



CAASTRO Newsletter Edition 17, September 2016



INTRODUCTION FROM CAASTRO DIRECTOR

I am delighted to report that CAASTRO-3D, led by Prof. Lisa Kewley was announced on 8 September as one of the new ARC Centres of Excellence for 2017-24. The Centre of Excellence for Gravitational Wave Discovery (OzGRav), led by CAASTRO CI Prof. Matthew Bailes, was also successful. This is wonderful news, and the funding of these two new Centres represents a strong vote of confidence in CAASTRO and the wider Australian astronomy community.

CAASTRO-3D will receive a total of \$30.3 million from the ARC, starting from mid-2017, and will have its headquarters at the Australian National University with nodes at the University of Sydney, University of Melbourne, Swinburne, University of Western Australia and Curtin. OzGRav will receive \$31.3 million from ARC, and will have its headquarters at Swinburne University with nodes at the University of Adelaide, ANU, UWA, the University of Melbourne and Monash University.

The AAO and CSIRO are Partner Institutions for both new Centres, along with other national and overseas research organisations. The ARC announcement is online at: <http://www.arc.gov.au/announcement-kit-centres-excellence-funding-commencing-2017>

Warmest congratulations go to Lisa, Matthew and their teams. I look forward to working with them over the coming months as we start to plan for the transition to these new Centres. We anticipate that CAASTRO itself will continue to operate until at least the end of 2017, and we are fully committed to completing our current science programs and other activities.

The CAASTRO Executive held its latest face to face meeting in Perth earlier this month (just before the ARC funding announcement). This is the meeting at which we review the progress of all our science projects, and it was excellent to see that work in all areas is going well - and that the number of publications from CAASTRO projects continues to increase.

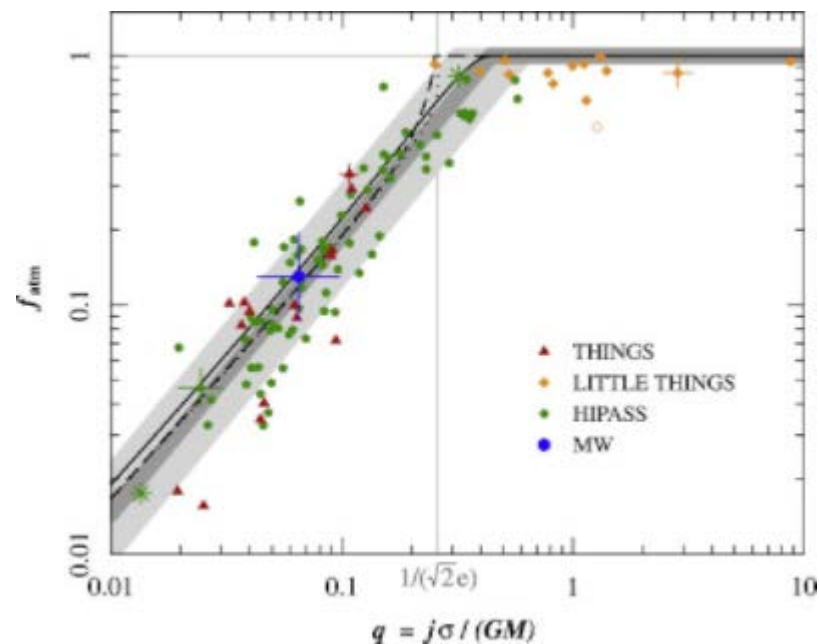
I've just returned from Queenstown, New Zealand where I attended a week-long meeting on "Innovation and Discovery in Radio Astronomy" held in honour of our CAASTRO Advisory Board member Prof. Ron Ekers. This was a wonderful opportunity to reflect on Ron's many contributions to Australian and international astronomy, and to discuss how best to create a research environment in which innovation can flourish.

In recent weeks I've completed a set of visits to all the CAASTRO university nodes, and very much enjoyed the chance to meet and talk with CAASTRO members across the country. I also hope those of you who attended last week's CAASTRO conference "The Changing Face of Galaxies" in Hobart, enjoyed their time there. Finally, I'd like to encourage all of you to consider attending the next Australia-China ACAMAR workshop in Suzhou, China on 5-7 December. This will be an excellent opportunity to hear from and build research collaborations with our Chinese colleagues. The workshop will focus on radio astronomy science and SKA, Antarctic astronomy, large optical/IR facilities and Big Data challenges. Registration is now open at: <http://caastro.org/event/2016-2ndacamar>

RESEARCH UPDATE

Angular momentum regulates atomic gas fractions of galactic disks

The mass fraction of neutral atomic gas (HI and He) in isolated local disk galaxies appears to be determined by just two factors: the baryonic specific angular momentum of the disk and the velocity dispersion of the atomic gas. The model agrees remarkably well (± 0.2 dex) with measured mass fractions, even for galaxies that are extremely HI-rich or HI-poor for their mass.



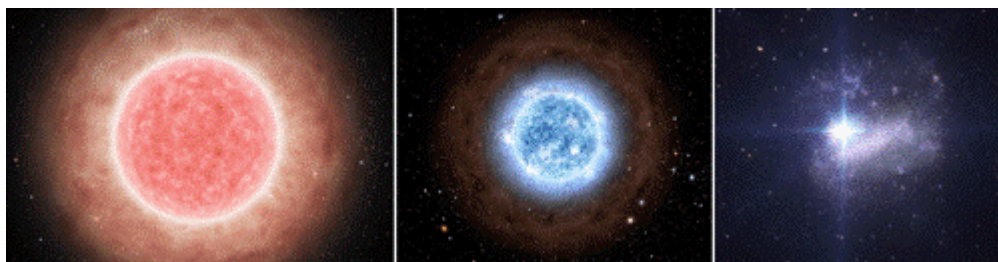
Comparison of the model against data from the local Universe. (From Obreschkow et al. 2016)

Publication details:

Obreschkow, D., et al. "Angular momentum regulates atomic gas fractions of galactic disks". *ApJL* 824, 2 (2016).

[Peering into the Pre-History of SNR 1987A](#)

The MWA has been used to observe supernova remnant 1987A at frequencies between 72–230 MHz, the lowest-frequency radio observations of the source to date. This large lever arm in frequency space constrains the properties of the circumstellar medium created by the progenitor of SNR 1987A when it was in its red supergiant phase. Previously, only the final fraction of the dead star’s multi-million-year-long life, about 0.1% or 20,000 years, had been observable.



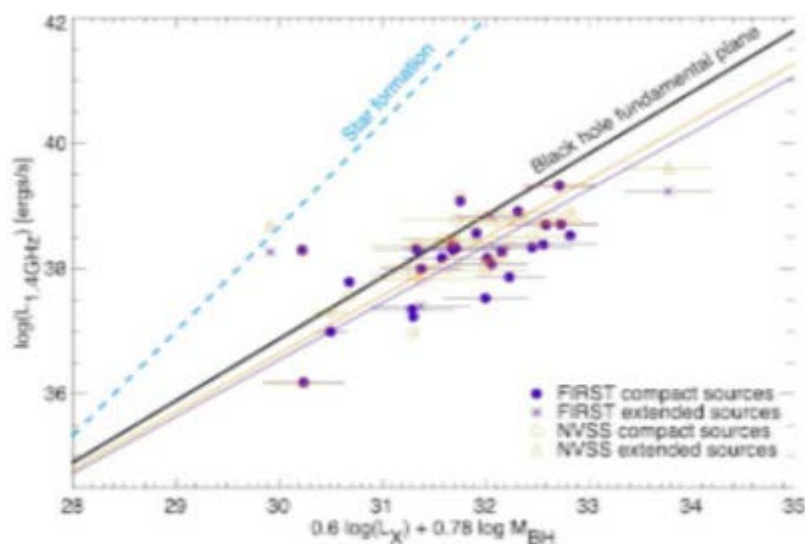
Publication details:

Callingham, J.R., *et al.* “Low radio frequency observations and spectral modelling of the remnant of Supernova 1987A”. MNRAS 462, 1 (2016)

<http://mnras.oxfordjournals.org/content/462/1/290>

[AGN vs Star-Formation in the Radio-FIR Arena: A New Umpire](#)

1.4-GHz radio emission can point to star formation or black hole activity. A sample of 92 AGN, selected by hard X-rays and found to be radio-quiet, fitted the radio-FIR correlation typical of star-forming galaxies. But the relationship between their X-ray and radio luminosities suggests that in fact the radio emission arises from AGN accretion.



The radio–X-ray Fundamental Plane (black line) and the X-ray–radio relationship expected from star formation alone (dashed blue line). (From Wong *et al.* 2016)

Publication details:

Wong, O. Ivy *et al.* "Determining the radio active galactic nuclei contribution to the radio-far-infrared correlation using the black hole Fundamental Plane relation". MNRAS 460, 2 (2016). <http://mnras.oxfordjournals.org/content/460/2/1588>

CAASTRO EDUCATION AND OUTREACH

With our hugely popular planetarium show "Capturing the Cosmos" attracting thousands of visitors to screenings around the country, the Education & Outreach program is focused on its next two big legacies.

An initial set of ten stories about some of our "Bright Stars" in CAASTRO (the pun is intended) is currently being prepared for publication on the website but also for print into a large wall calendar for classrooms. This program, led by Wiebke Ebeling and Jacinta den Besten, will tell high school students how varied interests and backgrounds can be and what really matters in the lives and careers of astrophysicists. The calendars will also highlight significant dates in astronomy.

Aiming at a launch at Perth Astrofest on 18 March 2017, CAASTRO members Wiebke Ebeling, Jenny Lynch and Christian Wolf are working with two Perth-based artists, author Cris Burne and illustrator Aška, to produce a children's book. The draft is already in its near-final stages and almost ready for the final artwork. This has already been an exciting project, and it promises to be a great resource – entertaining, yet educational – for young readers and budding scientists!

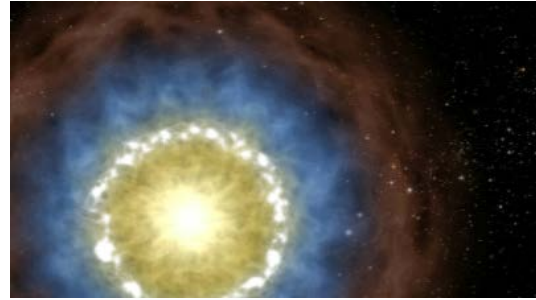
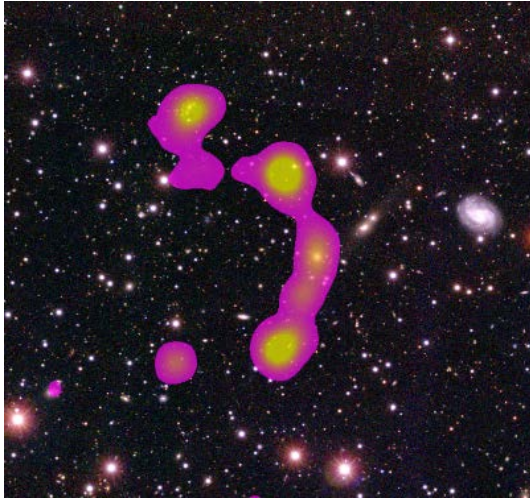
CAASTRO led the international collaboration on a [press release about the Radio Galaxy Zoo project](#). CAASTRO postdoc Julie Banfield (ANU) was lead author on the paper about the discovery of a rare "Wide Angle Tail" radio galaxy by two Russian citizen scientists, with CAASTRO members Anna Kapinska and Ivy Wong (both ICRAR) and Partner Investigator Ray Norris (CSIRO, WSU) among the co-authors. In Australia, the story was distributed by CAASTRO, ICRAR, the ANU and UTas; internationally, by the University of Minnesota (USA) and University of Guanajuato (Mexico). An [article by Ray Norris in The Conversation](#) was published on the same day, explaining the importance of citizen science in modern astronomy.

Now in its third year, our outreach partners at Ayers Rock Resort hosted the [Uluru Astronomy Weekend](#) on 26-28 August. Guests indulged in all things astronomy under the breathtaking outback skies, hosted by The Science Show's Robyn Williams and our CAASTRO experts Rachel Webster, Matthew Bailes, Emma Ryan-Weber and Ray Norris.

We recently produced a [video](#) to accompany our press release "[Faintest hisses from space reveal famous star's past life](#)" for University of Sydney PhD student Joe Callingham's paper about MWA observations of Supernova 1987A. This story generated good traction, especially in international online media, and the video has clocked up almost 6,000 views within a month.

CAASTRO was once again a major sponsor of Melbourne's "[Astronomy & Light Festival](#)" on Saturday 10 September. The event was again organised by our long-term outreach partners "Telescopes in Schools" and Mount Burnett Observatory and

hosted at Scienceworks. The program included screening of the CAASTRO planetarium show "Capturing the Cosmos" and our full-size MWA tile display (donated to Mount Burnett), well as talks and hands-on activities by CAASTRO members. Despite unfavourable weather earlier in the evening, the festival was a huge success and attracted over 2,000 visitors – about double the number of last year's inaugural event.

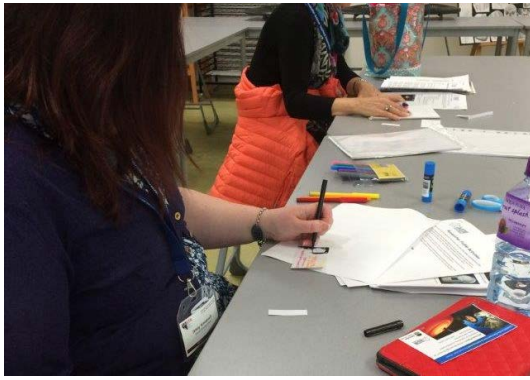


CAASTRO IN THE CLASSROOM

CAASTRO in the Classroom is powering along, reaching more students and teachers than ever before! Two successful online streaming events have been held over the past few months. 'Why Study Physics?', presented by Dr Vanessa Moss was held in May, reaching 700 students, and Professor Scott Croom presented 'Awesome Astronomy' for 2,400 primary school students in August. Schools submitted questions via Twitter and a selection of questions appeared on the screen during the live streams and were answered by the presenters at the end of each session. This was a collaboration between CAASTRO and the New South Wales Department of Education and everyone involved has been extremely happy with the results. Recordings of the live streaming events are available through YouTube, meaning the presentations will reach even more people into the future.

Excellent video conferencing sessions have been presented by Luz Angela Garcia (Swinburne), Fiona Panther (ANU), Dr Luke Barnes (University of Sydney) in school Terms 2, and Alexandru Codoreanu (Swinburne) in Term 3. Video recordings of past video conferencing sessions are now available on the CAASTRO in the Classroom website.

Silvia Choi, our resident high school science teaching expert, and Jenny Lynch, have finalised pre and post-visit classroom resources <<http://www.caastro.org/classroom-resources>> for each of the CAASTRO in the Classroom video conferencing topics, and teacher professional development workshops have been run in Sydney, Adelaide and Brisbane, and via webcast for teachers in Queensland.



Left: Teacher Workshop: Teachers getting hands-on at the South Australian Science Teachers' Association Conference in Adelaide, making business cards based on CAASTRO Researcher Profiles

Right: Trade display: Jenny Lynch at the South Australian Science Teachers' Association Conference in Adelaide

CAASTRO Connections

This year we will officially launch CAASTRO Connections – our Alumni Network. All CAASTRO alumni have been invited to join this new group and we will have a variety of events each year for past and current CAASTRO members. We encourage alumni to participate actively in the CAASTRO community, to attend events, volunteer, create new ways for alumni to stay connected to CAASTRO, and to contribute to the greatness of our centre. Whether you would like to be involved as a: committee member, speaker, mentor, or local alumni group.

The purpose of CAASTRO Connections is to foster a spirit of loyalty, support CAASTRO's goals, and to strengthen the ties between alumni, the community, and CAASTRO. For more information, visit to CAASTRO Connections page on our website.



First Sydney Astrofest draws 2000 people

Stargazing events are not uncommon, but how often do they come with a great line-up of speakers, activities for kids, a slate of exhibitors and a travelling planetarium? That's what the University offered on Saturday 30 July at Sydney Astrofest. As far as we know, this was the first event of its kind to be held south of Sydney Harbour.

The promise of a free night of family fun lured 2000 people to campus.

Events took place in and around the Charles Perkins Centre, next to Oval no. 2. That afternoon the University rugby team was battling it out with Warringah in the first semi-final for the Shute Shield, so amateur astronomers were setting up their telescopes to the crowd's happy cheers. (Sydney won, so the rejoicing carried on into the night.)

The astronomy-keen rolled in from 4pm, instantly forming a queue for planetarium tickets (which sold out within an hour). They then stormed the lecture theatre for the official opening by Joss Bland-Hawthorn (University of Sydney). That was followed by the first talk, by cosmologist Alan Duffy (Swinburne University): no dry spiel this, but a romp through space science as depicted in the movies. By the time Alan had finished it was dark, and while many people settled down in the theatre for a night of great talks, others formed lines to look through the eight telescopes on site at Mars, Saturn, Jupiter and the odd nebula. Inside in the warmth kids were busy building space stations and aliens out of LEGO and concocting telescopes out of toilet rolls, while their elders checked out goodies on the stalls, from liquid-nitrogen demos to virtual-reality goggles. After all that activity had fed the mind, the Lions Club Sausage Sizzle was there to feed the body too — and raise funds for the Starlight Foundation charity in the process.

Sydney Astrofest was organised by CAASTRO, the ARC Centre of Excellence for All-sky Astrophysics, and well supported by the School of Physics. In particular, thanks are due to Joss Bland-Hawthorn and to Tara Murphy, Vanessa Moss and Joseph Callingham, three of the night's eight speakers; and to the other wonderful volunteers, without whom the event wouldn't have happened: Tristan Anlezark, Dougal Dobie, Alexander Hinde, Tiphaine Lagadec, Shourya Khanna, Kevin Tam, William Tan, Bernanda Telalovic, Yingying Xu, Andrew Zic and Peter Zhu. CAASTRO's Debra Gooley and Jenny Lynch bore the brunt of organising the event, helped by Wiebke Ebeling, Helen Sim, Kylie Williams and CAASTRO's Chief Operating Officer, Kate Gunn. The many exhibitors and sponsors gave the event great support, with Sydney Observatory and Celestron, both of which donated prizes, deserving special mention.





MEMBERSHIP UPDATE

CAASTRO now has 184 members. We welcome most recent members:

- **Tania Barone** ANU Student (Honours)
- **Rajan Chhetri** CURTIN Research Staff
- **Aditya Parthasarathy Madapusi** SWIN Student (PhD)
- **Ding Yan** SWIN Research Staff (Molonglo)
- **Rodrigo Canas Vazquez** UWA Student (PhD)
- **Pascal Elahi** UWA Affiliate
- **Guido Granda Munoz** UWA Student (PhD)
- **Charlotte Welker** UWA Affiliate
- **Jacobo Asorey** UQ Research Staff
- **Susanne Meinen** ANU Administrator
- **Xiang Zhang** Curtin Student (PhD)
- **Kathryn Plant** Swinburne Research Staff
- **Jacob Golding** ANU Student (PhD)
- **Jing Li** University of Sydney Student (Honours)

CAASTRO MEMBER PROFILES

Susanne Meinen (ANU)

I was born in Germany and moved to Australia in May 2014 for the work of my husband. We have lived in Brisbane, Cairns and Canberra since we moved here.

I have studied Physics in Germany and before coming to Australia I was working as "Technical Product Manager" for Roche Diagnostics. As Technical Product Manager I was the interface between Global Marketing and R&D within Roche. The System I was responsible for offers solutions for



clinical chemistry and immunochemistry testing in low volume laboratories. At the moment I'm on maternity leave with Roche.

Laura Wolz (UMELB)

I started my position as a CAASTRO postdoc at the University of Melbourne with Stuart Wyithe in October 2014 to work on simulations and theory prediction for HI intensity mapping experiments. Prior to this, I have completed my PhD at the University College London where I studied the effect of foreground removal on the



cosmological analysis of intensity mapping observations, both on simulations and on data. Furthermore, I worked on novel signal processing methods for radio-interferometric imaging with Dr Jason McEwen.

My current research focus is to explore the scientific prospects of intensity mapping surveys in relation to their instrumental. For instance, observations with a single dish such as Parkes telescope are more suitable to test for cosmological effects on the very large cosmological scales, whereas experiments with radio interferometers, such as the Square Kilometer Array and its pathfinders might be more sensitive to galaxy evolution parameters, such as the HI gas contents of galaxies. More specifically, when cross-correlating HI intensity maps with galaxy surveys, the HI content of the optical galaxies determines the shape of their cross-correlation which is a unique way to test for galactic gas contents at redshifts around 1. In my research, I enjoy working with simulations to predict experiment outcomes as well as processing intensity mapping data in order to remove the foregrounds and estimate their power spectrum.

AWARDS

Congratulations to Sam Hinton - Bok Prize 2016!

University of Queensland and CAASTRO student, Samuel Hinton has been awarded the 2016 Bok Prize from the Astronomical Society of Australia. The Bok prize is given to the best Australian Astrophysics honours thesis of the previous year, as judged by a panel from the ASA. As a reward, Sam receives the prize of a bronze medal and cheque for \$500. Congratulation Sam!

Congratulations to Rachel Webster - Redmond Barry Distinguished Professor

This significant achievement recognises professors who demonstrate outstanding leadership in the University and wider community, coupled with pre-eminence in their research, teaching and creative activity.

At the end of its funding period (2017-2018) CAASTRO is keen to leave behind a legacy of useful items for future researchers, outreach and professional staff members working within astrophysics. This may take us a while to establish, so we are keen to start early.

The purpose of this survey is to collect information on the legacy items that we have developed within CAASTRO.

We would like all CAASTRO members to think about what we are doing well and complete this form. <http://goo.gl/forms/tK0byVsxy6>

These items could include:

- Intellectual property
- Software (we will ask you more questions later on this topic)
- Data product & simulations
- Case studies
- Policies – membership, publications, gender etc
- Outreach programs
- Tool kits
- Other programs – ECR, mentoring, busy weeks
- Templates – annual report, other reporting (project, KPI, budget), presentations etc
- Processes & procedures
- Event planning and systems
- Committee items and ideas – student, postgrads, etc

Don't worry about duplication.

Thank you for your contribution!

GENDER ACTION

Since late 2015, CAASTRO has been conducting Exit Interviews with CAASTRO members who have been leaving CAASTRO to receive feedback on how well we are progressing. Every respondent was extremely positive with their involvement in CAASTRO and communicated disappointment in having to leave. Most were also seeking or had obtained affiliation and were looking forward to future collaborations with CAASTRO members.

The positive impacts of CAASTRO had to do with travel funding (80%), mentoring (60%), and opportunities for collaboration/networking/conferences (80%). Also mentioned were strong leadership, outreach programs and cohesive sense of science themes.

Everyone was aware of the Gender Action Committee (GAC) although the knowledge seemed to be more incidental than targeted towards them. They were all able to list GAC initiatives, including family friendly workplace and conference arrangements, targeted gender equity at conferences and the Pleiades Award.

Whether the GAC had made a difference to gender equity was generally a positive response, but no-one was able to quantify this (but would like to.) The general

feeling was that gender equity was most prevalent within CAASTRO compared to other Physics departments both in Australia and internationally. All respondents were very keen to begin implementing similar initiatives or discuss them with colleagues at their new place of employment and spoke of a real need for this to happen.

No respondent had experienced or observed any form of harassment or discrimination within CAASTRO. All respondents did not have a clear procedure in mind for reporting incidents or know who would be the most appropriate person to report to (this information is below). Despite the lack of clear procedure, all respondents indicated that they felt comfortable in reporting to someone, supervisor, node leader, mentor but would have appreciated a clearer procedure.

Equity, Access and Diversity - Support and Advice

There are times when sometimes you need some informal advice on day to day issues. Feel free to contact us for this advice. While each University or organisation has their own support programs and specific policy responses to issues of diversity, harassment and gender issues, CAASTRO is happy to help you navigate through any challenges you may be facing. Please contact us now by clicking on the link on the CAASTRO intranet page <http://www.caastro.org/gender-action-committee> or you can contact any member of the Gender Committee directly.

If you would prefer to report an issue *anonymously*, you can describe it on "[I need support now](#)"

You are also welcome to discuss any matters related to the Gender Action Committee and its activities with the **co-chairs**, Brian Schmidt and Rachel Webster. Also, the Director, Elaine Sadler is always open to any staff member or student with an issue to discuss.

POST DOCTORAL COMMITTEE REPORT

The Committee created and has since curated a spreadsheet to advise CAASTRO postdocs (and finishing PhD students) on jobs and other funding opportunities and to alert them to upcoming training courses and award schemes. Having invited CAASTRO Director Elaine Sadler and ex-ANU postdoc Richard Scalzo to join the recent meeting and recommend further activities, the committee has started work on fact sheets about common grant programs, local contact databases of 'grant alumni' who can mentor postdocs through the process of grant applications with helpful tips, local 'hackathon-style' resume writing workshops and a session at the CAASTRO Annual Retreat. There is certainly not a shortage of ideas, and [the committee always welcomes feedback](#).

UPCOMING EVENTS

- [The Changing Face of Galaxies: uncovering transformational physics](#): 2016 CAASTRO Scientific Conference, 18-23 September 2016, Wrest Point Hotel,

Hobart, TAS, Australia

- [CAASTRO Annual Retreat](#): 28-30 November 2016, Abbey Beach Resort, Busselton, WA, Australia
 - [2nd Australia-China Workshop on Astrophysics](#): 5-7 December, The Sydney Suzhou Centre, Suzhou Higher Education Park, Suzhou, China
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PAST EVENTS

2nd OzSKA Workshop

The second annual OzSKA meeting was held in Perth on 8th April 2016 at the Rendezvous Hotel Perth Scarborough, directly following from the ACAMAR meeting held on 5-7 April at the same venue.

The main purpose of this one-day meeting was to update the Australian astronomical community about recent progress within the SKA project including: the development of key science and working group activities, how to participate, key upcoming dates, and progress towards the realisation of scientific operations on SKA1. The programme included a mixture of invited talks, contributed talks and discussion.

The meeting attracted 61 formal participants (22 female), including David Luchetti & Jerry Skinner from the Australian SKA office, Claire Patterson from the Department of the Premier and Cabinet (Government of WA), Simon Aarons from the Office of Science and Tyler Bourke from the SKA Observatory Office. The meeting included two Chinese participants, Prof. Xuelie Chen and Dr. Mingmin Chi.

The meeting consisted of a session on SKA politics, summaries of SKA science from members of the various SKA Science Working Groups, and a session on SKA infrastructure. The meeting concluded with a 45-minute discussion hosted by panelists Ron Ekers, Sarah Pearce, Peter Hall & Tyler Bourke on the upcoming technical challenges confronting the SKA.

The organising committee consisted of Jean-Pierre Macquart, James Miller-Jones, Martin Meyer, Kate Gunn and Kylie Williams, and the meeting was jointly sponsored by ICRAR and CAASTRO.
