and New Zealand Society for Mass Spectrometry. She is the board chair of Queensland Museum Network, the deputy chair of the Universities Australia board, and a member of the Australian Space Agency Advisory Group. Professor Sheil was made an Officer of the Order of Australia for her distinguished service to science and higher education.



Professor Svetha Venkatesh FAA FTSE
Deakin University



Professor Svetha Venkatesh is an ARC Australian Laureate Fellow, Alfred Deakin Professor, and Co-Director of the Applied Artificial Intelligence Institute (A2I2) at Deakin University. She was elected a Fellow of the International Association of Pattern Recognition in 2004 for contributions to formulation and extraction of semantics in multimedia data, and a Fellow of the Australian Academy of Technological Sciences and Engineering in 2006. In 2017, Professor Venkatesh was appointed an Australian Laureate Fellow, the highest individual award the Australian Research Council can bestow. Professor Venkatesh and her team have tackled a wide range of problems of social significance, including the critical areas of autism, security, and aged care. The outcomes have impacted the community and evolved into publications, patents, tools, and spin-off companies.



Professor Hala Zreiqat

AM FAA FTSE FAHMS

The University of Sydney



Professor Hala Zreiqat is a Payne-Scott Professor at the University of Sydney. The focus of her lab

is the development of novel biomaterials for regenerative medicine and the use of cutting-edge 3D-printing nano technologies. Professor Zreiqat's contribution to orthopaedics has led to a number of awards: Member of the Order of Australia, Fulbright Senior Scholar, 2018 New South Wales Premier's Woman of the Year, King Abdullah II Order of Distinction, Harvard Radcliffe Fellow, and Eureka Prize winner for Innovative Use of Technology. She is also a Fellow of the Australian Academy of Technological Sciences and Engineering, the Royal Society of NSW, the Australian Academy of Health and Medical Sciences, and the International Orthopaedic Research Society.

Absent new Fellows Also elected in 2021, but unable to join us for the new Fellows' ceremonies, are:

Professor Susan Coppersmith FAA

Emeritus Professor Eleanor Dodson FRS FAA (Corresponding Member)

Professor Cath Lovelock FAA

Professor Gordon Smyth FAA

Professor Sir Fraser Stoddart FRS FAA (Corresponding Member)

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NEW FELLOWS 2022



Professor Matthew Bailes FAA
Swinburne University of Technology



Professor Matthew Bailes is an expert in tests of relativistic gravity using radio pulsars, and a co-discoverer of Fast Radio Bursts. He currently leads the ARC Centre of Excellence for Gravitational Wave Discovery and is a professor at Swinburne University of Technology where he founded the Centre for Astrophysics and Supercomputing. Professor Bailes designs supercomputers for processing radio signals and was a co-founder of the start-up Fourier Space Pty Ltd. He also pioneered the use of 3D virtual reality tools for science outreach and education.

The discovery of fast radio bursts, new extragalactic messengers

Every day the Earth is struck by millions of millisecond-duration pulses of radio emission, most of which originate from neutron stars within our own galaxy. In 2007 a single pulse from a new type of source was identified that appeared to be a trillion times more luminous than any previously identified. This was later determined to be the first fast radio burst that probably originated a billion light years away, and opened up a new field of astronomy. In this talk, Professor Bailes will describe how this discovery came about and the resulting potential to count the number of atoms in the universe.



Professor Kathy Belov AO FAA
The University of Sydney



Professor Kathy Belov is the Pro-Vice-Chancellor (Global and Research Engagement) with responsibility for pivotal areas of the University of Sydney's research portfolio related to academic research partnerships, centres and institutes. She leads the Office of Global Engagement and focuses on developing the university's national and international partnerships to address the UN Sustainable Development Goals. In her research, Professor Belov uses immunogenetics to study immunity and health in Australia's native species. In recognition of her research discoveries, she was admitted as a Fellow of the Royal Society of NSW (2019). She was also awarded the Fenner Medal by the Australian Academy of Science in 2014, the Crozier Medal by the Genetics Society of Australasia in 2013, and the MJD White Medal by the Genetics Society of Australasia in 2021. Professor Belov is passionate about mentoring others and is an active contributor to science leadership. She is a member of the NSW Koala Expert Advisory Group and serves on scientific advisory boards at Taronga Zoo and the Ramaciotti Centre. She is co-chair of the International Policy Advisory Committee of the Association of Pacific Rim Universities and a trustee of the Australian Museum, where she chairs the Science Advisory Board. Professor Belov is also on the Council of the Royal Society of

NSW and is a past president of the Genetics Society of Australasia.

Accelerating species recovery using immunogenetics

Australia has the worst mammalian extinction record in the world. Further, as populations become smaller, critical adaptive genetic variants are lost. These variants provide resilience for populations to evolve. A textbook example of this is the Tasmanian devil, which has critically low genetic diversity, including at Major Histocompatibility Complex (MHC) genes. Low levels of genetic diversity enabled the spread of a contagious cancer that has decimated devil populations. Professor Belov will discuss the role that MHC has played in the spread of devil facial tumour disease and discuss how we have used genomics and immunogenetics to study immune responses to disease and to guide captive breeding and translocation programs in devils and more recently koalas. She will also discuss how immune defence molecules mined from genomes of our native species can be used to combat emerging infectious disease.



Professor Marcela Bilek FAA
The University of Sydney



Professor Marcela Bilek is Professor of Applied Physics and Surface Engineering at the University of Sydney. Her research comprises fundamental science and practical applications in materials physics and engineering, plasma processing, and cross-disciplinary research in

biointerfaces. She pioneered magnetic filtration for cathodic arc plasmas, plasma immersion ion implantation processes for reagent-free biofunctionalisation of surfaces, and environmentally friendly dry processes to synthesise nanoparticles for nanomedicine and diagnostics. She holds a BSc (Hons I) from the University of Sydney, a PhD from the University of Cambridge, UK, and an MBA from the Rochester Institute of Technology. She has published more than 350 peer-reviewed journal articles, one book, six book chapters and 15 patents. She has trained 35 PhD students and mentored 25 postdoctoral Fellows and early-career researchers. Her passions include evidence-based policies for tackling societal and environmental problems that leverage science and technology, integrity, and removing the remaining barriers that hinder women in STEM.

Expanding the frontiers of biomedicine and space with plasma

Plasma—the fourth state of matter—is beautiful, fascinating, and full of potential. This presentation will provide insights into the amazing properties of plasma and the new opportunities it can provide in biomedicine, environmental protection, and space. Professor Bilek will review rapid, plasma-based approaches that utilise environmentally friendly ionised gases to create bio-instructive and bio-interactive surfaces for applications in medicine and biomedical research; plasma synthesis of novel multicomponent alloys with extraordinary properties; plasma space thrusters that could use space junk for fuel; and the exciting prospects for plasma science in achieving net zero greenhouse gas emissions.



Professor Stuart Bunn FAA
Griffith University



Professor Stuart Bunn is a senior member of the Australian Rivers Institute at Griffith University and, until July 2022, was the founding director. His major research interests are in the ecology of river and wetland systems with a particular focus on the science to underpin river management.



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Leadership for good



Professor Bunn has extensive experience working with international and Australian government agencies and with industry on water resource management issues. He has been an active member and chair of several state and national science advisory committees, including Healthy Land and Water, the Murray-Darling Basin Authority, and the Lake Eyre Basin Ministerial Council. Professor Bunn is currently a board member of the Murray-Darling Basin Authority and has previously served as an Australian National Water Commissioner and as a director of Land and Water Australia. In 2019, he was appointed to the Earth Commission, hosted by Future Earth.

What sustains freshwater biodiversity in our rivers and wetlands?

Freshwater ecosystems occupy less than 1% of the global land mass yet host remarkable biodiversity, including one-third of all vertebrate species. However, they are highly threatened by human activities and populations of freshwater species are declining at twice the rate of those on land and in the sea. Professor Bunn's research has aimed to identify the important sources of energy and nutrients that sustain freshwater biodiversity and determine how the quantity and quality of food resources are influenced by environmental and anthropogenic factors. He has explored these questions across a broad range of biomes, from small forest streams to dryland rivers and tropical floodplain wetlands, combining field-based measurements, remote sensing, and laboratory analysis of chemical tracers. This work has illustrated the critical role played by inconspicuous aquatic plants and the important subsidies of energy and nutrients to freshwater animals that are derived through connections between rivers and their floodplains and the sea.



Professor Tom Calma
AO FAA FASSA

University of Canberra



Professor Tom Calma is an Aboriginal elder from the Kungarakan (Koong ara kan) tribal group and a member of the Iwaidja (Ee wad ja) tribal group in the Northern Territory. He has been involved in Indigenous affairs at a local, community, state, national and international level and worked in the public sector for over 45 years. He is currently on a number of boards and committees focusing on rural and remote Australia, health, mental health, suicide prevention, all levels of education, culture and language, justice reinvestment, research, reconciliation, and economic development. In 2010, after a distinguished career of 38 years in the Australian Public Service, Professor Calma retired and currently works as a consultant, volunteer and academic. Professor Calma is Chancellor of the University of Canberra and a Professor of Practice (Indigenous Engagement) at the University of Sydney. He is a former Aboriginal and Torres Strait Islander Social Justice Commissioner and Race Discrimination Commissioner (2004–09) at the Australian Human Rights Commission.

Discovery is the first step— advocacy is the next

Professor Calma will explore why advocacy is so important to move to the next step of implementation and funding for public and science policy, drawing on his experiences of Close the Gap and justice reinvestment.



Professor Jonathan Carapetis AM FAA FAHMS

Telethon Kids Institute



Professor Jonathan Carapetis is Director of the Telethon Kids Institute in Perth, Western Australia, a professor at the University of Western Australia, and a consultant paediatrician at Perth Children's Hospital. His research interests include rheumatic fever and rheumatic heart disease, other group A streptococcal diseases, vaccine-preventable disease, Aboriginal child health, child and youth health, development and education, and skin sores and scabies. Professor Carapetis undertook his medical training at the University of Melbourne and the Royal Melbourne and Royal Children's hospitals. Previous positions include terms as Director of the Menzies School of Health Research in Darwin and theme director at the Murdoch Children's Research Institute in Melbourne. From 2019 to 2021 he was the president of the Association of Australian Medical Research Institutes.

Strep, hotels and the gap

The cornerstone of Professor Carapetis' research career has been understanding a range of diseases caused by the group A *streptococcus* (strep A) bacterium, particularly rheumatic heart disease. This condition has largely disappeared over the past 70 years from affluent countries but remains unchecked in low-and-middle-income countries around the world.

And to Australia's shame, it also occurs at world-record rates in Aboriginal and Torres Strait Islander communities. Over the past three decades, Professor Carapetis has worked with wonderful collaborators to challenge dogma and systematically tackle gaps in our understanding of strep A diseases, and to implement new strategies to reduce the burden. In so doing, he has learned many lessons—usually the hard way—about how important research is to Closing the Gap, but also about how non-Indigenous researchers need to embrace new paradigms of working with First Nations communities and leaders. As a leader of medical research institutes, Professor Carapetis has also tried to influence researchers to focus more on team-based, outcomes-focused science.



Dr Beth Fulton FAA FTSE
CSIRO Oceans and Atmosphere



Dr Beth Fulton is a senior principal research scientist with CSIRO Oceans and Atmosphere. Dr

Fulton is the CSIRO's research portfolio leader for integrated oceans stewardship and the blue economy. She is shaping the strategic direction for research in this area, building off more than 20 years of work developing various system modelling tools for looking at marine ecosystems and sustainability. Dr Fulton is also an adjunct professor and deputy director at the Centre of Marine Socioecology, a collaboration between the University of

Tasmania, CSIRO and the Australian Antarctic Division, which focuses on finding transdisciplinary, equitable and sustainable solutions to the problems facing coasts and oceans. The common theme to Dr Fulton's work has been on developing system-scale decision support tools in support of sustainable management of potentially competing uses of marine environments and adaptation to global change.

The future is blue

Ocean industries and the sustainable form of those—known as the blue economy—are growing rapidly. Transitions that have taken us 10,000 years or more on land are now occurring in the oceans. This talk briefly outlines the changes occurring in our oceans and how interdisciplinary science, engagement of multiple knowledge types, and system-scale science-based approaches can support sustainable management of the many uses and values of marine environments, as well as adaptation to global change.



Professor Catherine Greenhill FAA UNSW Sydney



Professor Catherine Greenhill started her academic career as an undergraduate at the University of Queensland, before obtaining a DPhil from the University of Oxford (1992). She held postdoctoral positions at the University of Leeds and the University of Melbourne, then

joined the University of New South Wales (UNSW) in 2002. Today she is a professor and head of the combinatorics group in the School of Mathematics and Statistics, UNSW Sydney. Professor Greenhill's research interests lie in asymptotic, probabilistic, and algorithmic combinatorics. She was awarded the Christopher Heyde Medal by the Australian Academy of Science in 2015. Her work lies at the interface between discrete mathematics, theoretical computer science, and probability.

Short stories about random hypergraphs

A hypergraph is a very general mathematical structure that can be used to model the relationships that exist between objects in a complex discrete system. Two fundamental and related questions that can be asked about a given family of hypergraphs are, 'What are the properties of a random hypergraph from this family?' and, 'How many hypergraphs belong to this family?'. Professor Greenhill will discuss some of her recent work on these questions.



Professor Michelle Haber AM FAA FAHMS

Children's Cancer Institute



Professor Michelle Haber is Executive Director of the Children's Cancer Institute, and head of the Institute's experimental therapeutics program. She is internationally recognised for her world-class research into the treatment of neuroblastoma and

acute lymphoblastic leukaemia, working towards more effective treatments by identifying molecular targets that drive the growth and development of childhood cancer, developing new drugs to inhibit these targets, and combining existing and new treatments into novel therapeutic approaches that can be rapidly translated into national and international clinical trials. She has brought new standards of care to Australian children with cancer, exemplified by her establishment and leadership of the ZERO Childhood Cancer (ZERO) national personalised medicine program, which is enabling all newly diagnosed and relapsed high-risk child cancer patients in Australia to have tailored therapy, targeting the specific genetic and biological characteristics of their individual tumour. ZERO will become available to all Australian children with cancer by 2024.

Molecular targeted therapies and precision medicine for children with cancer

Cancer kills more Australian children than any other disease, and most survivors have serious long-term side effects of their treatment. Professor Haber’s research has focused on improving outcomes for children with cancer by identifying molecular targets and developing novel therapeutics and molecular diagnostics that have translated into national and international clinical trials, with an increasing focus on personalised treatment. Her team characterised the role of genes responsible for drug resistance and malignant behaviour in neuroblastoma, the most common tumour of young children. They identified the dependence of neuroblastoma on high polyamine levels and developed novel combination therapies targeting polyamine metabolism. The team developed a sensitive technique to predict relapse in children with acute

lymphoblastic leukaemia, the most common child cancer, which doubled survival of children at highest risk of treatment failure, and established ZERO Childhood Cancer, Australia’s national child cancer personalised medicine program, which has transformed clinical management of children with high-risk malignancies.



Professor Peter Høj
AC FAA FTSE

The University of Adelaide



Professor Peter Høj has made contributions to Australian society, particularly through 25 years of senior leadership as Vice-Chancellor and President of the University of Adelaide, the University of Queensland, and the University of South Australia, and as CEO of the Australian Research Council and the Australian Wine Research Institute. He has also been a member of numerous high-level policy committees, including the Prime Minister’s Science, Engineering and Innovation Council for seven years following his earlier career as one of Australia’s leading young biochemists.

In the quest to strengthen research and its application for societal benefit, are we on the right track or is there a better way?

Based on 25 years’ experience as a leader of three universities, the Australian Research Council, and an industry-funded research institute, Professor Høj will argue that the status quo is not optimal

and that our nation is putting at risk our future prosperity with its current approach to delivering benefits from our strong fundamental research endeavour. That endeavour is arguably too fragmented and currently underpinned to a very large extent by international student revenues rather than an OECD-competitive gross expenditure on R&D. Some pointers to alternative approaches will be discussed.



Professor Tim Hughes
FAA FAHMS

South Australian Health and Medical Research Institute



Professor Tim Hughes is the precision cancer medicine theme leader at the South Australian Health and Medical Research Institute, and a professor at the University of Adelaide. He is also Chair of the International Chronic Myeloid Leukaemia Foundation, and inaugural Fellow of the Australian Academy of Health and Medical Sciences. He has been a leading investigator for many of the key global and national clinical trials in chronic myeloid leukaemia (CML). His team led the establishment of the molecular response criteria that are used worldwide to measure response in CML. He has led a team of investigators who have been integral in transforming CML from a fatal disease to a treatable chronic disease and more recently to a curable disease, heralding an exciting new era in cancer therapy.

Closing in on the target in chronic myeloid leukaemia

Tyrosine kinase inhibitors (TKIs) have improved survival for chronic myeloid leukaemia (CML) patients dramatically. However, around 5–10% still respond poorly and die of their disease. There is an urgent need to identify the determinants of poor response. Genomic studies have revealed genomic variants in addition to BCR-ABL1 are likely the main cause of poor response. We now need to determine which of these ‘poor-risk’ genomic variants will respond well to more potent TKI, and which will need a more multi-targeted approach. Another major challenge is that most patients remain dependent on long-term TKI therapy to maintain disease control. The critical role played by the immune system in determining response, and achievement of treatment-free remission is becoming clearer. This understanding provides opportunities for new therapeutic approaches which warrant testing in the clinic.



Professor Lei Jiang FAA
Chinese Academy of Sciences



Professor Lei Jiang is a professor at the Technical Institute of Physics and Chemistry, Chinese Academy of Sciences. He is an academician of the Chinese Academy of Sciences; Academy of Sciences for the Developing World; and the National Academy of Engineering. His scientific contribution is learning from nature, and discovering and establishing

the super-wettability system—from fundamental understanding to innovative applications. He has had a series of achievements, continuously leading the development of the bioinspired super-wettability field, and won many important international awards. Recent research interests include the introduction of quantum-confined superfluid into super-wettability systems, and its applications in energy conversion, chemical reaction, and biological information transfer.

Bioinspired super-wettability systems

Wettability is a centuries-old concept that has been rediscovered in past decades, largely owing to new understanding of the mechanisms of superwetting phenomena in nature. By learning from nature, we have summarised three basic principles of superwettability: the static wetting is determined by the cooperative effect of micro/nano structure and surface energy; the transition point of the superlyophilicity and superlyophobicity on the nanostructure is the lyophilicity-lyophobicity limitation; and the direction of liquid transport is regulated by chemical composition gradient, rough gradient, curvature gradient, etc. Now superwettability systems could be extended to a wider range, including superhydrophobicity, superhydrophilicity, superoleophobicity and superoleophilicity in air; superoleophilicity, superoleophobicity, superaerophilicity, and superaerophobicity underwater; and superhydrophilicity, superhydrophobicity, superaerophilicity, and superaerophobicity under oil. We further established a superwetting interfacial material system including 64 combinations, and expanded to various liquid systems with different pressure and temperature ranges, leading and promoting the global development of this field.



Professor Peter Langridge
FAA FTSE The University of Adelaide



Emeritus Professor Peter Langridge is Emeritus Professor at the University of Adelaide, Honorary Professor at Murdoch University and International Coordinator of the Wheat Initiative based in Berlin, Germany. Professor Langridge serves on several science advisory committees for research organisations in Europe and North America. He chaired an expert panel on ‘Food security in a changing world’ for the Prime Minister’s Science, Engineering and Innovation Council, and several committees and reviews on crop biotechnology for the Food and Agriculture Organisation of the United Nations. From 2003 to 2014, Professor Langridge was the CEO and director of the Australian Centre for Plant Functional Genomics. His research has focused on the role of genetic technologies in crop improvement.

The challenges of increasing the yield stability of wheat

Wheat and barley were the first crops domesticated around 10,000 years ago and were the basis for agriculture. Today, wheat is the most widely grown crop in the world and provides 20% of the carbohydrate and 20% of the protein in the human diet. Importantly, wheat is the most traded crop, making it critical for global food security. But, despite huge yield increases over the past 50 years, yield gains are stagnating

and will not meet future demand. In addition, wheat is highly susceptible to the impacts of climate change. A wide range of technological advances provide opportunities for helping to ensure stable yields across unpredictable environments. The strategies for implementation of these technologies have required a consideration of wheat as part of a broad cropping system and changes in breeding objectives.



Dr Janice Lough FAA
Australian Institute of Marine Science



Dr Janice Lough is from Newcastle upon Tyne, UK. She has a BSc in environmental

sciences from the University of East Anglia and a PhD from the Climatic Research Unit. In 1982 she took up a postdoc at the Tree-ring Laboratory, University of Arizona, and in 1986 moved to the Australian Institute of Marine Science (AIMS) until retiring in 2021. A climate scientist, Dr Lough focuses on the historical context of current tropical environmental changes through growth and proxy climate histories from massive coral skeletons and documenting how a changing climate system is impacting coral reef ecosystems. She was a partner investigator with the ARC Centre of Excellence for Coral Reef Studies and maintains adjunct research Fellowships with AIMS and James Cook University.

A changing climate for coral reefs—tales from coral skeletons

Calcium carbonate skeletons are the backbone of tropical coral reef ecosystems and the amazing biodiversity they harbour. Their success, to date, relies on the special symbiotic relationship between the coral animals and single-celled photosynthesising algae. Extra energy provided by the symbionts enables the coral to construct skeleton faster than the natural forces of physical and biological erosion and build the complex three-dimensional architecture of a healthy reef—home to many thousands of associated organisms. In certain massive corals these skeletons are natural archives of the reef extending back several centuries in living corals and for windows of the past in dead corals. The basis of these records are annual density bands, like tree rings. The many dateable records stored in these corals document the past and highlight the unusual nature of recent environmental changes on reefs due to human activities (locally and globally) and their impact on coral growth.



Professor Naomi McClure-Griffiths FAA

The Australian National University



Professor Naomi McClure-Griffiths is an associate director and Australian Research Council Laureate Fellow at the Research School of Astronomy and Astrophysics at the Australian

National University. She uses the world's largest radio telescopes to study our galaxy and nearby galaxies. Since coming to Australia from the US in 2001, she held senior roles at CSIRO before moving to the Australian National University in 2015. Professor McClure-Griffiths is heavily involved in science planning for the Square Kilometre Array (SKA) and is the Chair of the International SKA Science and Engineering Advisory Committee. She is a principal investigator on two of the sky surveys underway with the Australian Square Kilometre Array Pathfinder telescope.

Exploring the Milky Way and the Magellanic Clouds with Australia's radio telescopes

Our own Milky Way and the local galaxies, the Magellanic Clouds, provide us with the closest laboratories for studying the life cycle of galaxies through their gas. In these galaxies we can study the circulation of gas between the galaxies' disks and their haloes with detail that is not attainable anywhere else in the universe. Diffuse atomic hydrogen gas, which can be detected with radio telescopes, gives us outstanding insight into both the distribution and circulation of a galaxy's gaseous atmosphere. Within the disk, gas circulation can catalyse cooling, helping the interstellar medium to convert from its atomic state to the molecular clouds where new stars can form. This conversion is a potential throttle in the star formation efficiency of galaxies. Meanwhile, the circulation of gas between a galaxy's disk and its surroundings helps to provide essential fuel for new star formation and pressure valves for venting out of the disk. In this talk, Professor McClure-Griffiths will walk through some of the key characteristics of the gaseous Milky Way and Magellanic Clouds to show how these local systems are helping us to understand the evolution of gas in galaxies more globally.



Professor Sarah Medland
OAM FAA FAHMS FASSA
 QIMR Berghofer Medical
 Research Institute



Professor Sarah Medland is the interim head of the Mental Health Research Program

at QIMR Berghofer Medical Research Institute. Her undergraduate and postgraduate studies were in psychology at the University of Queensland. She undertook postdoctoral training at the Virginia Institute of Psychiatric and Behavioural Genetics as an NHMRC Sidney Sax Public Health Fellow. In 2020, Professor Medland was awarded the Order of Australia Medal for service to medical research in the field of genetics. In 2017, she was awarded the Ruth Stephens Gani Medal from the Australian Academy of Science. Professor Medland chairs the genetics working group of the Enhancing Neuroimaging Genetics through Meta-Analysis consortium.

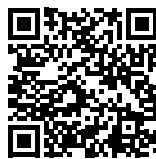
What have we learned from a decade of large-scale collaborative meta-analysis in neuroimaging genetics?

In late 2009, we started the Enhancing Neuroimaging Genetics through Meta-Analysis consortium with the aim of increasing the power and robustness of genetic findings in imaging. Since this time the consortium has grown to include more than 1,000 researchers from more than 400 institutions in more than 40 countries. From our initial focus on identifying common

variants that influence the size and shape of structures, we have diversified to look at other classes of variation and at phenotypic differences between cases and controls for a range of psychiatric and neurological disorders. This talk will provide an overview of our research and key findings.



Professor Ute Roessner
AM FAA
 The Australian National University



Professor Ute Roessner is the Academic Director, Research Initiatives and Infrastructure at

the Australian National University. She obtained a PhD in plant biochemistry from the University of Potsdam and the Max Planck Institute for Molecular Plant Physiology in 2001. Her research interests are to develop and apply metabolomics methods to study plants. In 2003, she moved to Australia where she established a metabolomics platform as part of the Australian Centre for Plant Functional Genomics. In 2007, she was involved in the set-up of Metabolomics Australia and led the University of Melbourne node until 2019. Between 2018 and 2022, Professor Roessner was the Head of School of BioSciences, the University of Melbourne. Professor Roessner is a Lifetime Honorary Fellow of the International Metabolomics Society. She was elected to the Victorian Honour Roll of Women in 2020 and in 2021 was appointed as a Member of the Order of Australia.

**Friend or enemy:
 The biochemical basis of plant root-microbe interactions**

Plants are composed of thousands of small molecules, called metabolites. These fulfill many functions in plant growth, development, reproduction, and interactions with other organisms. Plant roots, in particular, interact with a wealth of microbiota in the soil, both beneficial or pathogenic. But how are plant roots manipulating interactions to invite beneficial microbes into a symbiotic relationship while they activate the plant defence mechanisms to fight pathogenic microbes at the same time? To tackle this important question, we use high-end morphological root phenotyping with biochemical and molecular approaches, such as metabolomics (the study of chemical processes involving metabolites) and lipidomics (the study of pathways and networks of cellular lipids), to determine the biochemical basis of how roots and their associated microbes communicate with each other. Fundamental understanding of these processes is essential to enable the discovery of below-ground solutions to improve crop performance with reduced agricultural inputs.



Professor Craig Simmons
FAA FTSE The University of Newcastle



Professor Craig Simmons is a leading groundwater scientist, recognised for contributions to

groundwater science, science leadership, education, and policy reform. Professor Simmons was Foundation Director of the ARC National Centre for Groundwater Research and Training and executive director for mathematics, physics, chemistry, and Earth sciences at ARC. He is Pro Vice-Chancellor of the College of Engineering, Science and Environment at the University of Newcastle. Professor Simmons is a Fellow of the Australian Academy of Technological Sciences and Engineering and the American Geophysical Union. He has received awards including the Anton Hales Medal for distinguished contributions to research in the Earth sciences, South Australian Scientist of the Year, Australian Water Professional of the Year, and International Association of Hydrogeologists Presidents' Award. He is a lead author of the United Nations World Water Development Report 'Groundwater: Making the Invisible Visible' and co-author of the IPCC Sixth Assessment Report.

Modelling groundwater: Maths and physics get down and dirty
Ninety-seven percent of all liquid freshwater on Earth is groundwater. Groundwater supplies half of the world's drinking water and nearly half of the water used for growing food. Yet for something we rely on so completely, it has been historically very poorly understood. In this talk Professor Simmons describes the relationship between physics, maths, chemistry and biology, and the subterranean world of water movement, outlining the challenges we have faced, and the paradigm shift in science and policy required to cope with climate change, the population explosion, and pollution crises to come.



Professor Kate Smith-Miles
FAA The University of Melbourne

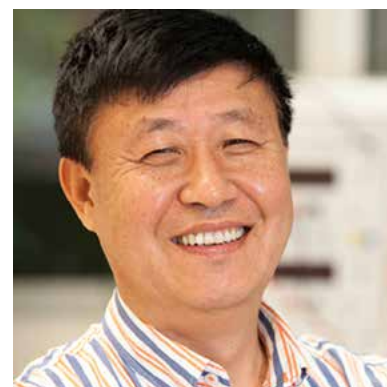


Professor Kate Smith-Miles is a Melbourne Laureate Professor of Applied Mathematics at the University of Melbourne, and Director of the ARC Industrial Transformation Training Centre for Optimisation Technologies, Integrated Methodologies and Applications (OPTIMA). She is also Associate Dean (Enterprise and Innovation) for the Faculty of Science at the University of Melbourne. Previous roles include president of the Australian Mathematical Society (2016–2018), member of the Australian Research Council College of Experts (2017–2019), and Head of School positions at Monash University (2009–2014) and Deakin University (2006–2009). Professor Smith-Miles holds a BSc (Hons) in mathematics and a PhD in electrical engineering, both from the University of Melbourne.

'Stress-testing' algorithms to develop trust

Modern society is increasingly dependent on algorithms, and establishing algorithmic trust is a growing concern. This vexing issue relies on testing algorithms with enough unbiased test instances to gain insights into strengths and weaknesses under various conditions. Instance Space Analysis (ISA) offers a new paradigm for objective testing of algorithms: a mathematically rigorous foundation for algorithmic 'stress-testing'. Rather than reporting algorithm performance on average across a chosen set of test problems, as is standard practice, ISA

offers a more nuanced understanding and visualisation of the unique strengths and weaknesses of algorithms across different regions of the instance space that may otherwise be hidden on average. It also facilitates objective assessment of any bias in the chosen test instances and provides guidance about the adequacy of benchmark test suites. This talk provides an overview of the methodology, and the online software tools that are enabling its worldwide adoption in many disciplines.



Professor Huijun Zhao
FAA FTSE Griffith University



Professor Huijun Zhao received his PhD in 1994 from the University of Wollongong, Australia. He held a research fellow position at the University of Wollongong between 1994 and 1997, took a lecturer position at Griffith University in 1997, and was promoted to professor in 2005. He established the Centre for Clean Environment and Energy at Griffith University in 2010 and is currently Director of the Centre for Catalysis and Clean Energy at Griffith University. He is an elected Fellow of the Australian Academy of Technological Sciences and Engineering, the Royal Australian Chemical Institute, and the Royal Society of Chemistry. He has extensive expertise in energy and environmental nanomaterials, water source control and management, and sensing technologies. One of his current research pursuits is to explore new means to unlock the catalytic

powers of nonprecious materials as high performance catalysts for important catalysis reactions.

Photo-electro-catalysis for analytical applications

The development of the photo-electro-catalysis chemical oxygen demand (PeCOD®) sensing principle and the process of transforming the discovery from laboratory to market will be presented. Chemical oxygen demand (COD) is a key water quality parameter in evaluating aquatic organic pollution levels. The conventional method uses highly toxic reagents, requires two-to-four hours to determine COD, and is unable to meet the needs of the modern water quality management regime. PeCOD® utilises the strong oxidative power of UV-illuminated nontoxic TiO₂ photoanodes to achieve near-real time continuous COD determination, bringing a paradigm shift for aquatic organic pollutant monitoring and assessment practice.



Professor Albert Zomaya FAA
The University of Sydney



Professor Albert Zomaya is the Peter Nicol Russell Chair Professor of Computer Science at the University of Sydney and serves as the director of the Centre for Distributed and High-Performance Computing. He has published more than 700 scientific papers and articles and is author, co-author, or editor of more than 30 books. He is the editor-in-chief of *ACM Computing Surveys* and serves as an associate editor for several leading journals. Professor Zomaya is a decorated scholar with numerous accolades including Fellowship of the IEEE, AAAS, and the IET. He is also a Fellow of the Royal Society of New South Wales and Academia Europaea. His research interests are in distributed computing and networking.

Edge computing: Empowering the next digital transformation

In the past few decades, industrial automation has become the driving force in a wide range of industries. There is a broad agreement that the deployment of computing resources close to where data is created is more user-friendly, as it can address system latency, privacy, cost, and resiliency challenges that a pure cloud computing approach cannot address. This computing paradigm is now known as edge computing. The full potential of this transformation for both computing and data analytics is far from being realised. The industrial requirements are much more stringent than what a simple edge computing paradigm can deliver. This is particularly true when mission-critical applications have strict requirements on real-time decision making, operational technology innovation, data privacy, and running environment. In this talk, Professor Zomaya aims to provide a few answers by combining real-time computing strengths into modern data-and-intelligence-rich computing ecosystems.

Absent new Fellows Also elected this year, but unable to join us for the new Fellows' ceremonies, are:

Professor John Cannon FAA

Professor Anne Dell CBE FRS FAA
(Corresponding Member)

Professor Emma Johnston
AO FAA FTSE

SCIENCE
at the SHINE DOME 2022



Gala Dinner

6.30pm–10.30pm, Wednesday 23 November

Continue the science festivities with us in the Great Hall of Parliament House for the gala dinner—an occasion not to be missed!

This fabulous evening will bring together people from all corners of Australian science to connect as a community and celebrate excellence, with hosts for the evening Professor Lyn Beazley AO FAA FTSE (Secretary, Education and Public Awareness of Science) and Professor Frances Separovic AO FAA (Foreign Secretary).

Join us for a special conversation between the Minister for Industry and Science, the Hon Ed Husic MP, and Karlie Alinta Noon from the Australian National University. Also, you will mingle with Academy Fellows, Members and Senators of the Australian Parliament, Nobel Prize winners, Chief Scientists, Prime Minister's Science Prize winners, senior representatives from the research, education and industry sectors, government officials, and members of the diplomatic community.

We will also present the Academy's most prestigious medals for 2020 to 2022 at the gala dinner. The Macfarlane Burnet Medal will be awarded to Professor Marilyn Renfree AO FAA FRS (2020) and Professor Steve Simpson AC FAA FRS (2022). Professor Andrew Holmes AC FAA FTSE FRS will receive the 2021 Matthew Flinders Medal. The Ruby Payne-Scott Medal will be presented to Professor Cheryl Praeger AC FAA for 2021, and to Dr Liz Dennis AC FAA FTSE for 2022. More information on these premier awards can be found in the Academy awards section of this program.

We are delighted to be able to bring this event to you in such a special venue, with the generous support of **The University of Sydney, Major Partner—Gala Dinner.**

Coaches depart Peppers Gallery, QT Canberra and Mantra on Northbourne at 6.00pm, and will return at the conclusion of the evening. No bookings required for the coaches; simply be at the front of the hotels at 5.55pm to take advantage of these transfers.

Pre-dinner drinks will be served from 6.30pm, with formal proceedings beginning at 7.00pm.

Dress code: formal (black tie optional).



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ACADEMY AWARDS



Premier Honorific Awards

Macfarlane Burnet Medal and Lecture

The Macfarlane Burnet Medal and Lecture recognises scientific research of the highest standing in the biological sciences. It is a Premier career award that commemorates the contributions to science by Professor Sir Frank Macfarlane Burnet OM KBE MD FAA FRS NOBEL LAUREATE.



2020 Awardee: Professor Marilyn Renfree AO FAA FRS

The University of Melbourne Australia is home to a unique assembly of mammals: the marsupials and monotremes. Professor Marilyn Renfree has pioneered modern research on their reproduction, development, evolution, conservation, and molecular and comparative genomics for 40 years, demonstrating their importance for biomedical research as well as providing novel conservation and management approaches for our iconic kangaroos and koalas. Her lifetime passion for these long-neglected Australian fauna has led to

pioneering discoveries and insights that challenged assumptions and opened up new areas of biomedical research internationally. Professor Renfree's research program has advanced our understanding of embryonic development and placentation, how the development of their embryos can be suspended, and how their extraordinary lactation is controlled. Her most important contributions have been to the field of sexual differentiation, overturning established paradigms and showing how genes and hormones interact during early development, providing new understanding of what makes a male and a female mammal—leading to new clinical guidelines and making a contribution to our understanding of human sexual development as well as that of other mammals.

Marsupials: Microchip miracles

Marsupials make up only 6% of living mammals but have many characteristics that have taught us about the control of reproduction and development. A striking characteristic is that marsupials give birth to highly altricial young after a

short gestation period, supported by a placenta. They deliver the smallest baby at birth (just 5mg) of any we know. They complete much of their development within the pouch, dependent on a long and highly sophisticated lactation that controls growth. A major difference is the timing of their differentiation of sex, which all takes place postnatally. We used the natural advantages of marsupial reproduction to show that genes can have a direct effect on the way males and females develop before the reproductive hormones kick in. We discovered a previously unknown hormonal pathway that controls masculinisation of the male and is critical for early sexual differentiation—in humans as well as marsupials. Errors in this pathway are now known to cause certain intersex conditions and human congenital adrenal hyperplasia; they also appear to be involved in polycystic ovarian syndrome. Our results have led to clinical applications, contributing to our understanding of human sexual development as well as that of other mammals.



2022 Awardee: Professor Steve Simpson AC FAA FRS

The University of Sydney

Professor Steve Simpson has revolutionised the scientific understanding of swarming in locusts, with research spanning neurochemical events in the brains of individual locusts to continental-scale mass migration. Professor Simpson, with colleague David Raubenheimer, has also developed a powerfully integrative framework for nutrition called the Geometric

Framework, which he devised and tested using insects. The framework has since been applied to a wide range of organisms, from slime moulds to humans, and to problems from aquaculture and conservation biology to dietary causes of human obesity and ageing. Since 2012, Professor Simpson has applied his biological and biomedical research and knowledge to ease the burden of chronic disease in humans through a unique, cross-disciplinary initiative at the Charles Perkins Centre at the University of Sydney.

An inordinate fondness for locusts

Some of the greatest challenges facing humanity require many disciplines to come together, sharing their specialist expertise and new ways of seeing and conceiving complex problems. In practice, however, initiating and sustaining productive

interdisciplinary collaborations is hard and is not encouraged in traditional academic careers, nor supported by current funding models. In this lecture, Professor Simpson tells the story of his journey in interdisciplinary research—beginning with studies of locust feeding behaviour and swarming spanning neurochemical events within the nervous system to mass migration and management of swarms, moving into the development of an integrative framework for nutritional biology with colleague David Raubenheimer, then the application of these models to human health and ageing, and culminating in the establishment of a new multidisciplinary institute designed using lessons from complex adaptive systems biology, with a mission to transform the systems of health. He ends by reflecting on what is needed next.

2022 Ruby Payne-Scott Medal and Lecture

The Ruby Payne-Scott Medal and Lecture is a Premier career award that recognises female researchers of the highest standing in the physical and/or biological sciences. It is one of the most prestigious career awards of the Academy and honours Ruby Payne-Scott's pioneering contribution to radiophysics and radio astronomy.



Dr Liz Dennis AC FAA FTSE

CSIRO Agriculture and Food

Dr Liz Dennis is a distinguished plant molecular biology researcher. She has addressed important basic questions in plant development, vernalisation-induced flowering, and the increased yield of hybrid varieties. A feature of her research is that she has worked with

Arabidopsis, a plant favoured in laboratory research, and then transferred her discoveries to crop plants. This has been a powerful strategy. Her analysis of the basis of hybrid vigour has been outstanding in Arabidopsis and subsequently in rice. The development of hybrid mimics in rice has removed the first-generation limit for hybrids and facilitates a continuity of high food grain production. The development of high yielding mimic varieties can be expected in many other crops.

Understanding plant growth and development

Dr Liz Dennis says she had been lucky—lucky to be working at the beginning of molecular biology and lucky to have colleagues with the same passion for science. She

started with bacteria, moved to yeast, humans, and native rats in Papua New Guinea—but most of her working life she has studied the molecular basis of plant processes. Topics include a plant's response to waterlogging, control of timing of flowering, and the role of epigenetics in flowering. More recently, she and her team have tackled the basis of hybrid vigour—a long-standing puzzle in biology. Hybrid vigour is only present in the first generation following a cross, but she has developed lines which retain the yield advantage of hybrids over many generations. This technology will allow vigour to be captured in species where there is no production hybrid system, such as lentils.

Inaugural award

David Vaux Research Integrity Fellowship Award

The David Vaux Research Integrity Fellowship Award has been established in honour of Professor David Vaux AO FAA FAHMS, who has championed scientific research integrity in Australia. This award recognises individuals who have led efforts to foster and promote integrity in science, championing fairness, honesty, and consideration of others in the practice of scientific research.



Professor David Vaux AO FAA FAHMS
Walter and Eliza Hall Institute
of Medical Research

Professor David Vaux graduated in medicine from the University of Melbourne and completed a PhD at the Walter and Eliza Hall Institute (WEHI), before a postdoctoral placement at Stanford University. His research was mainly concerned with the molecular mechanisms by which cells kill themselves, and in 1988 he discovered that BCL2—unlike other cancer-causing genes—promoted malignancy by preventing cell death. This

recognition of the first component of the cell death machinery marked a paradigm shift in understanding cellular homeostasis and its connection to cancer. He also has an interest in research integrity and is a member of the board of directors of the Center for Scientific Integrity, the parent organisation of the Retraction Watch blog. He has long advocated for Australia to establish a national office to promote research integrity and handle allegations of research misconduct.

If you've been searching for answers, you've been searching for us.

As Australia's national university, we are always looking at the bigger picture. Our cutting-edge scientific research addresses the complex challenges facing the world today. It changes conversations and transforms lives—in this country, the Asia-Pacific and beyond.



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Honoric awards

Career honorific awards

recognise lifelong achievement in the outstanding contribution to the advancement of science.

David Craig Medal

The David Craig Medal is awarded in honour of the outstanding contribution to chemical research of the late Emeritus Professor David Craig AO FAA FRS. It recognises contributions of a high order to any branch of chemistry by active researchers. The recipient of this medal delivers several public lectures across Australia.



Professor Christopher Barner-Kowollik FAA

Queensland University of Technology
Professor Christopher Barner-Kowollik's work fuses the in-depth understanding of chemical processes that are induced by light with their use to prepare soft matter materials, with applications from 3D printing inks to photodynamic materials. His main body of work—based on an esteemed career in physical-organic chemistry—exploits light as a 'molecular surgical tool', where its colour and intensity are finely adjustable gates to 'operate' on the molecular structure of materials with unprecedented precision. This precision gives rise to materials whose mechanical strength and chemical composition can be readily adjusted without bringing them in contact with chemicals or heat. Professor Barner-Kowollik's work has enabled new materials concepts, for example a material that is solely stabilised by light, so-called 'light stabilised dynamic materials'.

Mawson Medal

The Mawson Medal and Lecture recognise research in the Earth sciences and honours the contribution to science in Australia by Sir Douglas Mawson FAA FRS, geologist and Antarctic explorer.



Professor Andrew Roberts

The Australian National University
Professor Andrew Roberts has made fundamentally important contributions to understanding the magnetisation of sediments, which provides the basis for use of paleomagnetism to reconstruct global plate tectonic movements and to understand variations in Earth's magnetic field through its history. His work influences all aspects of understanding sedimentary magnetisation acquisition and has particularly contributed to recognising that the previously poorly-known magnetic mineral greigite, and magnetic minerals produced by magnetotactic bacteria, make important contributions to the magnetisation of globally distributed sedimentary rocks. He is an international leader in the field of environmental magnetic analyses of climate change and has developed new methods in rock magnetism that are used widely in solid state physics, materials science, the magnetic recording industry, and Earth science. His work in environmental magnetism has made significant contributions to understanding African monsoon dynamics, sea level variations, and Arctic and Antarctic glacial history.

Suzanne Cory Medal

The Suzanne Cory Medal honours the contributions made to science by molecular biologist Professor Suzanne Cory AC FAA FRS and recognises outstanding research in all of the biological sciences, being awarded in alternate years in the biomedical sciences and in all of the biological sciences excluding biomedical sciences. The 2022 award is for outstanding research in the biomedical sciences.



Professor Georgia Chenevix-Trench FAA

QIMR Berghofer Medical Research Institute

Professor Georgia Chenevix-Trench is a cancer geneticist, interested in both inherited and acquired genetic variants that contribute to the risk and development of cancer. Her main focus is on breast and ovarian cancer, but she has also made major contributions to inherited skin and gastric cancers. In the last 15 years, her main focus has been on genome-wide association studies to identify inherited genetic variants associated with cancer risk. These have identified over 200 regions of the genome associated with breast cancer risk. This information is currently being used in international clinical trials to stratify women for breast screening, but has also transformed our understanding of the biological basis of breast cancer. Professor Chenevix-Trench's main focus now is to identify the relevant susceptibility genes in those 200 regions, to determine how they contribute to breast cancer risk, and whether this information can be used to treat breast cancer, or even to prevent it.

Mid-career awards recognise outstanding contributions to the advancement of science by researchers between eight and 15 years post-PhD in the calendar year of nomination.

Gustav Nossal Medal for Global Health

The Gustav Nossal Medal for Global Health has been established to honour the contributions made to fields of cellular immunology, antibody formation and tolerance and vaccine research science by Professor Gustav Nossal AC CBE FAA FTSE FRS. The award recognises research of the highest standing in the field of global health.



Professor Rebecca Guy FAIMS
UNSW Sydney

Professor Rebecca Guy is a renowned international authority in the implementation and evaluation of public health interventions related to HIV and sexually transmissible infections (STIs), particularly among vulnerable populations. Among her many achievements to date, she has introduced STI and COVID-19 point-of-care testing in remote Aboriginal communities and led the evaluation of HIV point-of-care tests

that can be conducted by people in their own home (HIV self-tests). Serving as Head of the Surveillance Evaluation and Research Program at The Kirby Institute, as well as leader of both the NHMRC Centre of Research Excellence in the Accelerated Implementation of New Point-of-Care Technology for Infectious Diseases and the ARC Industrial Transformation Research Hub to Combat Antimicrobial Resistance, Professor Guy's research has been highly influential on policy and practice, both in Australia and internationally.


Nancy Millis Medal for Women in Science


The Nancy Millis Medal for Women in Science honours the contributions made to science by the late Professor Nancy Millis AC MBE FAA FTSE, and recognises her importance as a role model for women aspiring to be research leaders.

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Professor Vanessa Peterson
Australian Nuclear Science and
Technology Organisation

Our continual need for cheap energy presents major challenges. Professor Vanessa Peterson's game-changing research into the fundamental working mechanisms of energy materials is helping to solve these global challenges. Professor Peterson's significant research targets functional materials at the heart of energy technology such as batteries, fuel cells and materials for the separation and storage of energy relevant gases including hydrogen and carbon dioxide. She has pioneered methods to understand the atomic level function of materials, revealing in unprecedented detail how the arrangement and motions of atoms can be harnessed to make new and better sustainable-energy devices. Her work has led to discoveries that push the frontier of our understanding of energy materials, helping to reduce Australia's carbon emissions and develop sustainable clean-energy systems. Professor Peterson is an internationally-regarded leader in materials characterisation, specialising in neutron scattering methods, and is an outstanding mentor, advocate and role model for women in science.

Early-career awards recognise outstanding contributions to the advancement of science by researchers no more than 10 years post-PhD in the calendar year of nomination.

Anton Hales Medal

The Anton Hales Medal recognises distinguished research in the Earth sciences and honours the contributions to the Earth sciences by the late Professor Anton L Hales FAA. Professor Hales was the founding director of the Research School of Earth Sciences at the Australian National University.

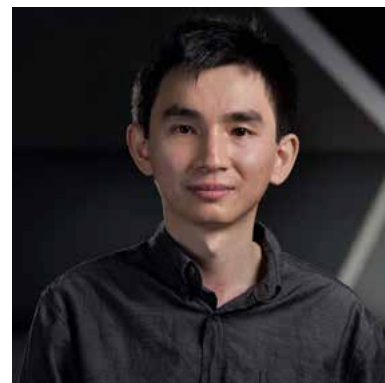


Associate Professor Jenny Fisher
University of Wollongong

Understanding of the sources, transport and fate of trace atmospheric species is crucial for the development of evidence-based policies for the management of air pollution and to evaluate their contribution to future climate scenarios. Associate Professor Jenny Fisher's research leads international efforts to model the atmospheric concentrations and transport of these species, to predict their response to future emissions and environmental change, and to quantitatively evaluate impacts of Australian and global environmental policies. The species include mercury, a neurotoxin that is distributed globally through the atmosphere. In recognition of its adverse effects, mercury is now regulated by the UN Minamata Convention on Mercury. Her work also provides new and crucial information on biogenic emissions and atmospheric chemistry of trace species from vegetation which play important roles in air pollutant formation.

Christopher Heyde Medal

The Christopher Heyde Medal honours contributions to mathematics by the late Professor Christopher Heyde AM FAA FASSA. In recognition of Professor Heyde's broad interests in the mathematical sciences, the award is offered in one of three fields of mathematics on a rotating basis. In 2022 it recognises outstanding achievement in probability theory, statistical methodology and their applications.



Dr Francis Hui

The Australian National University
Dr Francis Hui's research focuses on the development of innovative, fast approaches for the statistical analysis of big data, particularly when many correlated variables are collected in space and/or time to produce richly correlated data. He has made substantial contributions to the literature on efficient approximate methods for fitting multi-level models, techniques for data visualisation of many variables and scalable tools for flexibly fitting non-linear models and for selecting which predictors to include in complex correlated data settings. Dr Hui works at the interface between methodological and applied statistics, ensuring that his research has an immediate and substantial impact on the wider scientific community. His research has been

particularly impactful in ecology, where his methods and software are applied by practitioners to project spatio-temporal change of species assemblages under climate change scenarios and for enhancing the understanding of terrestrial and marine ecosystems both across Australia and internationally.

Dorothy Hill Medal

The Dorothy Hill Medal honours the contributions of the late Professor Dorothy Hill AC CBE FAA FRS to Australian Earth science, and her work in opening up tertiary science education to women.



Dr Samintha Perera

The University of Melbourne
Australia's per capita carbon dioxide (CO₂) emissions are among the world's highest and the recent drought and bushfire crises clearly illustrate our vulnerability to increases in greenhouse gas emissions. Although carbon dioxide geo-storage in deep coal seams can play a vital role in emission reduction, conversion of CO₂ into a highly chemically reactive 'supercritical CO₂ (scCO₂)' at such deep depths causes unpredictable CO₂ flow behaviours in coal seams while modifying its flow and mechanical properties. Dr Samintha Perera discovered the unique interaction between the coal mass and scCO₂ and the resulting impacts on underground applications. According to her findings, all these unique scCO₂ behaviours in coal seams are caused by the significant coal matrix swelling resulting from the coal-scCO₂ interaction. Regardless of

that, she found the effectiveness of scCO₂ as a fracking fluid for coal reservoirs, which gave a great value to this problematic scCO₂ as a reservoir stimulation agent.

Fenner Medal

The Fenner Medal is awarded in honour of the outstanding contributions to science by the late Professor Frank Fenner AC CMG MBE FAA FRS. It recognises distinguished research in biology.



Professor Chris Greening

Monash University

Professor Chris Greening's remarkable discovery that bacteria can live on air has redefined what constitutes life. When bacteria exhaust organic energy sources, they can survive indefinitely by scavenging the unlimited supply of hydrogen and carbon monoxide gas present in the atmosphere. This survival mechanism has broad-reaching consequences for global biodiversity, infectious disease, climate change, and public health research. Professor Greening has revealed it supports the biodiversity of life's soils and oceans, regulates greenhouse gases in the atmosphere, and enhances agricultural productivity. He has also shown that these gas-eating bacteria provide a basis for life in continental Antarctica, where conditions are too extreme for plants to prosper. Yet similar survival mechanisms are also used by devastating human pathogens, including causative agents of tuberculosis and dysentery.

By integrating his One Health microbiology laboratory with large-scale applied programs, Professor Greening is translating these fundamental insights into applied interventions that improve environmental and human health.

Frederick White Medal

The Frederick White Medal honours the contributions to Australian science of the late Sir Frederick White KBE FAA FRS. It recognises the achievements of scientists in Australia who are engaged in research of intrinsic scientific merit that has made an actual or potential contribution to community interests, to rural or industrial progress, or to the understanding of natural phenomena that have an impact on the lives of people.



Professor Kerrylee Rogers

University of Wollongong

Professor Kerrylee Rogers has made an internationally significant contribution to one of the most pressing environmental issues of our time: the impact of climate change on the world's most threatened and ecologically important habitat, wetlands. Her work has demonstrated that coastal wetlands (mangrove and saltmarsh) respond dynamically to sea-level rise. By trapping sediment and building root systems, wetlands adapt to climate change but also help mitigate climate change by sequestering atmospheric carbon dioxide. Professor Rogers has used these insights to show that the restoration of coastal wetlands is an effective climate change

adaptation strategy that can yield financial benefits to landholders. Carbon captured through wetland restoration can be reported by governments as saved emissions and traded by landholders in emissions trading programs. These insights have been effectively communicated through management and policy-focused papers, presentations, and expert advice.

Gottschalk Medal

The Gottschalk Medal recognises outstanding research in medical science and honours the contributions to science of the late Professor Alfred Gottschalk FAA.



Dr Alisa Glukhova
Walter and Eliza Hall Institute
of Medical Research

All cellular organisms exchange information with their environment in the form of chemical molecules or light, electrical or physical stimuli. G protein-coupled receptors (GPCRs) are primary information sensors at the cell surface and are major drug targets for a multitude of conditions. Dr Glukhova is using structural biology approaches to understand the biology of GPCRs and, specifically, how these receptors recognise chemical signals and how they transmit these signals inside the cell. Her research provided the first structural insights into the activation mechanism of the A1 adenosine receptor, a target for pain management and heart disease, opening possibilities for structure-based drug design. Her current work, in collaboration with

researchers from Monash Institute of Pharmaceutical Sciences, aims to understand the biology of other members of the adenosine receptor family and identify novel mechanisms for targeting them, either through unconventional binding sites or by altering their signalling path. The current research in her lab at the Walter and Eliza Hall Institute of Medical Research (WEHI) is focused on understanding the structural basis of Wnt signalling that involves a different GPCR family that is a major target for cancer therapeutics.

John Booker Medal

The John Booker Medal in Engineering Science recognises outstanding research in engineering mechanics that addresses problems in the static and dynamic response of physical systems within engineering and applied mathematics disciplines. It honours the memory of Professor John Robert Booker AO FAA who worked in the area of theoretical geomechanics, was Professor in the Department of Civil and Mining Engineering at the University of Sydney (1970–98), and held a personal chair in engineering mechanics at the University of Sydney.



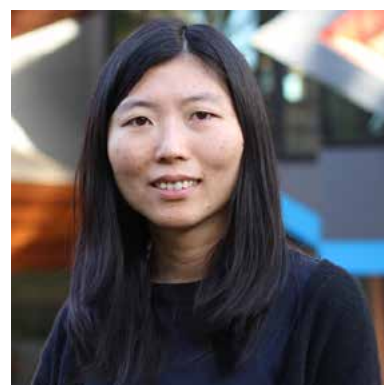
Associate Professor Annan Zhou
RMIT University

Associate Professor Annan Zhou has made seminal contributions to the understanding and modelling of the fundamental hydromechanical behaviour of unsaturated soils. Any soil can be unsaturated with water due to either evaporation or engineering

processes like excavation. Unsaturated soils have been widely blamed for many geotechnical problems like slope failures, dam collapses, pavement cracking and foundation failures since they may produce large deformations and even suddenly lose their strength in wetting events. Associate Professor Zhou has established a new modelling framework to tackle the most fundamental issues in unsaturated soil mechanics. Within this framework, many unanswered questions and seemingly conflicting behaviours related to strength, deformation and soil-water interaction of unsaturated soils can be reasonably explained and effectively modelled. Based on the novel constitutive modelling framework and robust numerical techniques, he has developed advanced numerical tools for better design and assessment of infrastructure involving unsaturated soils in Australia and worldwide.

Le Fèvre Medal

The Le Fèvre Medal for research in chemistry commemorates the work of the late Professor Raymond James Wood Le Fèvre FAA FRS. Its purpose is to recognise outstanding basic research in chemistry.



Associate Professor Yuning Hong
La Trobe University

Associate Professor Yuning Hong develops chemical probes to detect dysfunctional cells. Proteins are the major component of cells in

the human body and are essential for the maintenance of many of its functions. When the protein quality control process in the cell factory fails, the ensuing proteins that are not folded properly can not only lose their original functions, but also damage the cells. At worst this can lead to conditions such as Parkinson's, Alzheimer's and Huntington's diseases. With the aid of her chemical probes, Dr Hong studies how these proteins are generated and how they damage healthy cells. Her goal is to develop tests for the early diagnosis of, and treatments for, dementia and other neurodegenerative diseases.

Pawsey Medal

The Pawsey Medal recognises distinguished research in physics and commemorates the work of the late Professor Joseph Pawsey FAA FRS.



Dr Keith Bannister CSIRO

Dr Keith Bannister is an exceptional scientist who has led several projects at the forefront of radio astronomy, especially in the area of fast radio burst (FRB) research. His great strength is that he has a deep understanding of both astronomy and radio-science engineering. These qualities enable him to envisage novel and powerful techniques to advance key science goals, to bring systems based on these techniques to fruition, and then to harvest the scientific returns. By exploiting the unique wide-field capabilities of CSIRO's

ASKAP radio telescope, Dr Bannister and his team doubled the number of FRBs known at the time. He then went on to devise and implement a scheme to determine their precise sky positions, thereby identifying their source location in distant galaxies. These results provided vital clues on FRBs' astrophysical origin, and identified the location of 50% of the missing baryons in the universe.

Ruth Stephens Gani Medal

The Ruth Stephens Gani Medal honours the contribution to human cytogenetics of the late Ruth Stephens Gani. It recognises distinguished research in human genetics including clinical, molecular, population and epidemiological genetics and cytogenetics.



Dr Loïc Yengo

The University of Queensland

Dr Loïc Yengo has developed novel theory and statistical analysis methods and applied those to 'big data' in human genomics to address questions about the causes and consequences of human behaviour. He has discovered thousands of DNA variants that are associated with human traits and showed that the pattern of those variants in the human genome are in part the consequence of people seeking partners who are like themselves, in terms of, for example, height and the level of education. This is direct

evidence that human behaviour has an effect on the human genome in subsequent generations. In addition, Dr Yengo has developed better analysis methods to study the effect of homozygosity in the human genome and has shown that the larger the proportion of a person's genome that is homozygous, the more detrimental effects it has on traits that are associated with disease.



Safeguarding Australia through innovation, science and technology.

Defence employs Australia's brightest scientists, engineers, IT specialists and technicians to deliver scientific advice and technology solutions to enhance Australia's defence and national security.

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- Increasing scale by partnering with the national science and technology enterprise and international partners.
- Delivering impact and a capability edge through streamlined and secure innovation pathways.

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implementing new research security

achieving more, together.

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Aboriginal and Torres Strait Islander Scientist Award

The award recognises research in the physical and biological sciences, allowing interdisciplinary and sociocultural research that could straddle the social sciences and humanities, by outstanding Aboriginal and Torres Strait Islander PhD students and early- and mid-career scientists. It aims to support their research and/or the expansion and growth of their research networks and international knowledge exchange through visits to relevant international centres of research. Awards are for up to \$20,000, with additional support provided to attend the Academy's annual Science at the Shine Dome event.



Dr Jordan Pitt

The University of Adelaide

Dr Jordan Pitt is a proud Birri Gubba man studying the mathematics of water waves. He completed his PhD at the Australian National University with Emeritus Professor Stephen Roberts, in which he developed numerical methods to model tsunamis and storm surges. He is currently working as a postdoctoral researcher at the University of Adelaide with Dr Luke Bennetts, studying the interaction of ocean waves and the sea ice that forms as the ocean freezes in the Earth's polar regions. He has always been extremely interested in the motions of water and is keen to apply this interest to understanding natural hazards and the climate. He has recently returned from a workshop on the mathematics of sea ice in Cambridge and has just concluded a conference on the mathematics of sea ice and ice sheets which brought together world-leading researchers in the field.



Ms Tamara Riley

The Australian National University

Ms Tamara Riley is a Wiradjuri woman with family ties to Western NSW. She is a PhD Candidate at the National Centre for Aboriginal and Torres Strait Islander Wellbeing Research, within the National Centre for Epidemiology and Population Health, at the Australian National University. Ms Riley is a veterinarian and epidemiologist, and her research focuses on One Health (the relationship between human, animal, and environmental health) and Aboriginal and Torres Strait Islander communities. The One Health concept aligns with Aboriginal and Torres Strait Islander community contexts and cultural knowledges that recognise the relationships between the health of people, animals, and the environment, and support holistic approaches to health and wellbeing. The aim of Tamara's PhD is to design a One Health model for use in Aboriginal and Torres Strait Islander communities.



Ms Vanessa Sewell

The University of New England

Ms Vanessa Sewell completed a Bachelor of Animal Science with Honours at the University of New England (UNE) in 2019. Ms Sewell is currently enrolled in a PhD in molecular biology and parasitology at UNE. Her research involves developing a biotechnological solution against livestock parasites by generating a parasite-specific expression system to mass-produce parasite antigens for vaccine design. Her project is linked to a larger scour worm vaccine prototype project with UNE, Moredun Research Institute, and the University of Glasgow in the UK. Ms Sewell had the opportunity to present her work at the 15th International Congress of Parasitology conference in Denmark in 2022. In addition, Miss Sewell works closely with the Oorala Aboriginal Centre (UNE) to promote STEM to young Indigenous students.



Dr Keane Wheeler

The University of Queensland

Dr Keane Wheeler is a proud Ngarabal man and Accredited Exercise Scientist (ESSA). Dr Wheeler was the first First Nations person to graduate with a PhD from the University of the Sunshine Coast. Dr Wheeler was awarded the Accredited Exercise Scientist of the Year Award for 2020 from Exercise and Sport Science Australia. Dr Wheeler's research examines how Aboriginal and Torres Strait Islander communities can co-design programs that engage children in a broad range of child development areas. Dr Wheeler's research strengths consist of movement-based programs, ensuring a trauma-informed, culturally responsive approach towards childhood development. Dr Wheeler has led high performing teams working on programs that support Aboriginal and Torres Strait Islander families through a strength-based framework. Dr Wheeler has provided First Nations leadership to a range of projects that have catered to the diversity of Aboriginal and Torres Strait Islander communities.



Mr Luke Williams

RMIT University

Mr Luke Williams is a proud Gumbaynggirr man of northern NSW. He is currently completing his PhD in toxicology at RMIT University, which involves assessing the dietary safety of a range of native Australian foods, including traditional Aboriginal foods. He is also exploring how food regulatory frameworks can better accommodate traditional knowledge into the overall risk assessment of traditional food products that are being developed for commercial markets. To complete this work, Mr Williams was awarded an RMIT Vice-Chancellor's Indigenous Pre-Doctoral Research Fellowship. Mr Williams previously received First Class Honours in drug discovery biology from Monash University and has completed a bachelor degree in pharmaceutical science from RMIT University. As part of his PhD research, Mr Williams is actively bringing together the research sector and various government regulatory bodies with a range of First Peoples stakeholders. The goal of Mr Williams' research is to drive First Peoples food sovereignty through an Indigenous-led native foods industry.

Max Day Environmental Science Fellowship Award

This award provides up to \$20,000 to support early-career researchers working on the conservation of Australia's flora and fauna, ecologically sustainable use of resources, and protection of the environment and ecosystem services. The award is named in honour of the late Dr Maxwell Frank Cooper Day AO FAA who spent a lifetime championing entomology, conservation, and forestry, as well as helping other scientists. Through sponsoring this award Dr Day acknowledges the support that he received as a young researcher to travel overseas to gain his PhD at Harvard.



Dr Brock Bergseth

James Cook University

Dr Brock Bergseth is an ARC DECRA Research Fellow at James Cook University. His work seeks to understand and influence human behaviour to bolster conservation outcomes. Dr Bergseth's diverse professional and academic experience spans a range of roles and institutions, including academic, industrial, philanthropic, and popular science communication sectors. As a multidisciplinary conservation scientist, he blends psychological, ecological, economic, and cognitive science approaches to understand and shape the nature and implications of human interactions with marine ecosystems. A central tenet of his approach is delivering impactful research that addresses wicked problems in conservation, including illegal fishing, overfishing, and poaching. As an environmental writer, Dr Bergseth also works to counter the deluge of negative public perceptions about the state and future of our planet, to showcase those working to conserve our planet, and to galvanise environmental action in today's youth.



Ms Bridget Campbell

Macquarie University

Ms Bridget Campbell is a PhD candidate in the Cross-cultural Ecology Lab at Macquarie University, Sydney. For her PhD project she is collaborating with the Yolŋu Yirralka Rangers from northeast Arnhem Land, Northern Territory. Her project investigates the two-way biocultural value of fauna in the Laynhapuy Indigenous Protected Area (IPA). The aim of this project is to develop and test multi-disciplinary, cross-cultural methods to record and monitor native fauna that align with Yolŋu values and concerns. This work will contribute to the development of a cross-cultural fauna management strategy that bridges Yolŋu and balanda (Euro-Australian) knowledge systems. Ms Campbell's PhD builds on her Masters of Research work, which aligned Yolŋu knowledge and species distribution modelling to investigate critical weight range mammal decline in the Laynhapuy IPA. In 2020, she received the Macquarie University Medal in Environmental Science for this work.



Highly commended applicant:

Dr Stephanie Gardner

UNSW Sydney

Dr Stephanie Gardner has a life-long passion for the marine environment, spending as much time as possible around the ocean. She has a PhD in coral physiology and biochemistry, focusing on how corals protect themselves against coral bleaching caused by environmental stress. Dr Gardner's research as a marine microbial ecologist spans tropical and temperate reef ecosystems, with a range of organisms such as corals, algae, and fish gastrointestinal tracts. Her main research questions involve looking at bacteria to understand their role in health and function under a changing climate. She is currently a Postdoctoral Research Associate at the University of Sydney working on the Securing Antarctica's Environmental Future (SAEF) project, an Antarctic research program. SAEF's aims are to understand the changes taking place across the Antarctic region—to its climate and its biodiversity—and develop innovative ways to forecast, mitigate, and manage these changes.



Highly commended applicant:
Dr Timothy Ghaly
Macquarie University

Dr Timothy Ghaly completed his PhD at Macquarie University in 2022. He is a microbiologist with a broad interest in studying microbes in environmental settings. His research focuses on using metagenomics to understand the diverse roles that microbes play in facilitating ecosystem functions. In particular, he looks to connect microbial community composition with community function, and to determine how these drive ecosystem processes and support native biodiversity. He also aims to explore how we might harness the power of microbes to restore, and improve the resilience of, degraded ecosystems.



Highly commended applicant:
Dr Niloofar Karimian
Southern Cross University

Dr Niloofar Karimian is a postdoctoral research Fellow at CSIRO (mineral resources) and Monash University in Melbourne. She is an environmental geochemist, interested in applied and fundamental aspects of environmental geochemistry and mineralogy. Her research explores the multidisciplinary links between mineralogy, geochemistry, and microbiology in controlling environmental mobility and speciation of a wide range of toxic metalloids—such as antimony, arsenic, and chromium—in soil-water systems. She is interested in exploring how mineral formation and evolution over time affect the environmental behaviour association and bioaccessibility of impurities and contaminants in the geo-environment using a wide range of advanced analytical techniques including state of art spectroscopy techniques such as synchrotron-based X-ray absorption spectroscopy. In her current role at CSIRO, she is carrying out innovative research to resolve the invisible phosphorus puzzle in iron ore which is a critical step in unlocking the economic potential and reducing the carbon intensity of iron ore processing.



Highly commended applicant:
Dr Alice Twomey
The University of Queensland

Dr Alice Twomey is a post-doctoral research fellow at the University of Queensland. She is an interdisciplinary ecological engineer, specialising in the fields of coastal engineering, hydrology, and wetland ecology. Her research aims to bridge the gap between engineers and ecologists to improve the prediction, design, and restoration of coastal ecosystems whilst enhancing co-benefits such as blue carbon sequestration and coastal protection. Her research interests include identifying and predicting hydrological restoration opportunities for coastal ecosystems and utilising coastal and marine ecosystems as nature-based solutions for coastal protection. Dr Twomey was recently nominated for the Engineers Australia Young Engineer of the Year Award, and was listed as a finalist for Queensland, and received the Highly Commended Award.

2021 ACADEMY AWARDS

Premier honorifics

Matthew Flinders Medal and Lecture—**Professor Andrew Holmes AC FAA FTSE FRS** The University of Melbourne

Inaugural Ruby Payne-Scott Medal and Lecture—**Emeritus Professor Cheryl Praeger AC FAA**

The University of Western Australia

Career honorifics

David Craig Medal—**Professor Thomas Maschmeyer FAA FTSE** The University of Sydney

Hannan Medal—**Professor Mathai Varghese FAA** The University of Adelaide

Jaeger Medal—**Emeritus Professor John Church AO FAA FTSE** UNSW Sydney

Inaugural Suzanne Cory Medal—**Emeritus Professor John Endler AO FAA FRS** Deakin University

Inaugural Suzanne Cory Medal—**Professor Susanne von Caemmerer FAA FRS** The Australian National University

Thomas Ranken Lyle Medal—**Professor David McClelland FAA** The Australian National University

Mid-career honorifics

Jacques Miller Medal—**Professor Mark Dawson FAA FAHMS** Peter MacCallum Cancer Centre

Jacques Miller Medal—**Associate Professor Michele Teng** QIMR Berghofer Medical Research Institute

Nancy Millis Medal—**Professor Angela Moles** UNSW Sydney

Nancy Millis Medal—**Associate Professor Cathryn Trott** Curtin University

Early-career honorifics

Anton Hales Medal—**Dr Nicolas Flament** University of Wollongong

Christopher Heyde Medal—**Assistant Professor Kevin Coulembier** The University of Sydney

Christopher Heyde Medal—**Associate Professor Vera Roshchina** UNSW Sydney

Dorothy Hill Medal—**Dr Sarah Perkins-Kirkpatrick** UNSW Canberra

Fenner Medal—**Associate Professor Eve McDonald-Madden** The University of Queensland

Gottschalk Medal—**Associate Professor Francine Marques** Monash University

John Booker Medal—**Dr Bishakhdatta Gayen** The University of Melbourne

Le Fèvre Medal—**Professor Debbie Silvester-Dean** Curtin University

Moran Medal—**Professor Christopher Drovandi** Queensland University of Technology

Moran Medal—**Associate Professor Janice Scealy** The Australian National University

Pawsey Medal—**Professor Xiaojing Hao FTSE** UNSW Sydney

Ruth Stephens Gani Medal—**Professor Joseph Powell** Garvan Institute of Medical Research

Max Day Environmental Science Fellowship Award

Dr Laura Brannelly The University of Melbourne

Ms Lea Hannah Western Sydney University

Highly commended

Dr Stephanie Gardner UNSW Sydney

Ms Maggie-Anne Harvey The University of Queensland

Dr Luke Jeffrey Southern Cross University



2020 ACADEMY AWARDS

Premier honorifics

Macfarlane Burnet Medal and Lecture—**Professor Marilyn Renfree AO FAA FRS** The University of Melbourne

Career honorifics

David Craig Medal—**Dr Graeme Moad AC FAA FTSE** CSIRO

Haddon Forrester King Medal—**Emeritus Professor Ian Campbell** The Australian National University

Mawson Medal—**Professor Allen Nutman** University of Wollongong

Mid-career honorifics

Gustav Nossal Medal for Global Health—**Professor Alexandra Martiniuk** The University of Sydney

Nancy Millis Medal for Women in Science—**Professor Kate Schroder** The University of Queensland

Nancy Millis Medal for Women in Science—**Professor Nicole Bell** The University of Melbourne

Early-career honorifics

John Booker Medal—**Professor Britta Bienen** The University of Western Australia

Fenner Medal—**Professor Michael Bode** Queensland University of Technology

Ruth Stephens Gani Medal—**Associate Professor Marina Pajic** Garvan Institute of Medical Research and UNSW Sydney

Gottschalk Medal—**Professor Muireann Irish** The University of Sydney

Anton Hales Medal—**Associate Professor Jan Zika** UNSW Sydney

Christopher Heyde Medal—**Professor Ryan Loxton** Curtin University

Christopher Heyde Medal—**Associate Professor Jennifer Flegg** The University of Melbourne

Dorothy Hill Medal—**Associate Professor Rebecca Carey** University of Tasmania

Pawsey Medal—**Professor Adam Deller** Swinburne University of Technology

Frederick White Medal—**Professor Madhu Bhaskaran FTSE** RMIT University

Le Fèvre Medal—**Associate Professor Ivan Kassal** The University of Sydney

Aboriginal and Torres Strait Islander Scientist Travelling Research Award

Associate Professor Michael-Shawn Fletcher The University of Melbourne

Mr Frank Loban James Cook University

Max Day Environmental Science Fellowship Award

Ms Allison Broad University of Wollongong

Dr Emma Camp University of Technology Sydney

Highly commended

Dr Catherine Price The University of Sydney

Ms Emily Scicluna La Trobe University

Ms Georgia Sinclair RMIT University

Dr Tatiana Soares da Costa The University of Adelaide



INDIGENOUS KNOWLEDGES WORKSHOP

2.00pm–4.00pm, Thursday 24 November

Led by Professor Tom Calma AO FAA FASSA, this workshop will be an open dialogue and discussion exploring how modern science can intersect with traditional knowledges. We will also hear from Indigenous scientists about their experiences working within the Western science paradigm.



Join the conversation to learn, share, and discover how your practices can be enriched by effective and meaningful engagement with Aboriginal and Torres Strait Islander knowledge holders and contemporary science practitioners, and how you can help to build a more inclusive and diverse science sector.

This session is open for all attendees.

Professor Calma is Chancellor of the University of Canberra and has championed the improvement of Indigenous peoples' health, education, and justice for over 45 years. He is the first Fellow elected to the Academy who identifies as an Aboriginal person. He is a descendant of the Kungarakan and Iwaidja tribal groups, whose traditional lands are south-west of Darwin and on the Cobourg Peninsula in the Northern Territory.



Smoking Ceremony at Science at the Shine Dome 2018

NOTES



Australian Government
Department of Education

Australia's Economic Accelerator

Funding research translation to build stronger linkages between university research and end users.

National Industry PhD Program

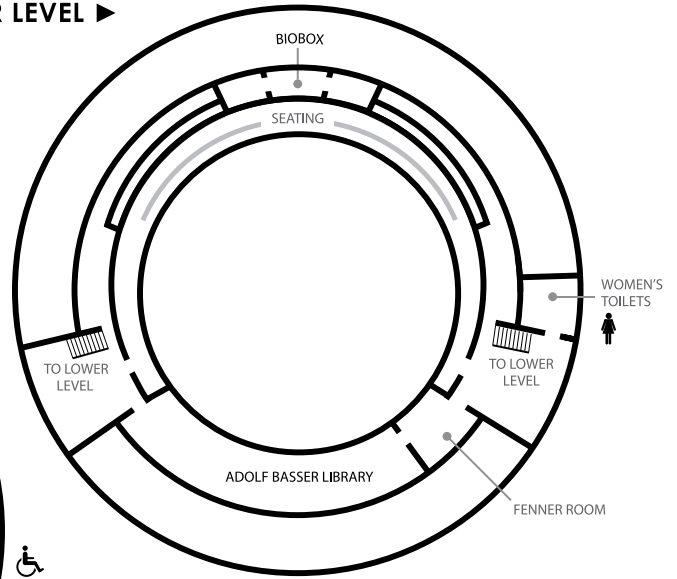
Industry and universities working together to build the innovation for the future.

www.education.gov.au/university-research-commercialisation-package

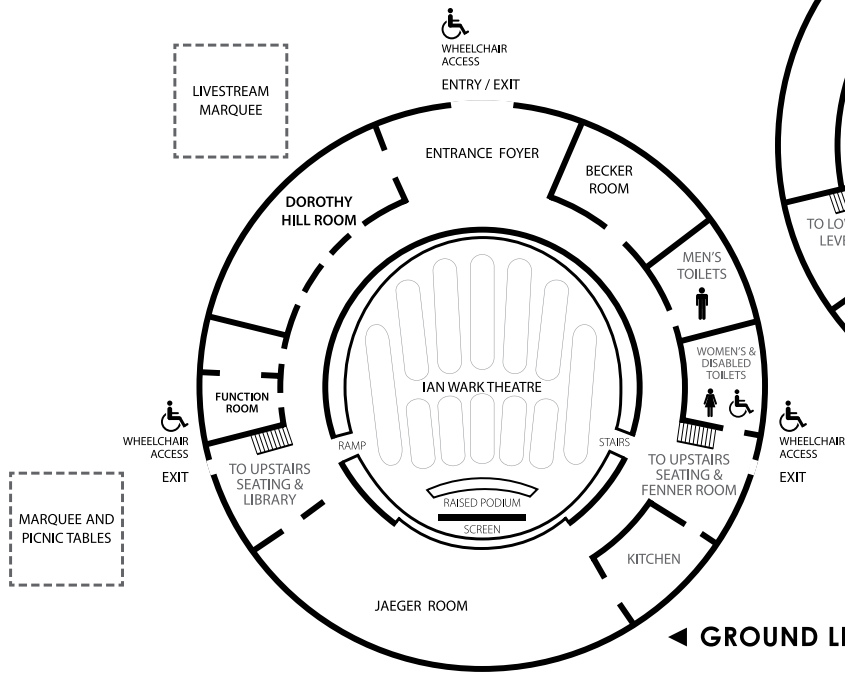


MAPS

UPPER LEVEL ▶



◀ GROUND LEVEL



KEY

- AUSTRALIAN ACADEMY OF SCIENCE GROUNDS AND PRIVATE PARKING
- MAIN ENTRANCE
- AUSTRALIAN NATIONAL UNIVERSITY CAMPUS
- ACCOMMODATION



EVENT INFORMATION

Code of Conduct

By registering for and attending any Science at the Shine Dome 2022 function, in person or online, guests agree to adhere to the Australian Academy of Science's Participant Code of Conduct. The policy is at science.org.au/code-conduct

COVID-19

All guests attending events at the Shine Dome are asked to be fully vaccinated against COVID-19 and be prepared to show proof of vaccination if requested. Masks are optional for all guests at the Shine Dome. Guests are asked not to attend the event if they are unwell and/or show signs of COVID-19.

Event app

The Science at the Shine Dome event app is available through app stores for delegates to download on all smartphones. The app contains the event program, the full printed program, information about the event, speakers and delegates, as well as an in-app messaging function to connect with delegates. Instructions on how to download and access this app are on the back of your name badge.

Please see information desk staff if you need assistance.

Information desk

The main foyer information desk will be staffed at all times for your assistance.

Colour coding

Colour coding in the program matches the lanyards worn by delegates. Delegates are welcome at every session unless restrictions apply.

■ New Fellows: red

■ Fellows: yellow

■ EMCRs: purple

■ Awardees: green

■ Event partners: orange

■ Guests: blue

Photo sessions

For group photos, please meet in the main foyer. For portraits, please go to the Becker Room.

Tuesday lunch: new Fellows 2020 group + new Fellows (all years) portraits

Tuesday afternoon tea: new Fellows 2021 group + new Fellows (all years) portraits

Wednesday morning tea: new Fellows 2022 group + new Fellows (all years) portraits

Wednesday lunch: EMCR group + new Fellows (all years) portraits

Thursday morning tea: awardees (all years) portraits

Thursday lunch: awardees 2022 group + awardees (all years) portraits

Luggage

Staff at the information desk can tag and store luggage onsite.

Parking

Limited free car parking is available in the Academy's Gordon Street carpark. Additional pay parking areas are available within short walking distances to the Shine Dome. The forecourt area of the Shine Dome is set down and pick up only.

Taxis

Staff at the information desk can book taxis for guests as required.

Transfers

Gala dinner: Buses will transfer delegates to and from Parliament House for the gala dinner on Wednesday evening. Coaches will pick up and drop off at Peppers Gallery, QT Canberra and Mantra On Northbourne. No bookings are required, but guests need to be at the front of the hotels at 5.55pm to utilise this service.

Transport to the airport from the Shine Dome will be provided at 4.30pm on Thursday 24 November. There is no charge, and no bookings are required. Please be at the main entrance of the Shine Dome at 4.25pm.

Accessibility

Two accessible parking spaces are available within the Academy car park. The ground floor of the Ian Wark Theatre, and the Jaeger Room, Becker Room and amenities are all wheelchair accessible. Due to the heritage of the building however, doorways into the venue are only equipped for access by standard wheelchairs.

Hearing loop

The Ian Wark Theatre, both upstairs and downstairs, is equipped with an Infrared Hearing Loop. See event staff to obtain a receiver and required attachments.

Mobile phones

Guests are asked to respect speakers and other guests by switching phones to silent while events are in session.

Parents' quiet room

A quiet room is available next to the Dorothy Hill Room in the Shine Dome. There are also full parent room facilities in Ian Potter House. Please see the information desk if any other facilities are required.

First aid

For any emergency or medical assistance, please notify staff at the information desk in the main foyer.

Wi-fi

Complimentary WiFi 'Shine Dome Public' can be accessed throughout the venue. No password is required.

Contacts

The following Academy staff are available to assist you. Please don't hesitate to call them.

General enquiries

Lisa Crocker: 0488 044 186

Media

Dan Wheelahan: 0488 766 010

Early- and mid-career researchers

Dr Mari Kondo: 02 6201 9486

New Fellows

Helen Longdon: 02 6201 9400

Awardees

Nancy Pritchard: 0488 038 112

Engage online

Tune in to the livestream online.



ShineDome22

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THE SHINE DOME

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