



THE UNIVERSITY OF
SYDNEY

The University of Sydney Physics Foundation

Annual Report 2018



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President's Report 2018



President's Report 2018

It is my privilege and pleasure to present the 2018 Annual Report for the University of Sydney's Physics Foundation. The past 12 months has been another successful year of great activity, with preparations well under way for the staging of the 40th Professor Harry Messel International Science School (ISS), with the title "Frontier Science". ISS2019 will be held in July and coincides with the 50th Anniversary of the first Moon landing so there will be plenty to celebrate. We have been fortunate to secure Dame Jocelyn Bell Burnell, a world-famous astronomer, and Dr Matthew Abbott from the NASA Space Program, as keynote speakers. As ever, it is an ongoing challenge to continue to fund the ISS in line with the legacy of Professor Harry Messel and his fundamental goal of the pursuit of excellence in science.

In June, Mr Trevor Danos AM represented the Foundation Council at the annual School of Physics prize-giving ceremony. He gave a speech reminding the students of the history of the Foundation and offered advice to the students about the value of good communications and breadth of interest. It is very pleasing to reward so many talented science students, across all undergraduate years. The Foundation awards 20 scholarships and prizes to recognize excellence and to encourage further study in physics. In 2018, 25% of the prize winners were female, with an ongoing goal to reach the outcomes in gender equity and diversity space that the ISS continues to demonstrate.

The Foundation has been able to support the School in other ways, including for our Julius Sumner Miller Fellow, Dr Karl Kruszelnicki and for the Harry Messel Fellowship program. Additional projects include support for the Physics for Girls Workshop and the reconstruction of a representative version of the Narrabri Stellar Intensity Interferometer, which was funded by Harry Messel and the brainchild of Professor Robert Hanbury Brown. More detailed descriptions are given later in this report. We gratefully acknowledge all donations to the Foundation and the Messel Endowment to enable such support to continue.

It is with great sadness that we record the passing of two of our most enthusiastic and generous supporters. Emeritus Professor John Graham was a highly regarded astronomer and Mr John Hooke CBE FTSE a long-standing Councillor and philanthropist. There are more detailed notices of appreciation for both outstanding individuals later in this report.

Many congratulations to our Councillor Dr Gregory Clarke AC for the award of the Companion of the Order of Australia in the 2018 Australia Day Honours List. This is the highest award under the Order of Australia and was given for eminent service to science as a physicist in the area of innovative technology and communications, and for the promotion of philanthropy. My congratulations also to past President, Councillor, and now Life Governor, Mrs Louise Davis AM on her receipt of an Honour in the 2018 Queen's Birthday Order of Australia Awards. The award was for significant service to business in the not-for-profit sector through promoting corporate social responsibility, and for outstanding commitment to education and science, particularly in disadvantaged communities in Australia and the Asia Pacific region.

After fifteen years of exceptional dedicated service to the Foundation as Council Member and President, we bid farewell to Mr Albert Wong AM. I would like to thank Mr Wong for his outstanding support and commitment to the principles of the pursuit of excellence and the encouragement of science. Mr Wong is now one of our Life Governors. The Foundation acknowledges his efforts in raising funds and we are very appreciative of his generous donation which has been important in ensuring that the ISS continues in perpetuity.

In 2018, the Nippon Sheet Glass Group celebrated its 100th Anniversary and listed as one of its notable successes the Spacia vacuum-glazing process, which resulted from the commercialisation of a research development led by a Previous Head of School and Foundation Director, Professor Richard Collins. The project was originally supported through the Physics Foundation and is a great story on the impact of research carried out in the School of Physics.

Mid-year the Council welcomed Professor Celine Boehm as the new Head of School and Director of the Foundation. It has been a great pleasure working with Professor Boehm to develop some exciting new projects for the Foundation that are well aligned with our mission to advance science through research and education. We were also very pleased to welcome Professor Iain Young as Executive Dean of Science and University Officer. Professor Young was most recently the inaugural Head of the School of Life and Environmental Sciences. It has been very rewarding working with them both.

My thanks to all the Council members for their commitment to the Foundation over this past year, in particular to Mr Michael Winternitz who has very ably taken on the role of Deputy President. Thank you to Ms Annalee Powell for her excellent administrative support throughout the year and we are appreciative of the assistance given by Ms Clara Spencer, School Manager, and Ms Grace Schiavello, Executive Officer. It is with great anticipation that we look forward to another exciting year in achieving the pursuit of excellence.

Yours sincerely

Emeritus Professor Anne J. Green FTSE, FAIP, FASA
President, Physics Foundation



Physics Foundation objectives and aims



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

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 and to generate philanthropy, promote careers and broaden knowledge and understanding of science (in particular physics) in the wider community.

Objectives of the 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

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. These generous supporters are acknowledged in the Messel Endowment Honour Board that is published on the Physics Foundation website.

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.

Currently the Endowment holds \$5,779,020 in funds.

In 2018, donations and bequests to the Foundation totalled \$19,082.

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.

the **MESSEL**
ENDOWMENT
Science Foundation for Physics.

Donations of \$2 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 visit <https://sydney.edu.au/science/schools/school-of-physics/physics-foundation.html>



Group shot of the ISS2017 students and staff, at the accommodation at Kincoppal Rose Bay school on the edge of beautiful Sydney Harbour.

2018 Physics Foundation members

Foundation staff

Professor Celine Boehm Head, School Of Physics

Grace Schiavello - Executive Officer

Patron

General David Hurley, AC DSC

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 (2008)

Mr Jim O'Connor (2011)

Mr Albert Wong AM (2013)

Past Directors

(initial year of directorship shown)

Emeritus Professor Harry Messel AC CBE (1954)

Emeritus Professor Max Brennan AO FAA (1987)

Professor Lawrence Cram (1991)

Emeritus Professor Richard Collins FTSE (1997)

Professor Bernard Pailthorpe (2002)

Associate Professor Robert Hewitt (2003)

Emeritus Professor Anne Green FTSE (2006)

Professor Clive Baldock (2010)

Professor Tim Bedding (2012)

Foundation Council 2018

Office Bearers of the Foundation

Emeritus Professor Anne Green FTSE, President

Mr Michael Winternitz - Deputy President

University Officer

Professor Iain Young, Dean of Science

Professor Trevor Hambley FAA, Dean of Science
(until June 2018)

Council Members

Professor Dame Marie Bashir AD CVO

Mr Albert Wong AM

Dr Gregory Clark AC FTSE

Mr Trevor Danos AM

Professor Greg McRae

University Ex Officio Council Members

Ms Melinda Deerling

Ms Melissa Bonevska

Foundation Members

Founder

Emeritus Professor Harry Messel AC CBE

Life Governors

Mrs Louise Davis AM

Associate Professor Robert Hewitt

Mr John Hooke CBE FTSE

Dr David Mills AM

Mr Jim O'Connor

Mr Martin Rogers

Mr Paul Slade

Mr Albert Wong AM

Foundation Members...continued

Honorary Governors

Mr Tony Aveling

Emeritus Professor Max Brennan AO FAA

Emeritus Professor Richard Collins FTSE

Professor Lawrence Cram

Mr Raymond Kirby AO

Individual Members

Professor Dame Marie Bashir AD CVO

Dr Gregory Clark AC FTSE

Mr Trevor Danos AM

Emeritus Professor Anne Green FTSE

Professor Greg McRae

Mr Michael Winternitz

Corporate Members

The James N. Kirby Foundation

The Nell and Hermon Slade Trust

The Physics Foundation

Supporting the School of Physics

The Physics Foundation supports the School of Physics in several ways. These include a direct grant of untied funds, promoting its achievements, funding its alumni communications, supporting its events and through annual scholarships, prizes and awards valued at over \$30,000 annually. The Foundation also contributes funding towards the Julius Sumner Miller Fellowship, held by Dr Karl Kruszelnicki.

Alumni Engagement

Alumni and community engagement is a priority within the University of Sydney. In 2004 the Foundation announced that it would support the alumni activities of the School of Physics.

Over the past fifteen years the alumni and community engagement activities of the School have benefitted from the promotion and management of events, and production of interesting content for Physics News (previously known as Alumni News).

The Foundation's support has seen an increase in the number of alumni now in touch with the School and the Foundation, from 1,000 Physics and ISS alumni in 2004 to a current listing of more than 5,000 Physics and ISS alumni.

The Foundation also supports the School's media, publications, events and fundraising with all these areas linking into alumni activities in terms of communication, connection and highlighting the School's achievements.

Untied Funds

As well as the aforementioned areas, the Foundation provides untied funds to assist the School of Physics in areas where conventional funding is difficult to obtain. The Foundation was pleased to be able to transfer the full budgeted adjusted amount of \$300,000 to the School for both 2016 and 2017.



In memorium Mr John Anthony Lionel Hooke CBE FTSE



John Hooke was a man of great passion and an advocate for science and nanotechnology and how it could benefit society. It is with sadness that we mark the passing of such a keen innovator, philanthropist and astute businessman. John died on 28 October 2018 at the age of 85 after a brief illness.

John graduated from the University of Sydney with a BSc majoring in Physics and a BEng (Electrical), for which he was awarded First Class Honours and the University Medal. He spent his life exploring new frontiers. In 1954, as a young man working for Amalgamated Wireless Australasia (AWA), he screened the first experimental television broadcast in Australia from the back of an old Arnott's van. Later, he provided the signal that relayed the first moon landing. John went on to become Chief Executive and Chairman of AWA. During his long business career, John was a Director of numerous companies including BHP, National Australia Bank, AMP General Insurance and Channel Ten. He was also chairman of Tubemakers of Australia.

At Sydney, John was an enthusiastic and active member of the University community. He was a long-serving councillor and Deputy President of the Physics Foundation, chairman of the Messel Endowment Fund, foundation Board Member of the Brain and Mind Institute and on the Board of the Inspired Philanthropy campaign.

In particular, he generously funded the John Hooke Chair of Nanoscience and he will be long remembered for his far-sighted philanthropy, his warmth and his incisive intellect. John also leaves a lasting legacy for future students with the naming of Laboratory 5001 in the Sydney Nanoscience Hub in his honour. John was a passionate scientist and engineer and he will be greatly missed.

In memorium Emeritus Professor John Graham

Astronomers world-wide were greatly saddened to hear of the passing of Emeritus Professor John Graham, most recently a member of the Carnegie Institute of Washington, Department of Terrestrial Magnetism. He died in Washington on 13 September 2018, aged 79 years, following a battle with cancer. John was a warm and generous man with a broad range of astronomy interests but also very knowledgeable on an eclectic and diverse number of topics and subject areas.

John was born in Sydney in 1939 and passionate about astronomy from an early age. He graduated BSc with Honours from the University of Sydney and received his PhD from the Australian National University in 1964. As an observational astronomer, he was associated with several important telescopes - the Leiden Observatory in Holland and South Africa, the Kitt Peak National Observatory in Arizona, the Cerro Tololo Inter-American Observatory (CTIO) in Chile and finally the Mt Wilson and Las Campanas Observatories all owned by the Carnegie Institution. He was an important academic at the Carnegie Department of Terrestrial Magnetism, Washington from 1985 until 2002.

John was an expert on the observation of young stars, variable stars and star formation in the Galaxy, but published widely on nearby galaxies and in collaborations making fundamental observations with the Hubble Telescope. He also was strongly committed to contributing to the wider astronomy community, holding numerous senior positions in the Commissions and Divisions of the International Astronomical Union, the American Astronomical Society and the National Science Foundation. He was a kind and generous man, with a formidable intellect.

Several astronomers here at Sydney have fond memories of association with John. He attended North Sydney Boys High School at the same time as Dick Hunstead and Don Melrose, and graduated BSc(Hons) in Physics from Sydney in 1961. Following his PhD, John continued his career overseas, principally at CTIO, where he was known to both Professors Elaine Sadler and Dick Hunstead.



From the mid-eighties, John was an occasional and welcome visitor to Sydney University, and an enthusiastic supporter of the Messel International Science School (ISS). John was a generous donor on several occasions to the Physics Foundation and the ISS and had many wonderful discussions with successive Heads of School (Professors Don Melrose, Anne Green, Tim Bedding).

John is particularly known for his excellent work on photometric standard stars and observations of the radio galaxy Centaurus A, among other research papers. But, more importantly, he will be remembered as a kind, generous scientist with a great sense of humour and a broad and deep knowledge of astronomy. He will be sadly missed but long remembered.

The 2018 ISS Report

Science on the Frontier - ISS2019 is coming!

ISS2019, the 40th Professor Harry Messel International Science School, will run from Sunday 7 July to Saturday 20 July 2019. With a theme of Frontier Science, the ISS will explore a wide range of current and cutting-edge topics, from space exploration to climate change, from quantum engineering to genomics.

The ISS gathers 130 talented year 11 and 12 students from across Australia and around the world for two weeks of lectures and activities, as well as a rich social program. Students attend from China, India, Japan, New Zealand, Thailand, the UK and the USA, as well as every state and territory of Australia, and are selected for their academic achievements in science as well as their enthusiasm, leadership and potential. Since 2005, five ISS scholarships have been set aside for talented Indigenous Australian students — in 2019 we will again seek out our best Indigenous students from across the country.

Speakers

The backbone of the ISS program is the lecture series, and this year we have another great list of speakers across a spectrum of research fields. Our inspiring researchers this year include:

- Professor Jocelyn Bell Burnell, astrophysicist from Oxford, who **discovered pulsars as a graduate student in the 1960s**
- Matthew Abbott, NASA Flight Director for the **next generation of space exploration, the SLS and Orion missions**
- Professor David Reilly, Principal Researcher and Director of Microsoft Station Q, Sydney, on **the forefront of quantum technology**
- Professor Kathryn North AC, Director of the Murdoch Children's Research Institute (and one of our alumna from ISS1977), on **the future of genomics in medicine and health**
- Associate Professor Alex Sen Gupta, from UNSW's Climate Change Research Centre, on **modelling the global climate**
- The irrepressible Dr Karl Kruszelnicki, radio and TV science guru, Sleek Geek and the University of Sydney's Julius Sumner Miller Fellow, who enthuses and entertains at every ISS with rollercoaster-ride talks featuring the best of his **Great Moments in Science**

Activities

Around the scientific talks, the students take part in hands-on activities and laboratory tours, led by staff and students from across the Science and Engineering Faculties at the University of Sydney. Students will get hands-on with electron microscopes, get a back-stage tour of the University's museum collections, compete for glory in the Science & Engineering Challenge, and meet-and-greet postgraduate students about their research and experience of university life.

Social life

Outside the formal scientific program, the ISS scholars also enjoy a rich social program, giving them an opportunity to make new friends from all over the world. They see the sights of Sydney from an evening harbour cruise, meet alumni and supporters of the ISS at the Gala Reception in the University's Great Hall, and show off their musical, dance and comedy skills at the infamous ISS Talent Night.

"The two weeks in the ISS was the most meaningful, fulfilling, exciting time in my life. That was an experience we cannot gain anywhere else. Thank you very much!" — ISS2017 Scholar



Physics for Girls Workshop 2018

The School of Physics hosted the 2nd Girls in Physics workshop on 30 November 2018. Lunch was generously provided by the Physics Foundation for the 50 students and 6 teachers. The Year11/Year12 girls interacted with postgraduate students and academics and were introduced to the wide variety of interesting careers that are open to Physics graduates. Students came from a mix of public and private schools, Penrith Selective High School, The Jannali High School, Queenwood School, MLC School and St Clare's College. It was particularly gratifying to see 3 students and 2 teachers from Peel High School in Tamworth, northern NSW. They arrived the night before and spent the day with us. Their feedback was that it was worth the effort to get the on-campus experience and the girls were keen to continue their studies at Sydney.

During the morning session, the students attended presentations by two female researchers (Hilary Byrne – Medical Physics and Andrea Blanco-Redondo - Nanophotonics), participated in hands-on activities (measured the speed of light and speed of sound, used an ultrasound machine) and watched demos of cool Physics experiments. After the delicious lunch, students and teachers had the opportunity to hear from Stefano Palomba, a leading researcher in the area of Nanophotonics and Nanoplasmonic technologies. Stefano gave a brief overview of the exciting, cutting edge, multidisciplinary research that is done at the Sydney Nanoscience Hub. In our final session, students and teachers participated in a Q&A session with a panel of students and academics, where they had the opportunity to ask questions about what it's like to study Physics at The University of Sydney and the myriad of career pathways they can pursue after graduating with a major in Physics.

The feedback from both students and teachers was very positive. This is what the students said they would tell others about the workshop:

'Women can do anything and everything guys can do. Don't second guess someone's ability based on gender. The women lecturers today were amazing'.

'Stick with it. There are so many options in Physics'

In response to the question 'What did you find most useful?' the students said:

'Hearing from people who research aspects of Physics which are very relevant to my life'

I liked learning about the different options of study at the University of Sydney. Especially how you can go on to study Honours and PhD, it is something I never really considered before.



The Narrabri Stellar Intensity Interferometer - Mirror Project

This was the first astronomical instrument to make high resolution measurements of the diameters of normal stars at visible wavelengths. It was designed by Robert Hanbury Brown and Richard Twiss and was the experimental basis of the concept that became the hugely important field of quantum optics. Harry Messel and the Foundation provided the funding for the instrument and appointed Professor Hanbury Brown as leader of the project at Sydney University. The results from the project were of major scientific value, establishing an effective temperature scaling relationship which has underpinned stellar astronomy for 50 years, but more importantly the instrument was the foundational experiment for quantum optics - a field supporting a huge sector of the technology which enables our modern world.

The original instrument consisted of two 7m segmented mirrors mounted on a track that enabled the precision measurement of the diameters of 32 stars. Each mirror was composed of over 250 small hexagonal segments. Many of the original mirror segments were rediscovered by chance and the current project aims initially to recreate a 2m prototype mirror, consisting of 19 of the original hexagonal mirror segments mounted on a movable frame. The mirrors will be affixed to a steel frame that results in the correct overall curvature of the mirror tile mosaic. The entire structure will be mounted vertically so as to give a horizontal optical axis about 2m above the ground: this yields the best opportunities for viewing and playful experimentation with optical principles.

We plan for the 2m mirror to be available for ISS2019 scholars and also for this equipment to be part of the optics teaching modules and laboratory experiments, giving students hands-on experience with a novel optical device. Once the small version has been constructed and verified, there is a plan to recreate two 4m versions, one to be mounted in the School of Physics, at a site to be determined, and one to be placed close to the new Museum under construction near the Great Hall.

The rediscovery of the original array mirrors offers a major opportunity to celebrate a heroic episode in the history of the School and the University, and indeed, in Australian scientific endeavour. One of the key outreach benefits of the project (initially with the prototype but eventually with the larger versions) will be to demonstrate basic optical properties, with the viewer watching as their reflection in the mirror expands to fill the mirror when approaching the focal point, which then suddenly flips upside down and shrinks as they proceed past that point. The installation will do the same job for Acoustics. Standing at the right location, sound will be focussed in the manner of a whispering gallery and people should be able to whisper to friends standing many metres away. The Foundation is enthusiastically supporting the prototype project and is working to find a way to fund the larger versions.



Dr Karl Kruszelnicki AM | Julius Sumner Miller Fellow

The Science Foundation established the position of Julius Sumner Miller Fellow within the School of Physics in 1995. The Fellow's mission is to champion Physics, Science and the University of Sydney in order to educate, encourage and recruit students into science-based courses and careers. Science author, media personality and broadcaster Dr Karl Kruszelnicki has held the position of Fellow since its inception.

University of Sydney Events

Dr Karl continued with University of Sydney events and his open-door policy for all students. In fact, one in seven enrolling students reported that they came specifically to the University of Sydney because of Dr Karl.

Student-driven events included talks at Sancta Sophia College and the Physics Society, and a presentation at the KOALA Conference (Optics, Atoms and Laser Applications) for students and the public.

Throughout the year other events included Year 10 Information Evenings on and off campus, University Open Day, Camden Open Day, Spectacular Science, talk at schools (usually to the entire school, Y7-12), and guided tours of the ABC for promising primary and high school students. As part of its STEM outreach activities, the University of Sydney supported more than 300 Year 9-12 students from 56 high schools across NSW in the Zero Robotics competition.

National Science Week

Dr Karl was invited to give his Sydney Science Forum lecture in Western Sydney, titled 'Great Moments in Science', presented as part of National Science Week. He spoke to an estimated 10,000 people over the course of National Science Week, from Hobart to the Sunshine Coast. His primary and high school talks were sponsored by the University. A livestream of the talks went out to schools around the country, giving regional and rural students the same science experience as students on-site. A highlight was the premier of the documentary *The Living Universe* at Event Cinemas, narrated by Dr Karl.

School Activities

Skype Sessions for Schools

School Q&A skype sessions continue to be a feature. Dr Karl did 58 sessions throughout the year, including many regional areas, a Brisbane School of Distance

Education, a high school in Christmas Island. Overseas schools included Canada, New Zealand and India.

The automated Skype Booking System launched this year has streamlined the process. Every government school receives a box of Dr Karl's personally signed books for their library (with Sydney University bookplate) and a one-year subscription to *National Geographic Kids* magazine.

School Visits & Activities

The demand for school visits at the University continues to grow. He also visits schools outside of the University, including Cabramatta High School, (Intensive Language Centre and mainstream), Marrickville West Primary School, and Trinity Grammar for their Books at Breakfast program. Dr Karl visits schools when traveling, such as Bundaberg North State High School, Queensland.

Supporting teachers is also a priority and Dr Karl spoke to the teachers participating in the University of Sydney's STEM Teacher Enrichment Academy. He gave a talk for 80 teachers at the Science Teachers Workshop and contributed an educational video for the School of Physics SUPER (Sydney University Physics Education Research) team, which provides resources and professional learning opportunities to support schools and teachers.

Sleek Geeks Eureka Schools Prize

The University of Sydney Sleek Geeks Eureka Schools Prize is now in its thirteenth year. Films about the decline of the bee population, relative numbers of stars in the Universe vs sand grains on Earth, and sea cucumbers saving coral reefs were amongst the shortlisted winners. They spent a day with Dr Karl and Adam Spencer, before attending the Eureka Awards Dinner.

Television

Dr Karl continued his regular appearances on Channel 9's *Today Extra*, talking about science related stories in the news. Other appearances included *Sunrise* and *The Project*.

He was also involved in ABC *Stargazing Live*, with Brian Cox and Julia Zemiro. Dr Karl hosted Brisbane's biggest Star Party and announced a successful 'nationwide attempt to break the Guinness world record for the most people simultaneously observing an object in the night sky through a telescope'.

The TV highlight was Dr Karl appearing on Anh Do's Brush with Fame. This episode had the highest rating of the last two seasons of the show. The feedback from fans and University staff was overwhelming.



Radio

Dr Karl continued his national ABC radio segments. New fortnightly programs started around mid-year with regional Victoria and Hobart. The Triple J audience in just the five capital cities currently attracts over 750,000 listeners. Overall, the Triple J podcast downloads went up by 100,000 to a total of 4.1 million downloads for the year. While Dr Karl was travelling overseas, he invited University of Sydney academics (and a student) to replace him on air and to participate in his weekly BBC program, which is transmitted across the UK and globally via the web to a growing audience of around 1.5 million people.

Interwebs

Dr Karl's social media engagement on Facebook (48K), Instagram (40K) YouTube and Twitter is strong with Twitter Followers now around 307K. His website, drkarl.com includes University events and podcasts, science talks in Australia and the UK, media appearances, science writing and the automated booking system for School Skypes. Dr Karl's ABC Webpage is currently responsible for almost one-half of all visits to the ABC Science webpage, and about 5% of all Internet traffic to the ABC.

Further media highlights

Reaching new audiences is always on the radar and the feature article in Frankie magazine (creative arts) highlighted his amazing collection of colourful shirts. Dr Karl's ABC video outlining advice to his 12-year-old self, received hundreds of messages of gratitude from parents and teachers. The National Living Treasures book was published featuring Dr Karl as one of Australia's 100 Living Treasures.

Podcasts

Karl has four podcasts: two via the ABC and one a weekly one-hour on the BBC. The fourth podcast is the weekly University of Sydney podcast 'Shirtloads of Science' (average download per episode is 10K) launched in late 2016 and showcasing excellent science. Interviews included

University of Sydney physics graduate Kirsten Banks, who describes herself as a Proud Wiradjuri woman, and mathematics legend Eddie Woo.

Twitter

In 2009 Dr Karl joined the Twitterati and now has 309,000 followers and his account has been used throughout 2018 to promote university staff events, research and news.

Books & Other Writing

Book 44 was released in November, Vital Science. This year Dr Karl added a more personal touch to the book with short autobiographical introductions to each science story. He continued his regular columns in Australian Geographic magazine and National Geographic Kids magazine (Australia and New Zealand edition). Throughout the year, Dr Karl contributed stories to the Sydney University Science Alliance newsletter (4000 members) and Physics News.

Mentoring and Media/Speaker Training

In 2018, Dr Karl continued to help students and staff at the University with "media training" – specifically, how to give public talks in an effective manner. Professional staff were also included, sitting in on school skypes and joining him at the ABC for an insight into the media world and science communication. Dr Karl took part in the AIME (Australian Indigenous Mentoring Experience) with year 9 and 10 students. He again met with the Top 5 Under 40, the Science program for early career university researchers designed to nurture communication skills and media awareness. Dr Karl was an invited speaker at the Australian Science Communicators Conference at the Powerhouse.

An Ending with New Beginnings

A new book High Five to the Boys celebrating 'Ace Australian Men' was published for Christmas and featured Dr Karl as a role model and inspiration for children. The majority of questions at Dr Karl events come from children with an average age of 10. New minds, new questions, new science, new beginnings. As the year ended, the new Anh Do portrait of Dr Karl was hung in the Physics corridor, ready to commemorate what will be Dr Karl's 25th year as Fellow in 2019.

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 Chief Accountant 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 2018 consisted of the following members:
Unless otherwise noted all terms are annual.
Member of the Foundation Council were eligible to attend two meetings in 2018

Executive

President, Emeritus Professor Anne Green FTSE
Appointment term: 2017 AGM until 2019 AGM
Meetings attended: 2

Deputy President, Mr Michael Winternitz
Appointment term: 2018 AGM until 2019 AGM
Meetings attended: 2

Deputy President, Professor John Mattick AO FAA
Appointment term: 2017 AGM until 2018 AGM
(resigned March 2018)

University Officer Foundation
Professor Trevor Hambley FAA
Meetings attended: 1 (resigned June 2018)

Professor Iain Young
Meetings attended: 1 (appointed Dean in June 2018)

Members

Professor Dame Marie Bashir AD CVO
Meetings attended: 1

Professor Celine Boehm (Ex-officio Head of School)
Meetings attended: 2

Ms Melissa Bonevski (Ex-officio representing University Foundations)
Meetings attended: 1

Ms Melinda Deerling (Ex-officio representing the Development Office)
Meetings attended: 2

Dr Gregory Clark AC FTSE
Meetings attended: 1

Mr Trevor Danos AM
Meetings attended: 2

Professor Gregory McRae
Overseas Member

Professor Susan Pond AM FTSE
Meetings attended: 1 (resigned 2018 AGM)

Mr Albert Wong AM
Meetings attended: 2

Council members were elected at the Foundation's AGM on 9 March 2018. There is not a separate nomination committee of Council. All terms are annual except for the President and Deputy President who serve for two years. 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 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 2018: 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, & 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 to the Annual General Meeting and two meetings per year.

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 and outlines those activities in this annual report. Any 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

2018 Finance Statement



Annexure 1

NSW 2006 AUSTRALIA

TO: Financial Control and Treasury

FROM: University Officer (Foundation)

SUBJECT: Certificate of Operations

CERTIFICATION

I hereby certify that the activities reflected in the Financial Statements for the year ended 31 December 2018 of the Physics Foundation fully complies 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 overall governance of the Foundation's operations.

Signature:

A handwritten signature in black ink, appearing to read 'Iain Young', written over a horizontal line.

Professor Iain Young

University Officer (Foundation)

Date:

18 February 2019

The University of Sydney

Physics Foundation (L7500_SCI_FND_PHYS)

Income Statement

for the Year Ended 31 December 2018

	Note	31 December CY2018 \$	31 December CY2017 \$
INCOME			
Grants		0	94,000
Scholarships, Donations and Bequests		19,082	17,371
Business and Investment Income		35,035	51,241
Realised Gain / (Loss) on Investments		88,453	206,072
Unrealised Gain / (Loss) on Investments		943,841	1,187,480
Investment Administration Fee		(64,870)	(61,122)
Internal and Other Income		12,718	4,203
Total Income		1,034,258	1,499,246
EXPENDITURE			
Salaries	5	47,739	112,688
Consumables		4,400	7,863
Equipment and Repairs/Maintenance		87	5,576
Services and Utilities		10,083	126,488
Travel, Conferences, Entertainment		6,576	263,131
Contributions to University areas	6	0	300,230
Consultants and Contractors		3,990	0
Student Costs and Scholarships		30,250	39,740
Other expenses		6,839	63,614
Total Expenditure		109,964	919,329
Surplus / (Deficit)		924,294	579,917
Accumulated Funds as at 1st January		20,529,410	19,949,493
Accumulated Funds Adjustments	4	42,450	0
Accumulated Funds as at 31st December		21,496,155	20,529,410

Notes to Financial Statements (....continued)

5 . Salary expenses (including oncosts) were incurred on the employment of: Megumi Kikuchi in 2018 (\$48k); and Teagan Jenkins (\$22k), Elizabeth Palmer (\$4k), John Bright (\$4k) and Chris Stewart (\$82k) in 2017, for managing the International Science School activities.

6 . During 2017, an amount of \$300,000 was allocated to support the School of Physics teaching and research activities. The allocation amounts for 2018 and 2019 will need to be decided by the Foundation Council during 2019.

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 financial reports.

Jong Nheu
Jong Nheu

Finance Manager
School of Physics
13/02/2019

Carma Du Plooy

Carma Du Plooy
Finance Director
Financial Services - Science, Engineering and Architecture

2018 Balance Sheet

The University of Sydney
Physics Foundation (L7500_SCI_FND_PHYS)

Balance Sheet

as at 31 December 2018

	Note	31 December CY2018 \$	31 December CY2017 \$
ASSETS			
CURRENT ASSETS			
Cash		1,342	1,342
Short Term Funds	3	1,717,469	2,892,739
Total Current Assets		1,718,811	2,894,081
NON CURRENT ASSETS			
Medium/Long Term Investments	3	19,777,317	17,635,303
Total Non Current Assets		19,777,317	17,635,303
TOTAL ASSETS		21,496,128	20,529,384
LIABILITIES			
CURRENT LIABILITIES			
Payables		(27)	(27)
Total Current Liabilities		(27)	(27)
NON CURRENT LIABILITIES			
TOTAL LIABILITIES		(27)	(27)
NET ASSETS		21,496,155	20,529,410
EQUITY			
Accumulated Funds		21,496,155	20,529,410
TOTAL EQUITY		21,496,155	20,529,410

Notes to Financial Statements

1. Accounting Policies

- The financial statements have been prepared on a modified accrual accounting basis.
- All fixed assets are expensed in the year of purchase.
- 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 Council and University Treasury approvals, to support the School of Physics in its teaching and research endeavours.

3. Short Term and Long Term Investments include \$5,779,020 of the Messel Endowment (\$5,401,039 in 2017) managed by the University of Sydney to retain its value in accordance with the commitments made by the Foundation when the Endowment was established.

2018 Statement of Changes in Equity

The University of Sydney
Physics Foundation (L7500_SCI_FND_PHYS)

Statement of Changes in Equity for the Year Ended 31 December 2018

	Note	Foundation Operations (L7501) \$	Messel Endowment (L7505) \$	International Science School (L7502) \$	Total \$
Balance as at 1 January 2017 [ISS Year]		14,396,568	5,445,643	107,282	19,949,493
Add (Less): Accumulated Funds Adjustments		0	0	0	0
Add: External Income (incl. Investment Income and Donations)		1,004,808	389,786	104,652	1,499,246
Add (Less): Intra-Foundation Funds Transfer		(70,000)	(430,000)	500,000	0
Less: Funds Transferred to Physics	6	(300,000)	0	0	(300,000)
Less: Expenditure		(68,389)	(4,390)	(546,551)	(619,330)
Balance as at 31 December 2017		14,962,987	5,401,039	165,383	20,529,409
Balance as at 1 January 2018 [Non-ISS Year]		14,962,987	5,401,039	165,383	20,529,409
Add (Less): Accumulated Funds Adjustments	4	42,450	0	0	42,450
Add: External Income (incl. Investment Income and Donations)		640,007	377,981	16,270	1,034,258
Add (Less): Intra-Foundation Funds Transfer		0	0	0	0
Less: Funds Transferred to Physics	6	0	0	0	0
Less: Expenditure		(47,136)	0	(62,826)	(109,962)
Balance as at 31 December 2018		15,598,308	5,779,020	118,827	21,496,155

Notes to Financial Statements (...continued)

4. The Accumulated Funds Adjustments figure of \$42,450 is a reversal adjustment to the UEM overhead expenses levied on the Foundation accounts during 2016 and 2017. This adjustment restores the Foundation funds balance by the same amount.

ISS 2017 Audit Report



Gerard Hughes CPA
CPA No 710863

Independent Audit

I have audited the financial report, being a special purpose financial report of the 39th Professor Harry Messel International Science School at the University of Sydney for the period of 1 January 2016 to 31 December 2017.

My audit was conducted in accordance with the Australian Auditing Standards. The procedures included examination, on a test basis, of evident supporting the amounts and other disclosures in the financial report. These procedures have been undertaken to form an opinion on whether, in all material respects, the financial report is presented fairly in accordance with the predominantly cash basis of accounting whereby revenue is recorded when it is received, expenses are recorded when they are paid, and no material assets or liabilities, other than cash are recorded.

I hereby certify that the attached Statement of Income and Expenditure is true and fair. The funding has been expended in accordance with the DEST funding agreement and all interest generated by the \$1,000,000 capital contribution has been fully expended in contributing to the costs of the International Science Schools.

Yours sincerely

A handwritten signature in black ink, appearing to be 'Gerard Hughes', written over a horizontal line.

Gerard Hughes CPA No 710863

28/8/18

Date



THE UNIVERSITY OF
SYDNEY

The University of Sydney

Physics Foundation

39th Professor Harry Messel International Science School

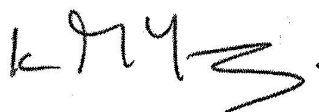
Income Statement

1st January 2016 to 31st December 2017

	31 December CY2017 \$ L7502 All Projects	31 December CY2016 \$ L7502 All Projects	ISS2017 2016 and 2017 \$ L7502 All Projects
INCOME			
Grants (NSW Department of Education)	94,000	0	94,000
Scholarships, Donations and Bequests	1,250	250	1,500
Business and Investment Income	9,401	974	10,375
Messel Endowment contribution (Note 1)	500,000	358,600	858,600
Total Income	604,651	359,824	964,475
EXPENDITURE			
Salaries	108,298	44,939	153,237
Consumables	7,863	126	7,989
Equipment and Repairs/Maintenance	5,576	152	5,728
Services and Utilities (Note 2)	124,993	1,756	126,749
Travel, Conferences, Entertainment (Note 3)	263,017	714	263,731
Contributions to University areas (Note 4)	230	34,292	34,522
Student Costs and Scholarships	0	1,444	1,444
Other expenses (Note 5)	36,575	218	36,793
Total Expenditure	546,552	83,641	630,193
Operating Margin	58,099	276,183	334,282
Accumulated Funds (Beginning Balance)	107,282	(168,899)	(168,899)
Accumulated Funds (Ending Balance)	165,381	107,284	165,383

Notes

- 1 Internal funds transferred to the ISS accounts are as follows:
 - (i) First transfer of \$358,000 of Messel Endowment funds in 2016 - being \$208,600 (= 174,308 + \$34,292) for ISS2015, plus \$150,000 for ISS2017.
 - (ii) The final contribution of \$500,000 was transferred during June 2017, from various Messel Endowment accounts (totalling \$430,000) and other Foundation accounts (totalling \$70,000).
- 2 The 2017 Services and Utilities expenditure (\$124,993) includes ISS catering and function costs incurred at Kincoppal Rose Bay and other venues.
- 3 The 2017 Travel, Conferences and Entertainment expenditure (\$263,017) includes airfare, harbour cruise, accommodation and conference expenses incurred during ISS2017.
- 4 The 2016 amount of \$34,292 "Contribution to University areas" is the transfer of donations from one ISS account code (D0630) to another account code (22222). This \$34,292 "expense" amount is offset by the equivalent "revenue" amount mentioned in Note 1 (i) above.
- 5 The \$36,575 amount of Other Expenses incurred in 2017 include printing, binding, stationery and miscellaneous expenses.



Professor Iain Young
University Foundation Officer

July 2018

