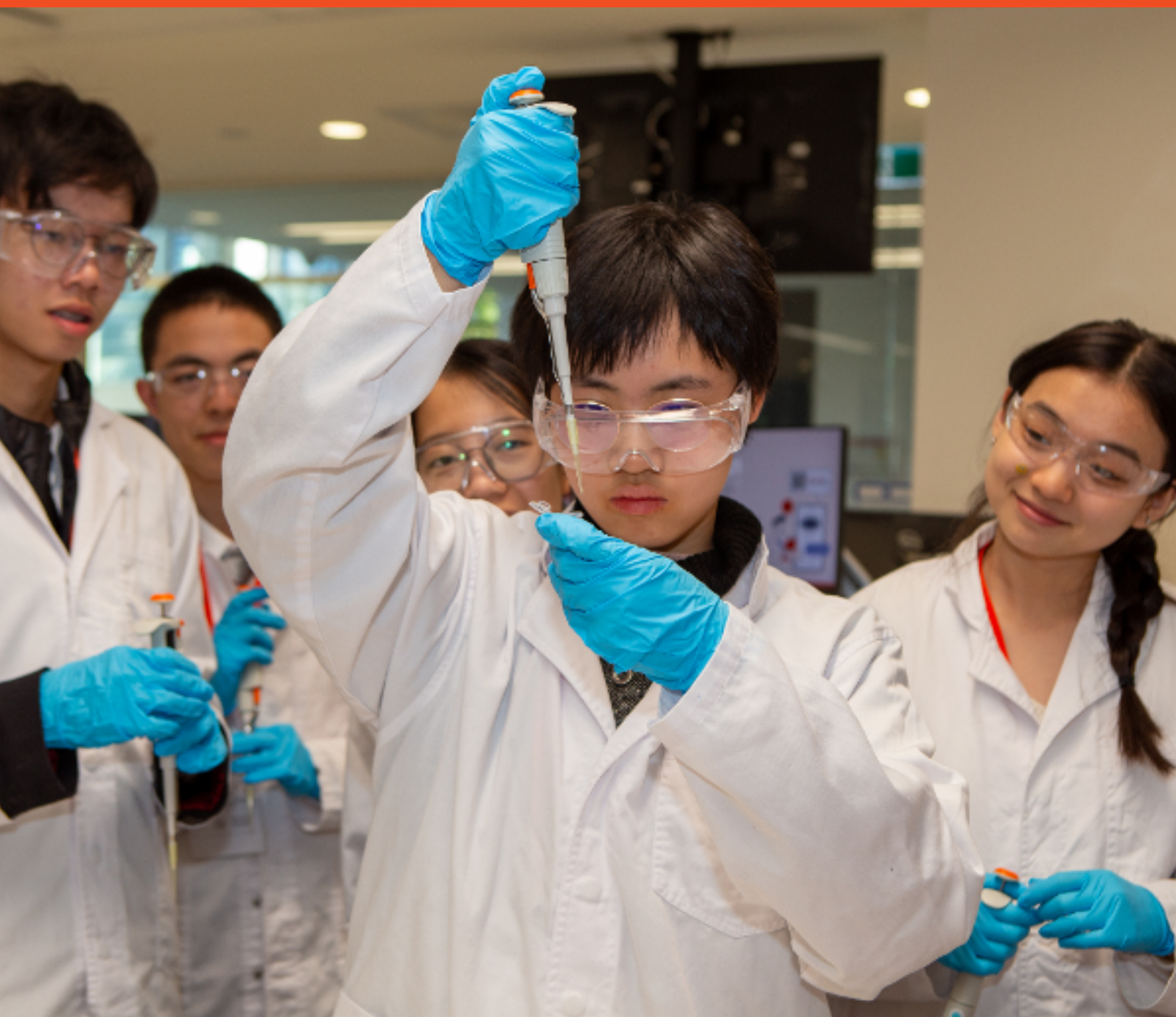


The University of Sydney Physics Foundation *Annual Report 2025*



The pursuit of excellence is at the heart of our mission

We recognise and pay respect to the Elders and communities – past, present, and emerging – of the lands that the University of Sydney's campuses stand on. For thousands of years they have shared and exchanged knowledges across innumerable generations for the benefit of all.

Cover image: Scholars getting hands-on with some experimental techniques at ISS25

The University of Sydney

Physics Foundation

Contents

President's Report	5
Physics Foundation Objectives and Aims	6
The Messel Endowment	7
Physics Foundation Members 2025	8
Head of School Report	9
Staff Supported by the Physics Foundation	10
Messel Fellowship	11
School of Physics Prize Night	12
The Grand Challenges Wraps Up	13
Physics Grand Challenges 2023 Update	
Nanostructured Textiles for A Sustainable Warming World	14
Physics Foundation HDR Scholar Scheme	16
ISS25 Report	22
Dr Karl Kruszelnicki AM Julius Sumner Miller Fellow Report	32
Governance Statement	36
Certificate of Operations	39
Income Statement	40
Balance Sheet	41
Statement of Changes in Equity	42

“A life lived in
pursuit of
excellence is a
life well lived.”

Professor Harry Messel AC CBE

President's Report

James Kirby



After 5 years of service, Michael Winternitz term as President ended in June 2025 and I was honoured to be elected president. Thank you Michael for your inspiring leadership!

Also I would like to thank the outgoing council members - Professor Gregory McRae and Dr Gregory Clark - for their many years of contribution to the Foundation.

In July 2025 90 students attended the 44th ISS, a reduced number due to a large increase in budgeted costs. The duration was also reduced from 10 to 8 days. The main areas of increase were the need to provide professional level pastoral care for the students, and a university directive that all “staffies” be paid. Previously the ISS was run substantially by volunteers. These costs will be ongoing and have lead to the Faculty commissioning a review of the ISS. This will be completed by May 2026 and we look forward to seeing the outcome and working with the University to find a sustainable path for the ISS.

Notwithstanding the reduced numbers, feedback from the students was very positive, and we believe the cuts did not affect the student experience which is central to our mission.

2025 was the first full year of the HDR Scholarship Scheme. 10 PhD students from around the world are now on full scholarships and are bringing their exceptional skills to the School. The students presented an overview of their research to the Council in December and we were enormously impressed with the calibre of the students.

In 2026 the Physics Foundation will be restructured, changing from an “external” to an “internal” foundation. This will bring it into line with the other Foundations within Sydney University and better align within the University’s priorities. We dont expect it will result in any change to the mission or operations of the Foundation.

Physics Foundation

Objectives and Aims

The pursuit of excellence is at the heart of our mission.

For over 50 years, the Foundation's philanthropic work in supporting scientific research, education and outreach has continued, thanks to support from science, business, industry and government.

The University of Sydney Physics Foundation was established in 1954 by Emeritus Professor Harry Messel AC CBE. It was the first Foundation established within the University of Sydney and the first of its kind within the British Commonwealth.

The original purpose of the Foundation was to support the School of Physics as a voluntary philanthropic association of individuals and private organisations dedicated to the pursuit of excellence in science education, research, training and communication. Today, the Foundation still carries out this important role.

Aims of Foundation

- To support the School of Physics
- To generate philanthropy, promote careers and broaden knowledge and understanding of science (in particular physics) in the wider community.

Objectives of Foundation

- To increase the resources of the University (by fundraising or by otherwise securing gifts and grants or by securing the provision of services or other non-financial contributions).
- To assist the Senate and the Vice-Chancellor in the promotion of the field of physics, through the

School of Physics and to cooperate with the School of Physics, the Faculty of Science and the University in promoting the significance of science and developing an understanding of its importance both within Australia and internationally.

Foundation Activities in Support of its Objectives

- Raising funds from fees, donations, bequests and sponsorships.
- Building a strong financial position to ensure the Foundation can continue to meet its objectives in the long term.
- Providing additional funding to support the work of the School of Physics, through its scholarships, the purchase of equipment, and the underwriting of other initiatives.
- Promoting seminars, courses and workshops in the field of physics.
- Inspiring senior secondary school students through the Professor Harry Messel International Science School (ISS) to continue studies in science, and physics in particular, and to take up science careers.
- Any other initiatives and activities as the Foundation determines appropriate.

The Messel Endowment

Objectives and Aims



The Messel Endowment

The Physics Foundation established the Messel Endowment in 1999 to ensure the Professor Harry Messel International Science School (ISS) continues in perpetuity. Currently there are over 200 supporters to the Messel Endowment. The two largest donors to date have each donated over \$1 million. These donors are classed as Extra Galactic Donors and are:

- Australian Government through the then Department of Industry.
- Mr Lee Ming Tee, through Mulpha Australia.

As of the 31st of December 2025, the Endowment holds \$7,037,676 in funds. During 2025, donations and bequests to the Foundation totalled around \$44,530.

The Physics Foundation is appreciative of all our donors to the Messel Endowment. Without this valued support the ISS could not continue its important work of honouring excellence in outstanding Year 11 and 12 science students from Australia, China, India, Japan, New Zealand, Singapore, Thailand, the UK and the USA and encouraging them to pursue careers in science.

The Endowment seeks to accrue further funds through gifts, grants and bequests to ensure the ISS can be run in perpetuity with due allowance for inflation over the years. Donations of \$2 dollars and over are tax- deductible. Pledged gifts (donations spread over a three-to-five- year period) are welcome and are also tax- deductible.

Careers and Achievements

The ISS now has over 5000 alumni with many going on to outstanding career achievements in their chosen fields including science, medicine, engineering and technology.

Please help us in continuing to offer this world- class program to these talented students who come from diverse cultures and backgrounds.

Donations to the Messel Endowment can be made online, or via mail. A donation to the Messel Endowment is an investment in the future of science.

For more information go to the Physics Foundation website at www.sydney.edu.au/science/schools/school-of-physics/physics-foundation.html

The University of Sydney Physics Foundation

Members 2025

Foundation Staff

Professor Tara Murphy, Head,
School of Physics
Sian Edwards, Administrative Officer

Patron

Her Excellency the Hon. Margaret
Beazley AC QC

Past Presidents

(initial year of presidency shown)
Dr Richard GC Parry-Okeden (1954)
Sir James N Kirby CBE (1957)
Sir Frank Packer KBE (1960)
Sir Noel Foley CBE (1963)
Sir Walter Leonard DFC (1966)
Sir Robert Norman (1969)
Mr James A Macpherson (1972)
Sir Walter Leonard DFC (1973)
Mr J Keith Campbell CBE (1975)
Mr Herman D Huyer AO OON (1978)
Mr Raymond J Kirby AO (1982)
Mr John R Slade (1986)
Mr Peter Douglas (1989)
Dr Peter Jones AM FTSE (1993)
Mr Paul Slade (1996)
Mr Graham Hall (1999)
Mr Pat Donovan AM RFD ED (2002)
Mrs Louise Davis AM (2005)
Mr Trevor Danos AM FTSE (2008)
Mr Jim O'Connor (2011)
Mr Albert Wong AM (2013)
Emeritus Professor Anne Green AC
FTSE, FRSN, FAIP, FASA (2017)
Mr Michael Winternitz (2021)

Past Directors

(initial year of directorship shown)
Emeritus Professor Harry Messel AC
CBE (1954)
Emeritus Professor Max Brennan
AO FAA (1987)
Professor Lawrence Cram AM (1991)
Emeritus Professor Richard Collins
FTSE (1997)
Professor Bernard Pailthorpe (2002)
Associate Professor Robert Hewitt
(2003)
Emeritus Professor Anne Green AC
FTSE, FRSN, FAIP, FASA (2006)
Professor Clive Baldock (2010)
Professor Tim Bedding FAA (2012)
Professor Celine Boehm (2018)
Professor Tara Murphy (2023)

Foundation Council 2025

Office Bearers of the Foundation

Mr James R Kirby, President
Mr Paul Chadwick, Deputy President

University Officer

Professor Marcel Dinger PhD,
GAICD, FFSc (RCPA) (Research), FRSN

Council Members

Mr Paul Chadwick
Emeritus Professor Lawrence Cram
AM
Professor Gemma Figtree AM FRACP
FCSANZ FAHA
Mr James R Kirby
Mr James Read

University Ex Officio

Council Members

Ms Alexia Nicholson

Foundation Members

Founder

Emeritus Professor Harry Messel AC
CBE

Life Governors

Dr Gregory Clark AC FTSE FAA FAPS
Mrs Louise Davis AM
Emeritus Professor Anne Green AC
FTSE FRSN FAIP FASA
Associate Professor Robert Hewitt
Professor Greg McRae
Dr David Mills AM
Mr Jim O'Connor
Mr Martin Rogers
Mr Paul Slade
Mr Albert Wong AM
Prof. The Hon. Dame Marie Bashir
AD CVO

Mr Trevor Danos AM FTSE

Honorary Governors

Mr Tony Aveling
Emeritus Professor Max Brennan
AO FAA
Emeritus Professor Richard Collins
FTSE
Emeritus Professor Lawrence Cram
AM
Mr Raymond Kirby AO

Corporate Members

The James N. Kirby Foundation
The Nell and Hermon Slade Trust

Head of School's Report

Professor Tara Murphy

I am very pleased to be writing this report after a successful 2025 for the School of Physics. Of course the highlight of the year was the International Science School, which ran for two weeks in July, attracting 90 students from around Australia and around the world. Despite some changes to the program, the students enjoyed an outstanding experience, under the leadership of Chris Stewart and the Faculty of Science outreach team. Here are some fun facts about our 2025 program:

- 11 days of lectures, workshops, competitions, excursions, and social activities;
- 90 high school students from around Australia and the world;
- Estimated total round trip in KMs that students made to participate in the program: 900,000km;
- Estimated total number of meals: 4000;
- Estimated number of staff that have made this event happen: 50;
- Number of workshops, lectures, and seminars: 65;
- Estimated number of bus trips whilst travelling around Sydney: 60.

Overall, the feedback from students was extremely positive, a testament to the hard work and dedication from everyone involved.

As you know, in 2024 we launched our Physics Foundation Scholarship scheme as a new flagship program of the Foundation. The scheme is designed to attract outstanding students from Australia and across the globe to pursue a PhD at the University of Sydney. By offering a full stipend, the scheme enables recipients to fully dedicate themselves to their research and ensures that talented students can undertake advanced

study regardless of their personal or financial circumstances.

As I write this in 2026, the program has now welcomed 14 PhD scholars. This reflects a broad international mix, with students coming from Bolivia, Canada, China, India, Italy and Mexico. Together, they enrich the School's research community while benefiting from world-class scientific training in areas ranging from photonic lanterns to imaging exoplanets. As their careers progress, these emerging leaders are expected to make significant contributions to both science and society, while also enhancing the School's and the Foundation's global connections and reputation. Further details about some of these scholars can be found in this year's annual report.

There are some changes ahead for the Physics Foundation, as it transitions from an external to an internal foundation under a revised governance framework within the University. We recognise that this represents a significant shift, and that members may have questions about what it means for the Foundation's future.

I would like to reassure you that our core purpose remains unchanged. We will continue to support scientific research, education and outreach, and to uphold the values and legacy that have defined the Foundation over many years. The programs and community that you have helped build remain central to our work.

I look forward to working with the Foundation in this new structure in 2026 and beyond, and to ensuring that it continues to thrive while adapting to this updated governance model.

Staff Supported by the Physics Foundation

Academic Profiles

The Physics Foundation promotes excellence in research and teaching by supporting a number of outstanding academic staff members.



Professor Bruce Yabsley

Bruce is an experimental particle physicist. His current research is focused on searches for rare particle decays at the Belle II experiment in Japan.



Dr Theresa Fruth

Theresa is an experimentalist in Astroparticle Physics and an expert in Dark Matter direct detection. In 2025 she established the Dark Matter R&D laboratory in the School of Physics in collaboration with Dr Laura Manenti.



Professor Maryanne Large

Maryanne is an experimental scientist with expertise in optics and materials science. She is best known for her work on speciality optical fibres, and is currently developing a novel fibre sensor for methane, a potent greenhouse gas.

Messel Fellowship

Academic Profiles

The Professor Harry Messel Fellowship offers a high-profile position in the School of Physics to top female researchers. The Messel Fellow undertakes independent research that strengthens and/or complements existing programs in the School.



Dr Stefania Barsanti

Dr. Stefania Barsanti is an astrophysicist specialising in galaxy evolution. She has published extensively on the impact of the local and large-scale cosmic environments on galaxy properties, using optical photometric, spectroscopic and spatially-resolved spectroscopic data. Her most significant discovery is the detection of preferential directions for the spin of galaxies in cosmic filaments according to the stellar mass in their central regions, revealing different galaxy formation pathways. She is the principal investigator of the 4HS Spin Survey on the cutting-edge 4MOST spectroscopic instrument at Paranal Observatory, and a Founder and Executive of the Hector Galaxy Survey on the Anglo-Australian Telescope.

Since November 2024, she is a Messel Research Fellow at The University of Sydney, working at the Sydney

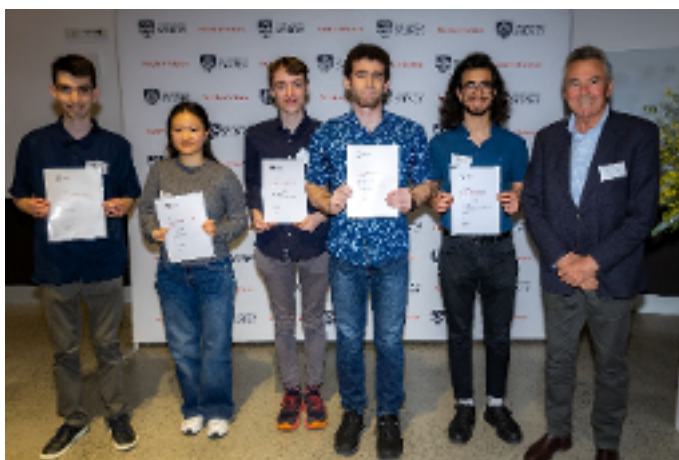
Institute for Astronomy. Previously, she was an ASTRO 3D Postdoctoral Fellow at the Australian National University. She received her PhD from Macquarie University in June 2021. Before Australia, she studied physics, astronomy and cosmology in Italy.

2025 Highlights

During 2025, Dr. Stefania Barsanti won the Georgina Sweet Early Career Researcher Physics/STEM Parents Award, the Research Collaboration Award from the University of Western Australia with Dr. Trystan Lambert and the Faculty of Science Visiting Fellowship with Dr. Benedetta Vulcani. She was selected as one of the five members of the Astronomy Australia Limited Space Science Committee, which promotes space collaborations between academia, industry and government.

School of Physics

Prize Night



The School of Physics prize night celebrates outstanding students within the School of Physics. The Physics Foundation supports a number of awards to promote excellence in education.

The School of Physics Prize night was held on Thursday 25th September 2025. Deputy President, Mr Paul Chadwick, attended the ceremony on behalf of the Foundation to present the Foundation Awards.

The occasion address was given by Dr Claire Edmunds. Claire is a Senior Scientist in Quantum Computing Research at Q-CTRL, working to enhance the performance of today's quantum computers. Claire is also passionate about science outreach and communication, particularly aimed at young women and girls.

Physics Foundation Awards

Physics Foundation Prize for Junior Physics

Awarded to the top students in Junior Physics who have enrolled in Intermediate Physics.

- Andrew Booth
- Ozan Kocatepe
- Loxon Angus Lauer
- Elizabeth Yiyong Lim
- Christopher Serena

Physics Foundation Prize for Intermediate Physics

Awarded to the top students in Intermediate Physics who have enrolled in Senior Physics.

- Jasmyn Curry
- Joshua Ferguson
- Shaurya Rajiv Kumar Garg
- Olivia Rose Silcock
- Mary Rose Williams

Physics Foundation Prize for Senior Physics

Awarded to the top students in Senior Physics who have enrolled in Physics Honours.

- Shuiquan Bai
- Michelle Kazarinov
- Milo Langker
- James Robert Locke
- Mitchell Joseph Spanner

Physics Foundation Prize for Excellence in Junior Group work

Awarded to two groups of students, one from Mainstream and one from Advanced Junior Physics based on overall performance in group work.

Mainstream

- Poramat Apichaicharoenkul
- Farhan Agus Ferdiansyah
- Cheng-Yan Li
- Parvez Manahan
- Hsu (Jasper) Yen
- Revael Pramudya Yudisthira

Advanced

- Milo Abrahams
- Michael Ashworth

Physics Grand Challenges

Funding Research

The Physics Foundation Grand Challenges fund ground-breaking research projects, driving excellence in Physics and more broadly in interdisciplinary science research and teaching.

The Physics Grand Challenges program was established in 2019, by then Head of School, Professor Celine Boehm, to fund ground-breaking research within the School of Physics.

Funded by the Physics Foundation, the Physics Grand Challenges is a 5-year initiative, with the aim of supporting unconventional, innovative and interdisciplinary projects that would typically struggle to attract conventional funding.

Winning teams received up to \$250,000 toward their project to be used over a two year period.

2025 marked the fifth and final year of the program. The Physics Foundation has funded over three million dollars worth of Physics Grand Challenges research projects since its inception. The winning projects have spanned across a broad range of fields including space, medicine and the environment.



Physics Grand Challenges 2023

Nanostructured Textiles for A Sustainable Warming World

Aim and Background

Limiting climate change and adapting to warmer conditions are undeniably this century's greatest challenge. The world needs to reduce its energy consumption, yet air-conditioning already accounts for 10% of global energy, and is the fastest growing use of energy in buildings. With increasing parts of the world becoming inhospitably hot, and some parts predicted to even become uninhabitable soon, effective cooling is shifting from a comfort to a vital necessity. The conflicting need for increased cooling while lowering energy consumption requires an entirely new approach.

The project aims to develop new types of textiles that can keep people cool in hot environments, without using any energy or electricity. These textiles are based on a technique called passive cooling, which means they can reflect the sun's heat and radiate the body's heat into the cold of space. This way, the textiles can lower the temperature of the wearer by several degrees, even in full sun. Emphasis will be on using materials suitable for everyday wear already use in the textile industry, changing their properties through nanostructuring.

Progress and Achievements

The project started in 2024 but accelerated considerably in 2025 with several more students (see student engagement) and the hire of new postdoctoral research assistant Dr Ben Nel who start in November 2025.

There are three aspects to our current work: natural fibre based passive cooling, synthetic fibre nanostructuring for deterministic passive cooling geometries, and theory and modelling for optimally cooling structures.

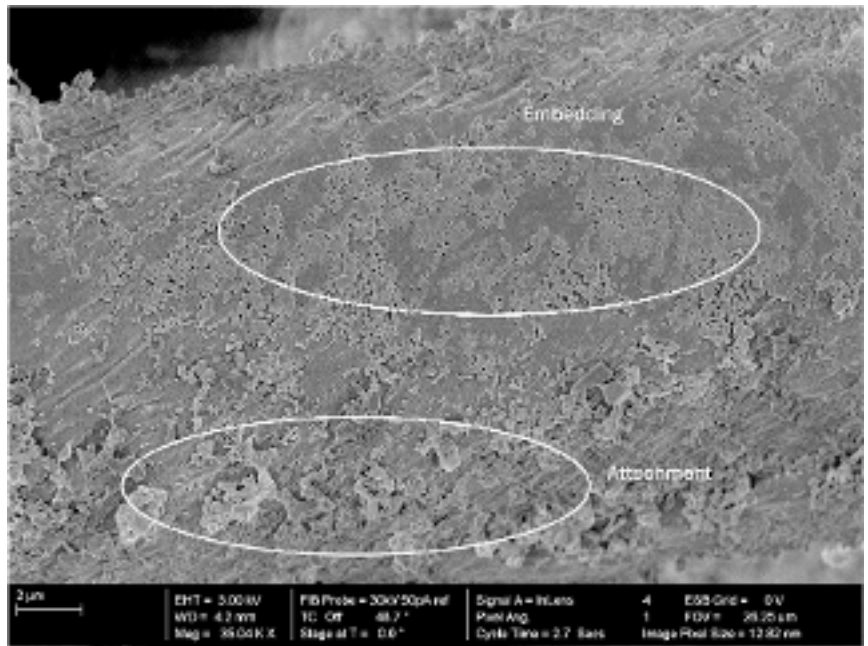
Natural fibres: During the previous reporting period, we successfully achieved the attachment of ZnO nanoparticles onto cotton fabrics. Building upon this initial result, we further optimized the processing protocol to enable effective embedding of the nanoparticles within the fibre matrix rather than merely surface deposition. Scanning electron microscopy (SEM) images confirm the successful incorporation of ZnO nanoparticles into the fibre structure.

This advancement significantly improves the practical viability of the approach. The embedded nanoparticles exhibit strong interfacial adhesion with the

cellulose fibres, preventing particle detachment under mechanical agitation such as machine washing. Durability tests demonstrate that the treated fabrics can withstand standard laundering cycles without noticeable loss of nanoparticle loading or structural integrity. In addition to the nanoparticle work, we have obtained extremely promising preliminary results on modifying cotton itself, currently under review.

Synthetic fibres: Synthetic fibres offer the advantage of top down rather than bottom-up fabrication, with techniques such as extrusion and drawing allowing for deterministic design of scattering structures. Of particular interest would be to incorporate scattering holes in viscoelastic materials such as polyurethane, a material already widely used in clothing. However, thermal drawing of viscoelastic materials into fibres with controlled micro-/nanostructure is highly challenging. We conducted characterisation experiments on five thermoplastic polyurethane samples using analytical techniques (two standard, one novel). The results provided key data for conventional drawing and revealed the unexpected possibility of drawing at much lower

Figure 1: Cotton fibre showing the difference between attached and embedded ZnO nanoparticles on a cotton fibre.



temperatures than typically assumed. Although currently slower, this enables significantly improved structural control. The work led to a conference presentation [1], and we are now focused on increasing speed and scaling to more complex structures.

Modelling and optimal structures:

We developed a fast topological optimizer for longitudinally invariant fibres such as those made by drawing or extrusion method. The method uses gradient aware multipole methods, and allowed us to show that random scattering media are sub-optimal for achieving broad band reflectivity across the solar spectrum. Work is ongoing to characterize optimal scatterer distributions. The work has led to two conference presentations [2, 3], and will be expanded to a full journal publication this year. Finally, in the three months since his arrival, our new postdoctoral researcher Ben Nel has developed a very promising and powerful theory of bounds on the

amount of broadband backscattering that is currently being tested. The bounds will provide guidance on how much room for improvement there is for our optimized structures.

Student and Community Engagement

The highlight of the year was the first Sydney Radiative Cooling workshop which we organized partly funded by the GrandChallenge, with world leader Prof Shanhui Fan from Stanford University as keynote speaker. The two-day workshop attracted over 40 researchers from across Australia and overseas, and was a rare opportunity for experts from different communities (physics, engineering, materials science, urban development, sustainability,

industry) to exchange on the topic. Our local students particularly benefitted from the range of perspectives and access to world leaders. The workshop had clear international appeal: An extended summary of the workshop was published in *Nature Photonics*[4]. Students involved: Ming Gao (PhD, Cotton morphology modification), Wei Xie (PhD, Cotton morphology modification), Yinxiang Xiong (PhD, Cotton morphology modification), Xiyuan Wang (Eng., Honours, Cotton morphology modification), Preethi Shamugam (Eng. Honours, Cotton morphology modification), Liheng Rong (Undergraduate), Daniel Glass (Physics Honours, fast topological optimization methods). Daniel Glass was awarded a University Medal for his work.

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- [1]S. Fleming, J. Digweed, and A. Stefani, "Analysis of Polyurethane for Drawing Microstructured Optical Fibres," presented at the ANZCOP, Auckland, NZ, 2025, ThA1.
- [2]D. Glass, S. Hawkins, A. Y. Song, and B. T. Kuhlmei, "Gradient aware multipole method for optimizing passive radiative cooling fibres," presented at the The 7th Australasian conference on wave science (KOZwaves), Sydney, 28-30/01/2026, 2026.
- [3]D. Glass, A. Y. Song, S. C. Hawkins, and B. T. Kuhlmei, "Optimising Radiative Cooling Fibers," presented at the Sydney Radiative Cooling, Sydney, 2-3/10/2025, 2025.
- [4]D. Pile, "Photonics based cooling outpaces policy," *Nature Photonics*, vol. 19, no. 12, pp. 1288-1290, 2025/12/01 2025, doi: 10.1038/s41566-025-01813-y.

Physics Foundation

Higher Degree by Research (HDR)

Scholarship Scheme

The Physics Foundation Scholarship is a high impact initiative aimed at attracting top talent from around the world to the School of Physics and pushing the boundaries of research within the School .

Introduction

The Physics Foundation HDR Scholarship Scheme was conceived by the Head of School, Professor Tara Murphy, to attract the best students from Australia and around the world to undertake PhD studies in Physics at the University of Sydney. The scheme aims to promote excellence in HDR education for 45 high-achieving students, elevate the profile of both students and the School, strengthen research productivity in key areas, and develop a cohort of graduates committed to advancing science and society.

Funded by The University of Sydney Physics Foundation, the scheme provides a full stipend as well as additional research funding for conferences and other career-building activities. The generous scholarship relieves financial pressure and improves student experience, allowing improved focus on research and career development regardless of financial circumstances.

Scholarship recipients are chosen for their exceptional academic abilities and potential, as future leaders who are motivated to make positive contributions in science and the broader community. The Scheme also offers additional training designed to support students in

achieving their career goals. The Scheme seeks to connect students with each other, forming a strong cohort where students support each other throughout their studies.

The first cohort consisted of four scholarships which were awarded in 2024. 2025 saw 8 new scholarships (both primary and top-up) awarded, with 84% primary and 16% top-up scholarships. The scheme currently includes students from 7 different countries, while female students comprise 25% of the cohort.

Activities

Cohort meetings: two cohort meetings and a social event BBQ were organised; the BBQ was also attended by student supervisors and members of the School leadership team. An HDR training information session was run by Maryanne Large with the support of Andrew Doherty. As part of broader HDR training initiatives, a survey was developed and distributed to identify training needs and priorities. Completed in early 2026, the survey has provided clearer insight into the cohort's skills development requirements and helped identify training and support areas that will better prepare students for future career pathways.

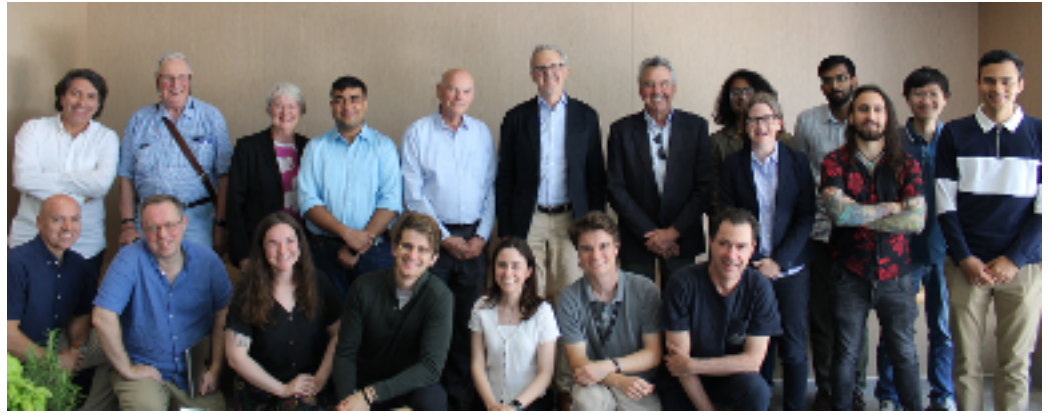


Image: Physics Foundation Scholarship recipients with Physics Foundation Council Members and Supervisors.

A flagship end of year Symposium was held with the participation of the Physics Foundation Council leadership, the scholarship student cohort, their respective supervisors and members of the School leadership team and professional staff. Seven students delivered three minute presentations outlining the focus of their research. In preparation for the symposium, a workshop led by Andrew Doherty and Maryanne Large, along with individual coaching sessions supported by the Scholarship Officer, were provided to offer feedback and strengthen students' presentation skills.

The symposium provided an opportunity for Council members to meet the scholarship cohort and understand in greater detail the research focus of each student. It also allowed students to develop and consolidate thinking around their research, and gain experience presenting in front of an audience. A lunch was held after the symposium providing the opportunity for the Council members to meet, mingle and discuss further with students and university staff.



Image: The Physics Foundation Scholarship recipients visit the Sydney Observatory.

Physics Foundation Scholarship

Personal Histories



Alexia Landry

My Name is Alexia Landry, and my country of origin is Canada. I'm 24 years old and speak French and English. I became interested in Physics in middle school, when my science teacher showed the class videos from Colonel Chris Hadfield, a beloved Canadian astronaut who made educational videos while aboard the International Space Station.

During my undergraduate studies, I didn't really know what my initial research interests were. My degree was in both Physics and Astronomy, and there wasn't a field that really stuck with me. It wasn't until my final year, when I took a course in astronomical instrumentation, that I discovered a field I was truly passionate about.

My PhD is on the development of a new device to be used on next generation massive research telescopes. More specifically, my research focuses on Astronomical Instrumentation and developing the first infrared hexabundle, a type of optical fibrebased integral field unit (IFU) device enabling spatially resolved spectroscopic observations. If successful, they would be used by astronomers around the world for leading galaxy evolution and exoplanet studies.

The Physics Foundation scholarship has allowed me to start my PhD at the University of Sydney and move to Australia, giving me opportunities that wouldn't have been possible otherwise.

Teodor Malendevych

I became interested in Physics in high school, when I was fortunate to participate in an internship in an optics lab at a local university. Optics/photonics have a good mix of the theoretical and experimental aspects that I found intriguing.

My PhD focuses on utilizing photonic lanterns for laser communications in the infrared domain. My supervisor is Prof. Sergio Leon-Saval.

By understanding better how photonic lanterns function, we are contributing to fundamental science as well as pushing cutting-edge photonics with serious applications in telecommunication field. The scholarship has allowed me to pursue my career and personal goals without financial worries. I have been able to focus on contributing to the scientific field as well as personal well-being during the duration of my PhD.





Ananthu K. Anilkumar

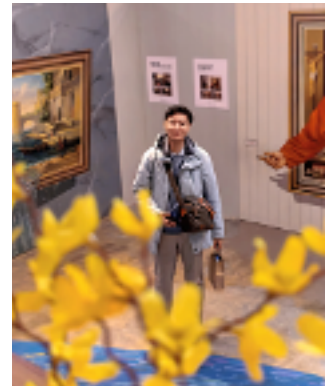
My name is Ananthu K. Anilkumar. I am from India and speak English, Malayalam, Tamil, Hindi, German. I became interested in science at high school and wanted to pursue an undergraduate degree in mathematics or physics...eventually I decided to do a degree in physics.

During my undergraduate degree I worked on various astrophysics and cosmology projects. However, it was during my MSc thesis that I came across the dark matter project on which I am working now. This work is closely aligned with ongoing work undertaken by my supervisor in Sydney, creating a natural pathway to continue my PhD research. My current research looks at understanding the local nature of dark matter, how is it distributed on scales within galaxies, and the prospect of detecting it using local experiments.

At a time when science funding faces increasing pressure, the Physics Foundation scholarship has provided crucial financial stability, enabling me to pursue fundamental research into one of nature's most profound questions concerning the true nature of dark matter. This work also complements various dark matter detection initiatives, as well as advances in computational techniques, which are at the intersection of physics and machine learning, generating the potential to benefit future, large-scale simulation projects across various scientific disciplines. The Foundation supports pioneering work on both our understanding of dark matter and the academic systems that enable future breakthroughs.

Qichen Huang

My name Qichen Huang, my country of origin is China, and I speak Chinese and English. I am 26 years old. I became interested in astronomy at a young age, first joining an astronomy club and participating in competitions in Grade 4. During high school, I served as president of the astronomy club for three years, which naturally led me to choose astronomy as my undergraduate major. Initially, I didn't feel particularly passionate about research, but everything changed when I began working with my undergraduate supervisor—research suddenly became fascinating.



My PhD focuses on radio stars, an emerging field that observes and studies stars in radio wavelengths—comparing to traditional optical bands. This reveals some stellar properties previously hidden from us, like how they generate magnetic fields.

During my PhD, I aim to significantly increase the number of discovered radio stars and combine this with my previous stellar research knowledge to explore correlations between radio emission and fundamental stellar parameters. This will greatly benefit future stellar and exoplanet research.

The Physics Foundation scholarship has provided me the opportunity to access the world's most advanced radio data and work with leading research teams; I've experienced a completely different atmosphere from China—both in culture and research. This has strengthened my confidence in pursuing a longer research career.

Danish Khan

My name is Danish Kahn. I am from India and I speak English, Hindi and Urdu. I am 21 years of age. I became interested in physics at the end of secondary school. I am fascinated by astronomy and stargazing and the idea that we could study and describe physical process that lead to the formation of stars and galaxies was very captivating to me. At university I got the chance to work on electronics to read out particle detectors, which combined my interest in electronics design with my passion for physics.



I was initially interested in cosmology and space science, but I soon discovered that I enjoyed doing more hands-on experimental work rather than simulations. Working on detector design allows me to do day-to-day work which can be applied towards studying space science, through Astro-particle physics.

The research focus of my PhD concerns studying how environmental radiation affects errors in superconducting qubits. Quantum computing has the potential to be a disruptive force in many different industries, with applications ranging from cybersecurity to drug discovery. One of the biggest challenges with superconducting microwave qubits right now is that they are very fragile systems, extremely susceptible to changes in the environment and external radiation. By studying how different kinds of radiation can affect and cause errors in these qubits, we hope to find solutions to improve the robustness of superconducting microwave qubits.

The scholarship has allowed me to pursue my passion for experimental particle physics, surrounded by peers who are doing really exciting research on a host of different topics. It has allowed to move to a different country than my own and experience an entirely new culture and community, while also letting me give back to the same community in the form of the research that I get to do.



Matteo Colombo

My name is Matteo Colombo. I am from Italy and speak Italian and English. I am 26 years old. I started to become interested in Physics, Space and Astronomy when I was a child, while reading some books of Margherita Hack, an Italian astrophysicist. I also enjoyed math, and at the end of high school I tried to figure out which subject would be the pillar of my future career. I decided to enroll in a bachelor's degree in Engineering Physics, a perfect blend of math, physics and practical expertise.

I soon became interested in optics and light-matter interactions, which led me to pursue a master's degree in photonics and nano-optics. At the end of my master's, I realized that I wanted to continue my career in photonics, but I wanted to go back to my childhood awe for stars and planets, which brought me to look for PhD opportunities in astrophotonics...and the rest is history!

I am currently working with Professor Peter Tuthill on photonics technology for the detection and characterization of exoplanets. The Physics Foundation Scholarship scheme has given me the opportunity to do research at the Institution where the field of Astrophotonics was born, and has enabled me work with bright-minded individuals and build connections with world-leading observatories. I also started to do some outreach activities at my home high school back in Italy, which I hope will inspire some students to pursue their careers in instrumentation for astronomy, which is a lesser-known field to the general audience.

“The scholarship has allowed me to pursue my passion for experimental particle physics, surrounded by peers who are doing really exciting research on a host of different topics.”

Danish Khan

International Science School 2025

Quanta to Quasars



The ISS was a life-changing experience for me. I think I found the true meaning of learning science. I can't express how thankful I am in words. — Japanese scholar

From July 7–18 2025 we welcomed 90 scholars from across the globe to the University of Sydney for ISS2025, the 44th Professor Harry Messel International Science School.

Our ISS scholars enjoyed daily lectures by inspiring research scientists, tours of cutting-edge labs and facilities, hands-on experiments and thought-provoking workshops, and a fabulous program of social events.

Quanta to Quasars

We chose the theme Quanta to Quasars in part to celebrate the International Year of Quantum Science and Technology (IYQ), marking 100 years since the landmark discoveries in quantum theory that transformed science and technology for the rest of the century. We worked with the local IYQ committee to invite several leading researchers to speak at ISS2025, including Nobel Laureate Prof. Donna Strickland, who shared the 2018 Nobel Prize for Physics for her work on high-intensity pulsed lasers.

The Quanta to Quasars theme also reflects the diversity of topics we aim to present at each ISS, as we know our scholars come to us with a wide range of interests and passions. As described below, ISS2025 explored the landscape of STEM and, we hope, offered something for everyone.

The ISS2025 Scholars

We invited all countries involved in recent in-person ISS events, though sadly this year India was unable to send a team of scholars — we sincerely hope to encourage them back for ISS2027.

In total we welcomed 90 scholars — 60 female, 37 male, 1 non-binary — from the following regions:

Australia 43 - NSW 20 • QLD 6 • VIC 5 • WA 4 • NT 1 • SA 3 • TAS 2 • ACT 2

China 10 • Japan 10 • NZ 5 • Singapore 5 • Thailand 7 • UK 5 • USA 5



Included in the Australian cohort were our five talented, passionate Indigenous Scholars from Aboriginal and Torres Strait Islander communities across Australia.

The overseas groups were accompanied by adult chaperones who helped to encourage and take care of their scholars, and who worked with the ISS staff team to provide a safe and inclusive environment for all students.

Funding and Support

The ISS is funded primarily through the Physics Foundation's Messel Endowment, and we thank all donors over many, many years.

We are grateful for the vital support of the James N Kirby Foundation through their Large Grant scheme, which assisted the participation of our Australian scholars, and allowed us to design and present another high-quality program.

The University of Sydney provides invaluable support through the provision of significant staff time and resources, which cannot be understated.

We are enormously thankful to the following organisations and individuals for supporting the selection, organisation, and travel of the overseas scholars:

- The Affiliated High School of Peking University, China
- Shanghai High School International Division
- The Ministry of Education, Culture, Sports, Science and Technology, Japan
- The Royal Society of New Zealand
- Mr Burns Fallow
- The Ministry of Education, Singapore
- The Ministry of Education, Thailand
- STEM Learning, UK
- Higher Orbits, USA
- The American Australian Association



Thank you again for
bringing us all together
and enriching us with
knowledge and experience,
it means the world. —

Australian scholar

The ISS2025 Program

The ISS is an intensive fortnight of lectures, talks, tours of the university's research facilities, hands on experiments, and social events.

The 44th Professor Harry Messel International Science School officially began with the Opening Ceremony event, held in the Messel Lecture Theatre under the skilful direction of event MC, Prof. Alice Motion from the School of Chemistry. Dr Mitchell Gibbs from the Dunghutti nation gave a warm and inspiring Acknowledgement of Country, then the Science Faculty's Associate Dean for Education Prof. Mike Wheatland welcomed all participants to the University of Sydney.

Physics Foundation Vice President Mr Paul Chadwick spoke to the scholars about the history of the ISS and the Physics Foundation's long support of the program. He then introduced Her Excellency the Honourable Margaret Beazley AC KC, NSW Governor and Patron of the ISS and Physics Foundation, who contributed a video address to officially launch the program.

Following the Opening Ceremony, the first ISS lecture was delivered by Prof. Kate Mack, the Hawking Chair of

Cosmology and Science Communication at the Perimeter Institute in Waterloo, Canada. Prof. Mack enthralled the crowd with the ongoing search for Dark Matter, one of the most mysterious and important research programs in modern cosmology.

The Lecture Series

The remainder of the lectures were also held in the Messel Lecture Theatre, the spiritual home of the ISS program, save for two talks held in the Eastern Avenue Auditorium.

Seven leading researchers, selected for their research expertise, scientific reputation, and communication prowess, each delivered two lectures on their work and its impact on society. Each 45-minute lecture was followed by Q&A with the scholars and, as ever, the standard of insightful questions was very high.

The lecture series comprised:

- Prof. Katie Mack (Perimeter Institute, Waterloo, Canada) — Dark Matter at the Heart of Physics, and How the Universe Ends
- A.Prof. Kate Michie (UNSW) — Protein Folding and AlphaFold

- Prof. Sven Teske (UTS) — Renewable Energy, and The One Earth Climate Model
- Prof. Iver Cairns (USyd) — CubeSats and Space Weather
- Dr Sabin Zahirovic (USyd) — The Deep Carbon Cycle, and The Earth through Deep Time
- A.Prof. Jacqui Romero (University of Queensland) — The New Quantum Revolution
- Prof. Donna Strickland (U. Waterloo, 2018 Physics Nobel Laureate) — Molecular Movies with Pulsed Lasers
- and the irrepressible Dr Karl Kruszelnicki with his Great Moments in Science

STEM activities

In parallel with the lecture series, a range of tours, hands-on activities and workshops were organised to give the scholars exposure to the diversity of science and engineering at the University of Sydney. Students participated in a wide range of hands-on activities and experiments staged by the schools of Vet Science, Biological Sciences, Chemistry, Physics, and Mathematics. These workshops were designed to build skills and show aspects of these disciplines beyond the normal classroom experience, as well as show off the range of educational and research facilities across campus.



Image: Scholars getting hands-on with some experimental techniques



Image: Getting up and close with Aussie fauna at Taronga Zoo

Special Events

The ISS2025 Speed Meet & Greet — An opportunity for the scholars to chat with research students and staff from across the faculties of science and engineering at a ‘trade-display’-style event. A wide range of researchers each set up a table with a talking point activity or object, with displays ranging from venom research to soil ecology, from vocal-tract MRIs to distant supernovae.

Science & Engineering Challenge — A popular mainstay of the program, scholars participated in a special ISS edition of the Science & Engineering Challenge produced by the University of Newcastle, where teams compete in a series of activities designed to encourage and reward problem-solving and teamwork, from bridge building to electricity grid design to code breaking.

Field Trip to SIMS and Taronga Zoo — A full day exploring the best of Sydney Harbour! We spent a morning at SIMS, the Sydney Institute for Marine Science at Chowder Bay, looking around their research facilities and learning about the work they do on sea life and the health of the marine environment. Then we enjoyed a behind-the-scenes tour of wildlife research at Taronga Zoo, including close encounters with a variety of Aussie fauna. Finally, the scholars enjoyed a Great Moments in Science lecture by the incomparable Dr Karl Kruszelnicki, who then joined the scholars for a BBQ dinner at the Zoo.



I will always be grateful for the memories and friends this program enabled me to make, and all the ways it expanded my horizons in science. Thank you all from the bottom of my heart. —
Japanese scholar

Gala Reception

The ISS Gala reception, held on Wednesday 16 July in the University's Great Hall, was an opportunity for alumni, donors, friends and staff of the University of Sydney to meet the ISS scholars firsthand. MC for the evening was once again Prof. Alice Motion, who kept the more than 400 guests entertained throughout and ensured the event ran smoothly.

Joining the ISS2025 scholars and staff at the event were many university staff and faculty, numerous alumni from across the many years of the ISS (including the most recent ISS in 2023, and the online events in 2021 and 2022), supporters and donors to the Foundation and the ISS, and Consuls General or their representatives from the Sydney consulates of China and Thailand.

Uncle Craig Madden, representative from the Metropolitan Local Aboriginal Land Council, gave a welcome to country, and Mr Michael Winternitz, previous President of the Physics Foundation, welcomed all to the event, speaking about the ISS program's

history and the Physics Foundation's support for excellence in STEM education and research.

Dr Laura Driessen, ISS alumnus from 2009 and now Postdoctoral Research Fellow at the Sydney Institute for Astrophysics, then spoke about her time at the ISS and how it inspired her journey in science.

Laura then joined Physics Foundation Vice President Mr Paul Chadwick, past President and Life Member of the Physics Foundation Mr Albert Wong, and Dean of the Faculty of Science Prof. Marcel Dinger, to present three important scholar awards: the Len Bassler Award for Leadership in Science, the Mulpha ISS Award for Leadership, and the Albert Wong Award for Excellence. The ISS staff select the winners of these special awards, based on close observation of the scholars over the two weeks.

The Len Bassler Award is presented to the scholar who demonstrates leadership in science through a combination of originality of thought and a willingness to assist other scholars. Singaporean scholar Erica Seah was this year's Len Bassler awardee.

Image: Dr Laura Driessen, ISS2009 alumnus and postdoctoral researcher in the School of Physics, speaks about the impact of the ISS on her early career



Images: Hwee-Lin Yee addresses the Gala on behalf of the ISS2025 scholars and Mohammad Safowan Shahed receives the Albert Wong Award for Excellence

The Mulpha ISS Award for Leadership recognises international kinship and cooperation, and is awarded to a student who displays diplomacy, friendship, encouragement and understanding of fellow students from all cultures. This year the recipient was Tasmanian scholar Hwee Lin Yee.

The Albert Wong Award for Excellence was initiated in 2019, in recognition of Mr Wong's generous financial support and many years of service to the ISS and the Foundation. The recipient of the award embodies the spirit of excellence central to the philosophy of International Science School and the Physics Foundation. The 2025 recipient was NSW scholar Mohammad Safowan Shahed.

The ISS2025 scholars were then invited onto stage in their country and state groups to receive medallions commemorating their participation in the program. The Chinese and Thai scholars were presented with their medals by the consuls general of their respective embassies, and the remaining scholars received theirs from Prof. Dinger.

On behalf of the scholars, Mulpha Award recipient Hwee Lin Yee addressed the audience, speaking about her experiences of the ISS fortnight and the impact of attending the program. The formal event was closed with an address by the Dean of the Faculty of Science, Prof. Marcel Dinger, who then invited guests and scholars to mingle and enjoy refreshments in the beautiful atmosphere of the Great Hall.



Images: Erica Seah receives the Len Bassar Award for Scientific Leadership and a selfie moment with Dr Karl

Thank you for organising this incredible event — for me, it was life-changing. I'm not exaggerating, by the way! ISS was one of the best experiences of my life. — Chinese scholar



Social Events

The program of social events forms a key facet of the ISS fortnight, providing opportunities for scholars to form and cement friendships, and to explore the city and let off steam after a busy day at the university campus. The socials program was run by the ISS Social Squad, a troupe of university student volunteers under the leadership of our tireless and unstoppable staffies and the core ISS staff team.

The program included a trivia relay event, bush dance, weekend city tours, movie nights, and many more external and in-house events. The ISSSS team's commitment to delivering these engaging activities was invaluable to the success of the program.

The scholars themselves helped to organise the infamous ISS Talent Night in the second week, with acts ranging from traditional dances and songs from the international students, to individuals and groups of scholars showing off their musical, comedy and magic skills.

The ISS Book & Lecture Videos

We produce a book to accompany every International Science School, featuring interviews with each of the invited lecturers discussing their work, influences and experiences, and thoughts on the future of their disciplines. The ISS book is a cross-section of scientific research at that point in time; it is both an introduction to a wide variety of scientific disciplines and a unique historical document.

All participants received a copy of the book on arrival. Copies were presented to each lecturer at the conclusion of their talk, and were also given to friends and supporters of the program. The book is available to download in PDF and e-book formats from the ISS website:

sydney.edu.au/science/iss

We also record the lectures themselves, and the entire ISS2025 lecture series, along with past talks going back to 2005, is available at:

youtube.com/TheSydneyISS



Behind The Scenes

The Incredible ISS Staff Team

The success of the ISS relies on a vital group of dedicated, capable, and endlessly enthusiastic volunteer staff — the “staffies” — drawn from past ISS cohorts. In 2025 we welcomed back staffies who were scholars from 2023 all the way back to 2017.

The staffie team gathered from across Australia prior to the start of ISS2025, bonded throughout training, and handled the tsunami of challenges every ISS brings with humour and determination.

Joining the staffies this year, for the first time, was a team of overnight staff from Not On My Watch to provide in-house pastoral care and overnight supervision at the accommodation at Kincoppal Rose Bay School. NOMW has worked with the University of Sydney on many residential programs in recent years, and provided this critical service with care, humour and professionalism, giving the staffie and core ISS team some much-needed downtime after hours.

It is impossible to overstate the devotion of these two staff teams to the ISS program — they gave their all to the fortnight of around-the-clock on-call duties (plus weeks of planning and training) to ensure the scholars could enjoy the best possible experience.

The University Faculty of Science Team

The other tireless and dynamic group driving the success of the ISS was the Faculty of Science Marketing and Communications team, with their creative and inspiring Science Communicators embedded in Schools and Departments across the university campus. From planning and logistics, to contracts and budgets, to managing major events like the Gala Reception and Opening Ceremony, to delivering the incredible array of experiments and activities — not to mention an endless stream of daily program requests like printing, copying, room booking, staff contracts, and volunteer wrangling — the Faculty team throw everything they have at ensuring the ISS achieves the highest standards.

Bright stars amongst the Faculty constellation were ISS Deputy Director Gabriel Nguyen, and ISS Program Officer Hung Duong. Gab, an ISS alumnus from 2007, has been a part of every ISS since — first as a staffie, then volunteer, then science communicator and member of the Faculty team. As Deputy, he was uniquely qualified to help steer the ship. Hung came to us out of a PhD in Chemistry education research, hit the ground running just months out from the start of the ISS, and excelled at juggling the ridiculous number of balls the program threw at him.

The whole team — from their fearless leader Kristin Anderson, through the entire wonderful MarComs office — deserve our deepest thanks. These amazing people truly make the ISS a life-changing event for so many scholars.

I just wanted to say a MASSIVE thank you for your manaakitanga (hospitality). I was blown away by the care and thought that went into every detail of the programme. Congratulations on a huge success! — NZ chaperone



Accommodation

Once again, we enjoyed the facilities at two neighbouring boarding schools in Sydney's eastern suburbs. All scholars and the NOMW overnight staff stayed at Kincoppal Rose Bay School, while staffies and overseas chaperones stayed next door at Kambala School.

While we always dream of a return to the university's campus, boarding at Kincoppal and Kambala has proven to be a workable option with many positive aspects. The schools are secure overnight and managed well, the catering is excellent, and the views are second to none!

Meanwhile, we continue our strong relationship with The Women's College, who provide lunch and dinner each day, and assist with venues for some of our major events. We are grateful to have worked with these institutions for so many years, and we hope this continues long into the future.

The Future of the ISS

ISS2025 marked two decades for me as Director of the International Science School, and over that time the program has been remarkably stable. Every ISS event since 2005 has followed a very similar pattern, with a

core set of participating countries and a proven schedule of events and activities — even through the Covid-19 years, we adapted to create an online ISS experience that stayed true to our core ideals.

For several years, however, it has been apparent that the ISS will need to change. In the last decade we have experienced increasing financial pressures, alongside necessary and welcome — if sometimes challenging — shifts in policies around child safety and pastoral care, as well as our responsibilities to our volunteers and staff.

In 2026 we embark on a thorough review of the International Science School program to grapple with these issues. We have 60 years of experience and demonstrated success to draw on, and I am confident that, with the support of and input from the Physics Foundation, the Faculty of Science and University of Sydney, and from our global network of devoted alumni, we will evolve the International Science School into a vibrant, exciting and resilient program for years to come.

Dr Chris Stewart

Director, The International Science School

“I can honestly say it went way beyond all my expectations. The ISS was truly a highlight of my year, and I'm so grateful for the opportunity to have been part of it”

Chinese Scholar

Dr Karl Kruszelnicki AM

Julius Sumner Miller Fellow Report

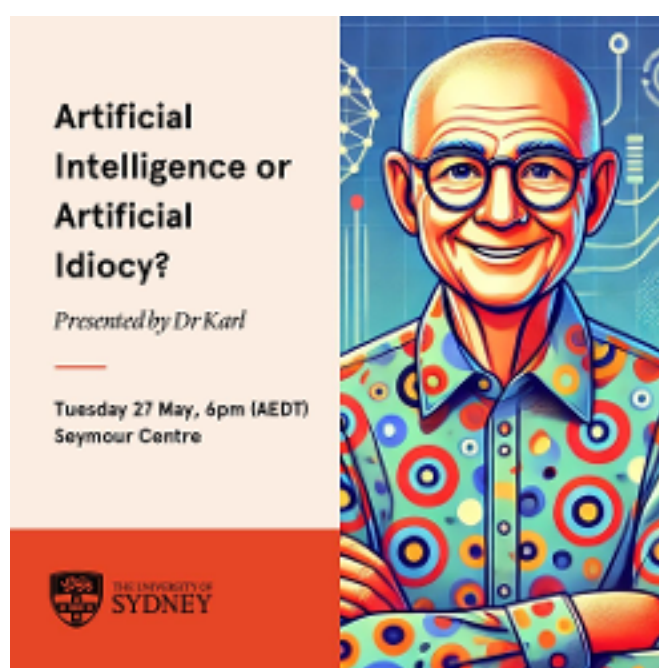
The Foundation for Physics established the Julius Sumner Miller Fellowship within the School of Physics in 1995, and appointed Dr Karl Kruszelnicki to the role. Since taking up the fellowship, Karl has motivated, educated and inspired innumerable students and engaged the public in science through a multitude of platforms. Dr Karl in his capacity as Julius Sumner Miller Fellow is currently supported by the Faculty of Science, working with the Partner Engagement and Outreach team.

University of Sydney Events

Karl presented a one-hour talk for the Leadership in STEMM subject for the University's high-achievers Dalyell stream; a thought-provoking 'Great Moments in Science' show for the Sydney Science Forum at the Seymour Centre; a Q&A for the University Community Festival, a presentation for Open Day and a Science Communication Workshop for a third year interdisciplinary Physics course with Chemistry and Physiology. He was also invited as an academic table speaker for the Philanthropic Campaign launch.

Karl represented the University of Sydney as a featured speaker in the Curious Festival of Ideas at the Sydney Opera House.

Karl has promoted and presented the Australian Museum and University of Sydney's Sleek Geeks Science



Eureka Prize for primary and high school students for twenty successful years. This year was the final year for the Prize. The finalists in all categories enjoyed a lunch and a Q&A with Karl before enjoying the winner presentations at the Australian Museum.

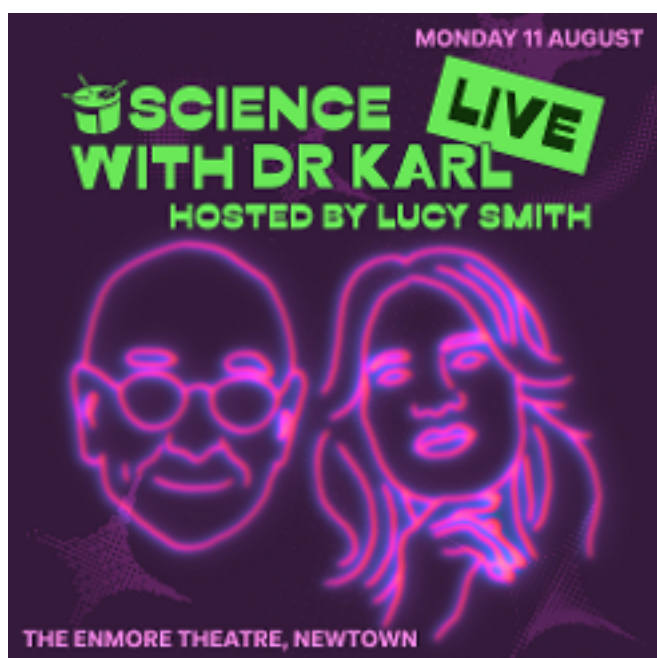
Karl gave a talk for the International Science School students during their visit to Taronga Zoo, and at the Sydney STEM Teachers Festival at the University. Karl supported the University's Easter Show 'Grow with Us' prize with personally signed books and online Q&As for the winning schools. He was also featured in the 'Ask Me Science' social media campaign about careers.

National Science Week

The University of Newcastle invited Karl to launch Science Week with a public lecture before he headed off to headline Beaker Street Festival in Tasmania. He presented shows for schools and the public in Devonport and Hobart and was a featured contestant in the Hobart City Hall Game Show.

Karl delivered part two of a three-part series of themed online Q&As for the NSW Department of Education's STEM Enrichment Program. The Science Week Q&A explored this year's theme: 'Decoding the Universe – exploring the unknown with nature's hidden language'. Each session attracted over 14,000 students across Australia. The series also celebrated International Day of Biological Diversity and Quantum Science and Technology.

Dr Karl and ABC triple j host Lucy Smith took their radio show to the stage (commemorating 50 years of triple j!) for a sold-out show at the Enmore Theatre in Sydney. The social reel showcasing Karl's incredible scientific knowledge and dexterity went global and received 1.4 million likes and reached close to 18 million views!



Schools

The ever-popular online Science Q&A sessions continued twice weekly. By mid-year the sessions are booked out. Karl spoke to over 4,000 students from 56 schools across Australia. These included: primary school students from the Young Environmental Leaders program in South Australia; distance education schools; homeschooled students, remote and regional schools, and two schools in the UK.

Karl was interviewed by a Year 6 budding journalist for her school newspaper and another primary student about the science behind the Bermuda Triangle disappearances. Surprisingly, each year, he gets about a dozen requests from US School students specifically related to the Bermuda Triangle.

Karl visited schools throughout the year and presented his 'Future Careers in Science' talk to Smith's Hill High in Wollongong, Newington School in Sydney, East Hills Girls High in Panania and all the high schools in Devonport in Tasmania. He also gave a talk to Mensa global citizens under sixteen.

Karl gave a Climate Science talk for high school students at the 'Speaking for the Planet' event for World Environment Day. Twelve local schools attended in collaboration with three local councils and the event was supported by local, state and federal MPs.

Television

Following the hugely successful 'Dr Karl's How Things Work' on ABC TV, Karl filmed a second 6-part series airing in 2026. The series looks inside factories across Australia to reveal how our most efficient manufacturing plants operate.

Karl was a sitter for the semi-final of the Australian debut 'Portrait Artist of the Year' on ABC TV.

Radio



Karl's weekly five hours of national ABC science radio segments continued, with the addition of ABC Adelaide. Triple j radio marked their 50th anniversary and Dr Karl featured in their celebrations sharing stories of his 40 plus years on the station and what drives him to communicate science to the youth-focused audience. Other radio appearances include CHAI FM in South Africa, plus Triple M, 2GB, 3AW, 4BC, 6PR and Curtin Radio.

Social Media

Karl was invited to join the TikTok STEM feed, a dedicated educational feed on the platform for science, technology, engineering, and mathematics (STEM) content.

Karl's impact on science literacy for the public cannot be understated. Social media followers continue to expand: 540.2K on TikTok, 272 K on Instagram, 223 K on Facebook.

His website, drkarl.com, remains the central hub for everything related to Karl. There is now a dedicated Climate Change menu with thousands of references for 'Dr Karl's Little Book of Climate Change Science' - an

invaluable resource for Climate Change information. Karl's weekly ABC 'Science explainers' videos continue to both entertain and educate audiences across his social channels.

Overseas Activities

Karl undertook his four-week Bellagio Center residency in Italy to develop a strategy using AI to counter climate change disinformation. Karl forged cross-disciplinary and cross-cultural connections with other residents and continues to work on the fruits of this project and connect with his international cohort.

In October Karl presented at The Royal Institution and New Scientist in London. He was also invited to give a Science Communication Workshop for Nature.

Podcasts

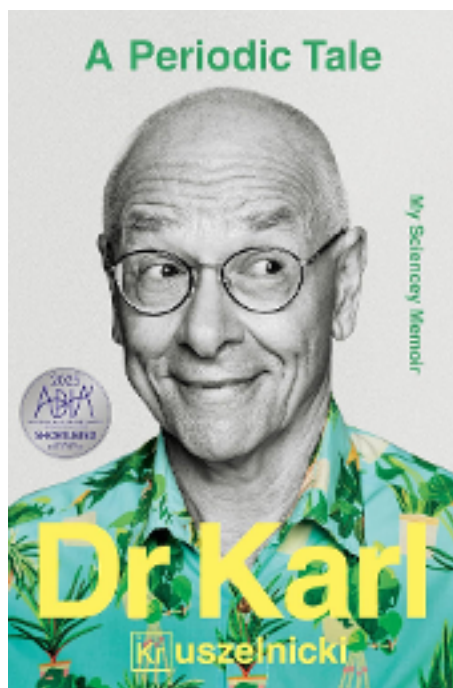
Dr Karl's University of Sydney podcast 'Shirtloads of Science' (average download per episode is 20K) transitioned to a vodcast, with highly engaging visuals and socials highlighting the work of the university academics. Guests included Professors Carolyn Hogg, Ollie Jay, Peter Tuthill, Boris Kuhmley, Geraint Lewis, visiting Nobel Prize in Physics winner Professor Donna Strickland and legendary visiting scholar Dame Jocelyn Bell Burnell.

Karl recorded a series for the ABC's 'Science Friction' podcast on the Challenger space shuttle disaster 'The Challenger Legacy', released in 2026.

Writing

Dr Karl continued his regular columns in Australian Geographic magazine and University of Sydney's Science Alliance newsletter (4000 members). Karl's

bestselling book 'A Periodic Tale: My Sciencey Memoir' was shortlisted for the ABIA Biography of the Year. He launched the paperback edition with an author talk and book signing.



Festivals, Shows and Talks

Karl gave presentations for the Embassy of Poland, Nine Lessons science variety show, and the Lost Paradise and Woodford Festivals.

He performed with Dr Kirsten Banks in their hilariously engaging 'Experimental Comedy' show in Sydney. Karl was invited to speak on cooperation in scientific matters for the Europe Day reception at NSW Parliament House.

Mentoring and Media/Speaker Training

Karl invited several University of Sydney students interested in science communication to join him for his ABC radio appearances and podcasts. He gave the opportunity to three science communicators to narrate some of his backlist books for audio, including Dr Laura Driessen from University of Sydney.

Karl once again participated in the ABC 'Top 5 Under 35' program, which offers support and media training for

early-career science researchers. The group took part in a day at the ABC featuring skills workshops, a science communication session led by Dr Karl, and joined him for his regular interactive online school Q&A sessions. As a mentor to many, Karl was asked to sit by four artists for their entry in the Archibald Prize.

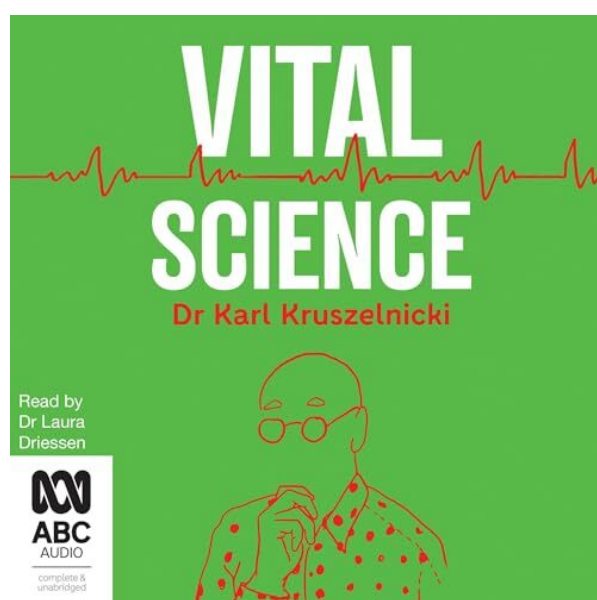
Awards

Karl attended the Australian of the Year Awards and Celebrations in Canberra and Sydney Opera House as the 2025 NSW Senior Australian of the Year in recognition for his services to the community as a science enthusiast and educator.

Farewell

After 30 years of tireless dedication and unbridled enthusiasm for sharing the awe and wonder of science, Dr Karl's Julius Sumner Miller Fellowship at the University of Sydney will come to an end in July 2026. During Karl's time as Fellow, countless students have sought out his office in the Physics building for some career guidance, some mentoring or a treasured selfie. Unimagined lives have become possible through Karl's generosity, encouragement of further education, his infectious curiosity and joy of learning.

Karl's work will continue, but for the Julius Sumner Miller Fellowship, in Karl's own sign off, let's just say: Peace, Love and Mung Beans.



Physics Foundation

Governance Statement

University Foundations are required to report to Senate. Summarised below is the Governance Statement Section to be reported upon as part of the Annual Report. The Annual Report prepared by a Foundation is to be submitted via the CFO to Finance and Audit Committee of the Senate.

The University of Sydney Physics Foundation recognises the importance and benefit of reviewing its adoption and alignment with governance principles and provides the following report.

Principle 1 -

Lay solid foundations for management and oversight

Nature of the entity

The Physics Foundation is a part of the University of Sydney ABN 15211513464 and not separately incorporated under a state or commonwealth Act.

The Foundation is required to gain prior approval for its fundraising activities from the appropriate University delegate. The Foundation's activities are not-for-profit and covered by the DGR status of the University of Sydney.

The University is exempted from the requirement to hold an Authority to Fundraise and obligations upon holders of such an authority but is still required to comply with the balance of provisions of the Charitable Fundraising Act.

Roles of board/council and management

The Foundation operates under the authority of the Senate of the University of Sydney, as approved in 1954, and has no powers of delegation.

The Foundation conducts its affairs pursuant to the Foundation Rules and the relevant policies of the University.

The Foundation had its annual fundraising plan approved and was able to meet its objectives.

Principle 2 -

Structure of the council to add value

The Council of the Foundation in 2025 consisted of the following members. They were all eligible to attend three meetings in 2025 including the Annual General Meeting.

Executive

- Mr James Kirby, President
Appointment term: 2025 AGM
Meetings attended: 3
- Mr Paul Chadwick, Deputy President
Appointment term: 2025 AGM
Meetings attended: 3
- Professor Marcel Dinger PhD, GAICD, FFS (RCPA) (Research), FRSN, Dean, University Officer
Meetings attended: 3

Members

- Professor Tara Murphy, Head of School
Meetings attended: 3
- Emeritus Professor Lawrence Cram AM
Meetings attended: 3
- Professor Gemma Figtree AM
FRACP FCSANZ FAHA
Meetings attended: 2
- Mr James Read
Meetings attended: 2

Council members were elected at

the Foundation's AGM on the 1st May 2025. There is not a separate nomination committee of Council.

The full Council resolves on nominations for co-opting of members to fill vacancies outside of the process of election at the AGM.

There was no performance evaluation of the Council undertaken in the reporting period.

**Principle 3 -
Promote ethical and responsible
decision making**

Council members have been provided with the University of Sydney Foundation Rules, Code of Conduct, Work Health & Safety policy and the External Interests policy. All these policies are available on the University's Policy Register, as are other relevant University policies regarding harassment, grievance procedures and the Delegations of Authority.

**Principle 4 -
Safeguard integrity in financial
reporting**

The annual accounts of the Foundation are prepared by the

financial staff of the University, signed off by the Finance Director, Divisions of Natural Sciences, Engineering & Information Technologies and Business, and included in this Annual Report to the Senate.

The Foundation is part of the University and therefore does not have its own audit sub-committee. While the Annual Financial Report of the University is audited by the Audit Office of NSW, the Annual Report of the Foundation has not itself been audited.

The Foundation undertook the following fundraising appeals during 2025: Donations.

In conducting those appeals the Foundation took all reasonable steps to ensure that commissions paid or payable to any person as part of a fundraising appeal did not exceed one-third of the gross money obtained by that person in the appeal and appropriate particulars of all items of gross income received or receivable, all items of expenditure incurred, including the application or disposition of any income obtained from the appeal and particulars of

those transactions to which they related were recorded in the minutes of the Foundation.

**Principle 5 -
Make timely and balanced
disclosure**

The Foundation complied with the reporting and disclosure requirements of the Senate. These include an annual budget and this Annual Report. Members and Council have been made aware of the processes for disclosure pursuant to the Code of Conduct, External Interests policy, which include protected disclosure to the ICAC, to the Ombudsman or the Auditor General.

**Principle 6 -
Respect the rights of
shareholders,
members, staff, volunteers,
clients
and other stakeholders**

The Foundation Council and/or membership consist of members of the community, industry bodies and the University whose input is invited via the Annual General Meeting and Council meetings of the Foundation.

The following forums/ mechanisms have been held during the year to involve stakeholders in election of the Council, activities of the Foundation or other stakeholder participation.

Invitations are issued to:

- The Annual General Meeting
- Two Council meetings
- ISS Opening Ceremony
- School Prize Awards Night

Under the Charitable Fundraising Act, the University may be questioned about any appeal on details of the purpose of the appeal such as the appeal target, objectives, distribution of proceeds, and the process to provide answers. During the year the Foundation published information on its website, via email newsletter and outlines those activities in this annual report. Specific requests for information are responded to by the Foundation office. Other enquiries may have been made to other parts of the University.

Principle 7 - Recognise and manage risk

The Foundation recognises its activities within University premises or other premises require risks such as health and safety, environmental protection, privacy, trade practices, and compliance with the Charitable Fundraising Act to be considered and managed. The Foundation has managed these risks during the year by adhering to University policies concerning events, publications and external relations activities.

Principle 8 - Remunerate fairly and responsibly

No member of a Council is entitled to receive any remuneration for acting in that capacity except reasonable remuneration on a basis which has first been approved in writing by the University Officer (Foundations) Members of the Foundation Council may be reimbursed for reasonable

expenses after written approval of the University Officer (Foundations). Any such instances are recorded in the minutes of the Council.



TO: Financial Control and Treasury

FROM: University of Sydney Physics Foundation

DATE: 5 March 2026


SUBJECT: Certificate of Operations

CERTIFICATION

I hereby certify that the activities reflected in the Financial Statements for the year ended 31 December 2025 of the University of Sydney Physics Foundation fully comply with the Foundation Rules.

Any areas of non-compliance or departure from such governing rules have been advised in writing to the Provost / Deputy Vice-Chancellor responsible for the overall governance of the Foundation's operations.

Signature
University Officer (Foundation)



Professor Marcel Dinger, Dean
of Faculty Science

Date: _____

The University of Sydney

Uni of Syd Physics Foundation (L7500_SCI_FND_PHYS)

Income Statement

for the Period Ended 31 December 2025

	Note	31 December CY2025	31 December CY2024
INCOME			
Scholarships, Donations and Bequests		44,530	13,225
Business and Investment Income		55,505	62,283
Realised Gain / (Loss) on Investments		2,008,670	4,591,489
Investment Administration Fee		(137,793)	(128,207)
Internal and Other Income	4	1,215,922	0
Total Income		3,186,835	4,538,790
EXPENDITURE			
Salaries	5	1,120,311	1,063,799
Consumables		1,568	0
Equipment and Repairs/Maintenance		567	234
Physics Grand Challenges Seed Funding	6	0	350,000
School of Physics Seed Funding	6	100,050	0
Services and Utilities		11,833	19,269
Travel, Conferences, Entertainment		149,564	656
Consultants and Contractors		217,248	41,100
Student Costs and Scholarships	7	474,978	67,410
Other expenses		58,002	10,075
Total Expenditure		2,134,120	1,552,543
Surplus / (Deficit)		1,052,715	2,986,247
Accumulated Funds		37,553,435	34,567,188
Accumulated Funds Adjustments		0	0
Total Accumulated Funds		38,606,150	37,553,435

Notes to Financial Statements (...continued)

4. Proceeds from the sale of Molonglo Observatory

5. The 2025 salary expenditure of \$1,120k includes \$378k of International Science School (ISS) related salary expenses and \$741.6k of education related funding support for the salaries of five School of Physics staff members.

6. Grand Challenge Seed Funding Scheme has been replaced with School of Physics Seed Funding.

7. Student Costs and Scholarships balance of \$475k includes includes \$340.4k HDR Stipends, \$68.3k Student Scholarship and Prizes and \$55.2k for Student travel and accommodation.

I certify that the Income Statement and Balance Sheet of the Foundation have been prepared in accordance with the University's accounting practices and procedures. These Foundation accounts form part of The University of Sydney's

Carma du Plooy

5 March 2026

Carma du Plooy
Finance Director

The University of Sydney

Uni of Syd Physics Foundation (L7500_SCI_FND_PHYS)

Balance Sheet

as at 31 December Calendar Year 2025

	Note	31 December CY2025	31 December CY2024
ASSETS			
CURRENT ASSETS			
Short Term Funds	3	1,872,644	1,266,213
Total Current Assets		1,872,644	1,266,213
NON CURRENT ASSETS			
Medium/Long Term Investments	3	36,733,506	36,287,222
Total Non Current Assets		36,733,506	36,287,222
TOTAL ASSETS		38,606,150	37,553,435
LIABILITIES			
CURRENT LIABILITIES			
NON CURRENT LIABILITIES			
NET ASSETS		38,606,150	37,553,435
EQUITY			
Accumulated Funds		38,606,150	37,553,435
TOTAL EQUITY		38,606,150	37,553,435

Notes to Financial Statements

1. Accounting Policies

- The financial statements have been prepared on a modified accrual accounting basis.
- Employee entitlements for Long Service Leave are held centrally in the University's accounts.
- The University (including the Foundations) is exempt from income tax.

2. The funds reported herein are overseen by the Physics Foundation, which was set up by the late Professor Harry Messel to promote education and research in the physical sciences. These funds are used to support the International Science School (which runs biennial events for high achievers in senior high schools throughout the world), with surplus, annual investment returns made available, subject to Foundation and University Treasury approvals, to support the School of Physics in its teaching and research endeavours.

3. Short Term and Long Term Investments include \$7,037,676 of the Messel Endowment (\$7,392,031 in 2024) managed by the University of Sydney to retain its value in accordance with the commitments made by the Foundation when the Endowment was established.

The University of Sydney
Physics Foundation (L7500_SCI_FND_PHYS)

Statement of Changes in Equity

for the Year Ended 31 December 2025

	Foundation Operations (L7501)	Messel Endowment (L7505)	International Science School (L7502)	Physics Foundation (L7507)	Total
	\$	\$	\$		\$
Balance as at 1 January 2023 [Full-ISS Year]	27,350,230	7,227,548	(196,978)	0	34,380,799
Add (Less): Accumulated Funds Adjustments	373,233	0	0	0	373,233
Add: External Income (excluding Gain/Loss on Investments)	40,549	46,351	3,069	0	89,968
Add (Less): Gain / (Loss) on Investments	1,868,819	422,807	0	0	2,291,626
Add (Less): Intra-Foundation Funds Transfer	0	0	0	0	0
Less: Funds Transferred to Physics	(1,067,950)	0	0	0	(1,067,950)
Less: Expenditure	(725,474)	0	(775,015)	0	(1,500,489)
Balance as at 31 December 2023	27,839,406	7,696,706	(968,924)	0	34,567,188
Balance as at 1 January 2024	27,839,406	7,696,706	(968,924)	0	34,567,188
Add (Less): Accumulated Funds Adjustments	0	0	0	0	0
Add: External Income (excluding Gain/Loss on Investments)	16,261	58,785	461	0	75,508
Add (Less): Gain / (Loss) on Investments	3,593,868	869,414	0	0	4,463,282
Add (Less): Intra-Foundation Funds Transfer	0	(1,232,875)	1,232,875	0	0
Less: Funds Transferred to Physics	(350,000)	0	0	0	(350,000)
Less: Expenditure	(1,014,598)	0	(187,945)	0	(1,202,543)
Balance as at 31 December 2024	30,084,937	7,392,031	76,467	0	37,553,435
Balance as at 1 January 2025 [Full-ISS Year]	30,084,937	7,392,031	76,467	0	37,553,435
Add (Less): Accumulated Funds Adjustments	0	0	0	0	0
Add: External Income (excluding Gain/Loss on Investments)	25,526	68,666	3,066	1,218,699	1,315,957
Add (Less): Gain / (Loss) on Investments	1,512,088	358,789	0	0	1,870,877
Add (Less): Intra-Foundation Funds Transfer	0	(781,810)	781,810	0	0
Less: Funds Transferred to Physics	(100,050)	0	0	0	(100,050)
Less: Expenditure	(1,242,495)	0	(791,575)	0	(2,034,070)
Balance as at 31 December 2025	30,280,007	7,037,676	69,768	1,218,699	38,606,150

For more information

The University of Sydney

Physics Foundation

physics.foundation@sydney.edu.au

www.sydney.edu.au/science/schools/school-of-physics/physics-foundation.html