ALMA tracks powerful AGN magnetic field

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Change, not decay

EDITORIAL In a few years, the RAS will be celebrating 200 years of promoting astronomy and geophysics, in line with our charter. RAS 200: Sky & Earth projects – the first six are described on pages 3.11–3.12 – will do this in innovative ways to bring the Society's interests to new and wider audiences, giving the bicentenary a lasting legacy.

While RAS 200 is a significant investment in change, it represents the ways in which the Society is evolving alongside the society in which we live. Today's professional science culture would be alien to the 14 gentlemen who sat down in the Freemasons Tavern in 1820 to promote astronomy. Although I'm sure our founders would enjoy a chat in the pub with today's astronomers and geophysicists, I think they would be surprised by who the scientists are now.

A survey described by Robert Massey on pages 3.15–3.17 of this issue examines RAS demographics. The short version is that we're too male and too pale. Society has changed and we as a society need to change, too.

That is the goal of RAS 200: new ideas to reach new people and build wider public support, while inspiring the world-leading scientists of the future. Whether we reach them through wilderness expeditions or music doesn't matter. We can't be complacent and assume that everyone thinks of science in the same way we do. We have to change what we do, or we risk decay.

Sue Bowler, Editor

SKA chooses UK for HQ after all

SKA After further consideration of the two bids to host the permanent headquarters for the Square Kilometre Array, members of the partnership have decided that they prefer the UK's bid for the University of Manchester's Jodrell Bank site.

The news was welcomed by RAS President Prof. Martin Barstow: "I'm delighted that the UK has won this hard-fought contest. Having a facility like this here in Britain demonstrates just how exciting a career in science and engineering can be – it shows young people that they really can reach for the stars."

A strong package of support from the UK government was an important element in the decision, which had originally been deferred after political wrangling (*A&G* 2015 **56** 2.4).

● The SKA itself has taken another step forward, with agreement to move to the final, preconstruction phase. The scope of the first phase of the array has been agreed, within a budget capped at €650m (at 2013 values). The updated SKA1 Baseline design will include SKA-MID (incorporating MeerKAT) in South Africa and SKA1-LOW in Australia, but not SKA1-Survey in Australia, which has been deferred. In South Africa this means 70% of the planned 190 SKA1 dishes will be built, to provide baselines of 150 km. SKA1-Low in Australia will consist of 50% of the planned 262 144 low-frequency dipoles, covering the planned range of 50–350 MHz, with the planned baseline of ~80 km.

http://www.skatelescope.org

Artist's impression of the expansion to the current SKA headquarters at Jodrell Bank proposed by the UK. (University of Manchester)

SKA heads for the Cloud

SKA Data handling is a necessary technology for SKA, which will generate more data than the entire instantaneous internet traffic. The prospect of being able to use such vast datasets is a draw for governments and industry seeking involvement in the SKA, but the tools and techniques needed to do so effectively do not yet exist. The SKA Organization has teamed up with Amazon Web Services to offer grants in the programme AstroCompute in the Cloud. Grants will be awarded for the development of innovative tools and techniques for processing, storing and analysing the global astronomy community's vast amounts of astronomic data in the cloud. Grant recipients will have access to credits for AWS cloud services over a two-year period and up to one petabyte of storage for data contributed by SKA partners, which AWS will make available as a public dataset. Anyone associated with or using radio astronomical telescopes or radio astronomical data resources around the world is welcome to apply.

"This is an exciting opportunity, not only for our partner institutions, but for all companies and research facilities around the world dealing with astronomy data," said Prof. Philip Diamond, SKA Organization director-general. "The call is to help us explore how cloud computing can help process the data deluge we are expecting in astronomy in the 21st century – and in particular with the SKA."

http://bit.ly/1H2RRme

ALMA tracks powerful AGN magnetic field

AGN Active galactic nuclei (AGNs) are powered by a stream of matter falling onto their central supermassive black hole, producing powerful jets along the axis of rotation. New ALMA measurements have shown that the magnetic fields where these jets form – close to the event horizon – are strong, at least tens of Gauss within a few light-days (0.01 parsec) of the black hole.

AGN jets consist of relativistic plasma driven by magnetic fields, which also produce synchrotron radiation. The polarization of this emission provides a measure of magnetic field strength, but is difficult to measure because synchrotron self-absorption blocks emission at wavelengths longer than submillimetre. Now the Atacama Large Millimetre Array (ALMA) has measured the Faraday rotation at 300 GHz (~1 Thz in the rest frame of the source) for AGN PKS1830–211. The field is strongest close to the black hole, where plasma is injected into the jet stream and accelerated.

Artist's impression of a supermassive hole surrounded by an accretion disc and dusty torus, and with a high-speed jet of ejection material. (ESO/L Calçada)

Researchers used the high resolution of ALMA at these wavelengths to pinpoint the emission, and developed a new polarimetry technique. Ivan Martí-Vidal of Chalmers University, Sweden, is lead author of the paper in *Science*.

http://www.eso.org/public/news/eso1515

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