Hello mqphysastros. Once again, it’s been far too long between newsletters but that’s because there was programming work to be done! – At Emma’s urging I’ve done some python tweaking to allow the newsletter to look quite a bit prettier (no more crazy line breaks and orphan text), and we’ve also simplified the online submission system so it no longer requires a google account. You’ll find the submission page as the first of the Useful Links at the end of the newsletter. Or you can also find it on the physics intranet which is one click from our home page at physics.mq.edu.au. So no excuses. Please do submit stories about your successes in research, teaching, engagement or even interesting things happening in your life you’d like to share. The many items below give a good flavour of the different stories you can share.

There’s many things to celebrate right now including the stories below. Congratulations to all our MRes2 students who have submitted or are just about to submit, and to all recent PhD thesis submitters (submitters?). Congratulations to our recent graduates in the September cycle who got to hear an inspiring occasional address on government and science from Ms Clare McLachlan, CEO of the NHMRC, and a good friend of our department. There’s been lots of funding success, some listed below, with a special shout-out to our new Future Fellow awardees Daniel Burgarth and Shari Breen. Fingers crossed we will have a strong ARC projects round whenever the announcements finally come, presumably before Christmas.

A few events to be aware of are listed below: tomorrow we have our Multicultural Morning Tea and the Moyal Medal presentation and lecture by quantum scientist Prof. Margaret Reid is on November 5. Remember that we are also active on all the socials at @mqphysastro and keep the #photooftheweeks coming in.

Happy Halloween for those who observe, Mike.

MQ Drone and Satellite Workshop
Submitted by Cormac Purcell—2019-10-02

"But what practical use is astronomy?" Most astronomers have faced this question; in a taxi, across a dinner table or standing in a room full of strangers. Of course, the answer is that astronomy gives us joy in discovery and perspective on our place in the Universe. But astronomy is also a close cousin to the practical discipline of 'remote sensing'. The differences are in direction, scale and terminology: replace the sky with the Earth, parsecs with metres and 'spectrometer' with 'hyperspectral'.
Macquarie University Department of Physics and Astronomy recently hosted a workshop on using satellites and drones for research. The headline speakers were astro-ecologist Prof Stephen Longmore (Liverpool John Moores University, UK) and shark expert Dr Paul Butcher (NSW Dept of Primary Industries). Prof Longmore is applying his experience of infrared astronomy to solving problems in ecology and climate change. His group uses machine-learning and astronomy techniques to count endangered animals, detect poachers and find underground peat fires. Peat fires in Indonesia are a greater source of carbon-dioxide than the global transport industry! Dr Butcher and his PhD student, Andrew Colefax, are developing new methods to manage sharks off Australian beaches. Drones have become a key tool for detecting sharks and tracking their behaviour. Ongoing research involving hyperspectral cameras, astronomy techniques and machine-learning is enabling highly reliable species identification. This will mean safer surfers (and sharks!), fewer beach closures and better ecological outcomes.

The day also hosted talks from scientists monitoring desert cover, changes in coastline and crop yields. Astronomers are using satellites and drones to calibrate telescopes, and drones to calibrate satellites. Slides presented during the workshop can be viewed at http://cormacpurcell.net/public/drone_workshop/. Interested in starting a cross-disciplinary research project? Want to use machine-learning techniques in your research? Come along to the X-Sensing Conference in late November: details and registration at http://x-sensing.net

**Astronomy PACE field trip**

*Submitted by Bianca Sawyer—2019-10-09*

During the second week of the semester break eleven students from the ASTR310 PACE unit, accompanied by Richard Richard McDermid (academic and unit convenor), Bianca Sawyer (tech team member), and Fotini Kouloukis (student mentor), went in search of starry skies and kangaroos on their annual field trip to professional astronomy research facilities in Western NSW.

The aim of the trip is to go on ‘behind the scenes tours’ of several large national facilities, meet with professional astronomers, and learn about what it takes to build, maintain and operate research infrastructure on this large scale.

The first stop was the Parkes Radio Telescope, or "The Dish" - essentially a gigantic antenna used for observing radio frequency electromagnetic radiation from astronomical objects. The Dish has been used to
detect and investigate all sorts of objects and phenomena, like the magnetic field of the Milky Way Galaxy, quasars, double pulsars, and was used to track the first interplanetary spacecraft!

We then reached Siding Spring Observatory in Coonabarabran just in time to witness a magical sunset overlooking the Warrambungles, from a catwalk at the top of the dome housing the 3.9 m Anglo-Australian Telescope (AAT). We then spent time with night assistant Andre and astronomer Angel Lopez-Sanchez who were preparing to observe the spectra of faint dwarf galaxies.

In the morning we toured the 3.9 m AAT (one of the largest optical equatorial telescopes in the world) and its instrumentation. This was followed by a tour of the 2.3 m ANU telescope, which has a unique dome configuration - the whole building is able to move and it’s square! Attached to this telescope is the Wide-Field Spectrograph (WiFeS) which is used for a wide range of science applications including studying distant Gamma-Ray Bursts. Finally, we visited SkyMapper, a 1.3 m telescope that does exactly that: maps the sky!

That evening, we celebrated a successful trip with a BBQ, card games, and some of our own observing and astrophotography - marveling at the spectacular night sky in the absence of light pollution!

An infinite Universe: What is it, and can we ever understand it?
Submitted by Orsola—2019-10-09

Orsola was part of a panel of astronomers, artists and filmmakers to celebrate Penrith Observatory's 50th anniversary. The theme was "understanding infinity". The panelists were Emma Fielden (artist who works on the theme of infinity), Tom Compagnoni (filmmaker who did a documentary on infinity), Ray Norris, Brad Tucker and Orsola De Marco (Astronomers) and the MC was Wilson da Silva.

Gender and the Australian Research Workforce - ERA Report
Submitted by Emma—2019-10-15

The Australian Research Council has recently released a report into the relative gender representation with the research workforce. The Gender and the Research Workforce ERA 2018 report draws upon eligible research staff data from 31 March 2017, and compares where possible to data taken in previous rounds. Of the two-digit Fields of Research the physical sciences (including astronomy) show the greatest gap between relative representation of female and male researchers. Diving deeper into the data repeatedly shows that the physical sciences face the greatest disparity. This is not news, and is indeed one of a number of driving forces behind efforts being taken within our Department to close out those gaps.

A comparison of the ERA report data to our own in-Department data from the same date (31 March 2017) shows some clear similarities: our proportion of female to male researchers at levels A and B sits on par with the national figure; and the % of researchers employed in Department at each level B-D regardless of gender (as a proportion of the total number employed at all levels A-E) are also in line with the national figure for physical sciences. Differences also appear: the % of researchers at levels C and D who identify as female is significantly higher nationally than in our in-Department indicators, with no female researchers employed at level D in Department on that date; instead, at level E, the proportion of female to male researchers is four times that of the national figure, with more female than male researchers employed in Department at that level.

The ERA report addresses data for staff who identify as neither female nor male, indicating that numbers reported are small. I would suggest that this may not be a true picture as a number of institutions, like MQ, may yet be unable to reliably capture or report the full
spectrum of genders.


**Inclusive language 101**

*Submitted by Mikolaj K. Schmidt—2019-10-21*

Adopting inclusive language is an easy step towards building a more open and safer environment for our LGBTQI students and staff. In the linked article you will find a few hints for adopting it in your daily communication, for example how to ask which pronouns to use, and how to use them correctly [https://www.vic.gov.au/inclusive-language-guide](https://www.vic.gov.au/inclusive-language-guide)

**Workshops for Diversity and Inclusion**

*Submitted by Emma—2019-10-15*

The team at MQ Workplace Equity and Diversity have arranged a number of workshops to be held over the next few months that may be of interest to many. The majority of the training sessions have been designed and are facilitated by external partners.

- Ally training (staff and students) | 28 October and 20 November
- Disability Confidence Workshop (for staff) | 29 October
- Disability Confidence Workshop (for managers) | 11 November
- Respect. Now. Always: Responding to disclosures of sexual assault and sexual harassment | 4 November, 11 November, and 18 November
- Introduction to Recruitment at MQ | 15 October, 14 November, 9 December

This (above) new workshop is open to all staff involved in recruitment at MQ (including researchers) and includes information on mitigating bias and inclusive recruitment techniques. Facilitated by MQ HR Managers.

Details and registration links for all of these workshops (and others) can be found on the Staff Wellbeing page [https://staff.mq.edu.au/work/wellbeing](https://staff.mq.edu.au/work/wellbeing)

**Notable publications**

**New paper in Science:**

*The low density and magnetization of a massive galaxy halo exposed by a fast radio burst*

Prochaska, J., et al. (including Marnoch, L., & Ryder, S.) 2019, Science, on-line 26 Sep 2019

Lachlan and Stuart used the ESO Very Large Telescope in Chile to observe the host galaxy of only the second Fast Radio Burst localised by the Australian Square Kilometre Array Pathfinder. They realised the burst had pierced the halo of a foreground galaxy on the way to Earth, yet the burst profile showed the gas halo to have surprisingly little turbulence, raising new questions about what sustains gas in the halo from collapsing down on to the galaxy.

**New paper in Nature Photonics:**

*Brillouin integrated photonics*

A century after its prediction by Brillouin and Mandelstam and 50 years after its observation, stimulated Brillouin scattering (SBS) — the nonlinear interaction of photons and phonons — has recently become viable in integrated photonics. We show how advances in theory, materials and device design are allowing SBS to transform capabilities in RF signal processing, narrow line optical sources and fundamental nonlinear optics.

**Congratulations**

**Alex Fuerbach, Mick Withford and Stuart Jackson**

Funding from the Asian Office of Aerospace Research and Development of the US-Air Force for the development of "All integrated mid-infrared fiber lasers". 3-Year funding, A$530k on total.

**Finalists for University awards**

Many congratulations to four of our staff who are finalists for a number of University level awards to be announced next month. Dr Devika Kamath is a finalist in the STEMM category for ECR research excellence. Sue Lumley and Kelly Sharpless are finalists in the Outstanding Service category as part of a group nomination for the FSE Outreach team. Emma Hastings is a finalist in the Leadership Excellence category.

**Future Fellow awardees**

We are thrilled to congratulate Dr Daniel Burgarth from the quantum team and Dr Shari Breen an Australian astronomer currently at the SKA in Manchester, UK, for their success in being awarded ARC Future Fellowships. These are highly prestigious awards with only 100 per year across all areas of non-medical research, and with only 10 this year being allocated in the physical sciences.

Daniel will be developing the theory of "NISQ" devices — noisy quantum computers based on microwave circuits such as the systems being developed by Google that have apparently achieved "quantum supremacy".

Shari will be studying the nature of star formation and dense gas regions in the Milky Way using radio astronomy techniques she has developed on the Australia Telescope Compact Array (ATCA) and other radio telescopes.
Upcoming events

**Multicultural Morning Tea**: *Thursday 24 Oct 2019 10:00am, Biology Courtyard (rear of 6 Wally's Walk)*

Please join us for the Physics and Astronomy multicultural morning tea celebrating the cultural diversity of all our HDR students and staff! Please bring a small food item from your country of origin to share - see you there!

**Moyal Medal Presentation and Lecture**: *Tuesday 5 Nov 2019 7:00pm, Level 8, 12 Wally's Walk*

The Moyal Medal Committee invites you to attend the lecture and presentation of the 2019 Moyal Medal to Professor Margaret Reid from the Centre for Quantum and Optical Science, Swinburne University of Technology. RSVP by Thurs 31 Oct via [https://bit.ly/33uKqS1](https://bit.ly/33uKqS1)

**HDR poster days**:

Please join us for our HDR Poster days showcasing the research of our HDR students!! There are 3 poster sessions to attend:

Astronomy :- Mon 25 Nov 1-4pm, Macquarie University - 14SCO, Atrium
Photonics :- Tue 26 Nov 1-4pm, USYD - Sydney Nanoscience Hub (Bldg A31), Research Wing
Quantum Physics :- Wed 27 Nov 4-7pm, UNSW - Physics Common Room Old Main Building, G59/60

**Astronomy Open Night 2020**: *Saturday 19 Sep 2020 18:00:00, Macquarie University - Wally's Walk*

Lock it in, Eddy! AON 2020 is coming to a galaxy near you on 19 Sept. And in the week immediately after, from Sep 21-25 will be the International Astronomical Union’s Communicating Astronomy to the Public Conference 2020, hosted at MQ, with local Chair Prof Richard de Grijs. Stay tuned for more on that one.

**Deadlines**

*Except for Physics and Astronomy deadlines, the following have no guarantee of accuracy and may be subject to change. You are responsible for checking the relevant websites for accurate dates and times.*

**Science and Engineering**

- **FSE staff and student excellence awards**: *Friday 01 Nov 2019*

  There are many categories of research, teaching, service and leadership awards for staff and students with prizes of $1000 to be awarded! Please check out the web page and consider a nomination. Portfolio leads Dave Spence (L&T), Research (Orsola De Marco) HDR (Alex Fuerbach), Service and Leadership (Emma/Mike) will be happy to provide advice. Info is at [https://staff.mq.edu.au/intranet/science-and-engineering/faculty-awards,-schemes-and-procedures](https://staff.mq.edu.au/intranet/science-and-engineering/faculty-awards,-schemes-and-procedures) and the nomination form is at [https://app.smartsheet.com/b/form/ad4f4dc8772849c6a8538b6b580d939a](https://app.smartsheet.com/b/form/ad4f4dc8772849c6a8538b6b580d939a).

**Macquarie**

- **DECRA MQ internal submission date**: *Thursday 06 Feb 2020*

  This is the internal deadline for compliance checking of DECRA applications by Research Services. Final ARC submission date is approximately one month later.
Useful links

- Submissions to this newsletter: tinyurl.com/mqphysastronewssubmissions
- Department facebook: facebook.com/mqphysastro
- Department twitter: twitter.com/MQphysastro
- Department instagram: instagram.com/MQphysastro
- AfA facebook: facebook.com/macquarieastronomy
- MUPAS student society: facebook.com/physics.mq