

Education/outreach: Capabilities and Opportunities

As with many aspects of our science, Australia's accomplishments in astronomy education and outreach far exceed what might be expected of a nation of its size. Our practitioners are internationally sought-after. The overall picture is of a vigorous and robust sector promising growth throughout the remainder of the Decadal Plan period.

University: A strong research sector stimulates undergraduate and postgraduate studies, and the growth in astronomy students noted in the current Decadal Plan shows every sign of continuing throughout the decade. The political landscape also appears reasonably promising, with both major parties foreshadowing university research funding increases that could be as high as 3% of GDP – somewhat higher than the UK, for example. There is also strong growth in externally-funded initiatives, such as those in the USQ's Astrophysics Group, which augments highly-competitive on-campus and external study programs with major infrastructure collaborations (<https://astrophysics.usq.edu.au/>). Several other universities have similar programs.

School education: Recent education conferences (e.g. <https://stem-in-ed2018.com.au/>) have consistently highlighted the value of feedback from professional organisations within STEM disciplines, with the concurrent theme of women in STEM also strongly represented. Both aspects are being addressed by a large number of programs within the astronomical community. The two astronomy-themed 2017 – 2023 ARC Centres of Excellence (OzGrav and ASTRO 3D) have full-time education officers, who not only take astronomy to the classroom, but also provide teacher workshops and participate in collaborative enterprises with museums, education centres and artists. Likewise, initiatives such as CSIRO's Pulse@Parkes and Astronomy from the Ground Up (in collaboration with the Australian Science Teachers Association), both of which are highlighted in the current Decadal Plan, are ongoing. Rather more than half the 27 presentations in the December 2018 ASA EPOC Workshop were about school-level education, many highlighting specific programs such as Our Solar Siblings, ICRAR's SPIRIT (for WA) and Edith Cowan University's ATARP for teachers. (<https://www.icrar.org/conferences/asaepoc2018/>)

Public outreach: Astronomy and space science are rich in opportunities for outreach activities, and there is no shortage of enthusiastic and effective practitioners within the Australian professional community. The rise of social media over the past decade or so has transformed the landscape, significantly augmenting traditional outreach media, particularly among the younger generation. Emerging outreach tools include podcasting, virtual reality, astronomy tourism, dark sky parks and *Stargazing Live* TV events, while visitor centres, public observatories, planetaria and the amateur community remain foundations of outreach. Public interest in indigenous astronomy is particularly high. Current efforts among astronomy/space communicators are directed towards the 100th anniversary of the IAU and the 50th of Apollo 11, both in 2019. Other anniversaries, together with natural phenomena such as eclipses, transits and comets, will continue to present opportunities for concerted outreach efforts.