SKA 2019 Calendar

Inspiring all generations with the world’s largest radio telescope
The SKA is a monumental scientific endeavour, promising to answer some of the biggest remaining questions in astrophysics and inspiring future generations to get involved in science and engineering.

Explaining the mind-boggling possibilities of the SKA to the public as well as its likely broader impact to society at large is the work of education and outreach teams at the SKA Organisation and in our partner institutions around the globe. Their efforts and those of many skilled colleagues across disciplines involved in outreach activities, are an essential part of this vast project, sharing their knowledge and enthusiasm for the SKA with budding young talents, explaining how the project is benefitting local communities, and developing skills and capacity among future user communities.

The 2019 SKA calendar celebrates their work: from public lectures and observatory tours to mass stargazing events and novel activities that help even the very youngest enquiring minds to learn about the capabilities of this awe-inspiring project.

The events chronicled in this calendar are just a snapshot of activities delivered by our partners for several years already, that have enthused millions of people and raised awareness about the SKA and its precursors and pathfinders across our 12 member countries. They provide a vital link between the science and engineering work at the heart of the pre-construction phase, and people of all ages and backgrounds all over the world.

As we progress through to construction and operations of the telescope, these efforts will grow further, reinforcing the support for our project and helping more people in more places to feel that they, too, are a part of the global collaboration that is the SKA.

We hope you enjoy this calendar as much as we do!

Happy 2019 from the SKA Organisation
Getting Australia excited about the SKA!

Australians love looking up to the night sky and wondering what’s out there. In 2018 we broke the world record for simultaneous stargazing with 40,000 people observing the moon at once! This July, we’ll celebrate the 50th anniversary of the moon landing, when CSIRO’s Parkes Observatory claimed a place in history by receiving the transmissions of man’s first steps on the moon.

Australia’s past astronomy achievements are impressive, but we’re even more excited to host part of the Square Kilometre Array. A range of outreach and education activities are helping to build this excitement and ensure we’re future ready.

ICRAR’s team of professional science communicators and educators have delivered programmes to more than 150,000 members of the public, school students and teachers. These programmes raise the profile of radio astronomy, the SKA and SKA precursors and pathfinders in Australia, inspire public interest and participation in science, engineering and data intensive research; and promote uptake of science, engineering and technology-related studies and careers.

CSIRO’s Pulse at Parkes programme provides students with hands-on experience hunting for pulsars, as they remotely operate the telescope in real-time – the programme can run anywhere in the world and recently inspired scores of students in South Africa, thanks to our engagement with SARAO. CSIRO is developing the future SKA observatory in Australia – the Murchison Radio-astronomy Observatory (MRO) and hosts VIP, media and regional stakeholder visits, including the local Wajarri Yamatji, the site’s traditional owners. Notably in 2018, CSIRO partnered with the Australian SKA Office and the Murchison Widefield Array team, to host the first public open day at the MRO – welcoming 200 people from surrounding regions.

We look forward in 2019 to continuing to inspire Australians with the wonders of our southern skies, our proud history in astronomy, and the exciting future promised by the SKA and other next-generation astronomy projects.

SKA Australia, CSIRO, ICRAR
Perseid meteor shower in British Columbia, Canada

Each August, over 600 visitors gather at the National Research Council’s Dominion Radio Astrophysical Observatory in Kaleden, British Columbia, Canada to learn about the stars and to prepare for one of the biggest annual light shows of the year – the Perseid meteor shower.

This annual event is a crowd favourite, offering an unobstructed, dark sky for optimal viewing – participants may witness as many as 80 meteors per hour. NRC astronomers give a number of public talks through the evening, on topics ranging from the origin of meteor showers to the history of radio astronomy in Canada. Meanwhile the Royal Astronomical Society of Canada (Okanagan Centre) offer views through their telescopes, helping participants discover the splendours of the night sky up close.

While on the site, visitors also have a chance to learn more about the CHIME (Canadian Hydrogen Intensity Mapping Experiment) radio telescope which joined the SKA Pathfinder family on 21 November, 2018. The National Research Council Canada is proud to host this unique instrument that has been designed to map faint cosmic ripples over the entire sky in order to study the effects of dark energy as well as finding and studying Fast Radio Bursts (FRBs).

The CHIME project is co-led by the University of British Columbia, McGill University, University of Toronto and the Dominion Radio Astrophysical Observatory with collaborating institutions in North America.
Training the next generation of SKA users in China

Shanghai Astronomical Observatory (SHAO) is leading the China SKA Regional Centre preparation and hosting various scientific activities and outreach programmes. The most important of these is developing the science team and training students. The first three China SKA summer schools were held from 2013 to 2015 and focused on HI and pulsars, with financial support from the Ministry of Science and Technology (MOST) of China and Chinese Academy of Sciences. The fourth China SKA summer school was held by SHAO from 8-12 August 2018 with the main subject focusing on SKA low-frequency science and the SKA-low precursor MWA. This summer school was also a collaborative project under the cooperation framework between Chinese and Australian SKA teams, such as the Joint Research Centre established between SHAO and Curtin University, and the ERIDANUS project (Asia-Pacific SKA Regional Centre). Lecturers from University of Western Australia (Prof. Lister Staveley-Smith), Curtin University (Prof. Melanie Johnston-Hollitt, Dr. Paul Hancock, Dr. Jack Line, Prof. Ben McKinley and Dr. Steven Tremblay) and CSIRO (Dr. Christopher Riceley) were invited. The lecture topics covered general radio astronomy and radio data analysis, and SKA-related sciences including the neutral hydrogen detection of the Epoch of Reionisation, low-frequency radio continuum surveys, pulsar search and timing, galaxy clusters, and radio transient detection.

Hands-on training was also organised. About 50 undergraduate and graduate students and 30 junior researchers attended this event and showed great enthusiasm for the SKA. These workshops serve to develop the talent needed for one of the greatest global science endeavours of the century.

SKA China, Shanghai Astronomical Observatory

Credit: SKA China Office
Dreaming and making people dream about the SKA in France!

The French astronomical community is aware of the potential to make people dream by talking about the sky, the Universe, its birth and the evolution of all astrophysical sources. The SKA and its pathfinders are helping us to do this! These images represent just a few of the important events held at research institutes involved in SKA-France.

Every year in September, the Nançay Radio Observatory opens to the public. Visitors can stroll around the 150 hectares of the Observatory on foot or in horse drawn carriages, discover instruments, talk to scientists about their research, attend public conferences and sometimes have a rest and dream... Astronomers, engineers, and technicians working at Nançay also dream of new instruments and new discoveries.

NenuFAR is a large low-frequency radio telescope and an SKA pathfinder, in construction in Nançay. Designed, built and commissioned by a small team, it will perform observations in the 10-85 MHz range with very high instantaneous sensitivity, as a beamformer and imager on its own, and as a giant-station of the European LOFAR radio telescope. It will start its operations in 2019.

In autumn 2007, on the site of the LAB / OASU in Floirac, near Bordeaux, the renovation of the Würzburg radio telescope (former German radar of the Second World War) began, in order to turn it into an effective teaching and outreach tool for radio astronomy. From 2009 until 2016 the instrument was made available to teachers, students and amateurs, either via a web interface or through visits to the site. The radio telescope was open to everyone for free, and there were on-site mini courses. This tool was part of the European project and network “Hands-On Universe”. The developments for SKA of the LAB electronics team will be used in the future for a new radiotelescope, which will be open to the public.

The instruments at Plateau de Calern, one of the research sites hosted by Observatoire de la Côte d’Azur (Nice), welcome more than 5,000 visitors every two years for the Night of Open Doors. This flagship public outreach event of the southern region of France (Provence-Alpes-Côte d’Azur) hosts conferences, guided tours of the scientific instruments, art-science expositions and music concerts, creative workshops for children, observations of the sky with local astronomers, laser shots to the moon and astronomical observations.

Maison SKA France, CNRS
Indian celebration of the Raman Effect at GMRT

The National Centre for Radio Astrophysics (NCRA) has programmes to popularise science and technology among the general public, especially the student community. The most significant of the activities is the National Science Day which is celebrated every year on 28th February all over India to commemorate the discovery of the Raman Effect by C.V. Raman for which he was awarded the Nobel Prize in Physics in 1930.

The NCRA Science Day celebrations are held at the Giant Metrewave Radio Telescope (GMRT) observatory. The GMRT, which is one of the SKA pathfinders operating at low radio frequencies, was built and is being operated by the NCRA. Science Day events are usually spread over two days in order to cater to the tremendous response from the general public, especially the students from the schools and colleges in the rural and semi-urban areas and districts in western Maharashtra, and those near the GMRT observatory. It is perhaps one of the largest Science Day events in rural India, with about 100 schools, colleges and institutions participating, and over 25,000 people visiting each year during the two-day event.

The programme consists of a grand Science Exhibition, where children from the schools and colleges exhibit their science projects, and prizes are given for the best entries in different age groups. In addition, there are exhibitions illustrating astronomical themes and concepts, exciting results obtained with the GMRT, various subsystems of GMRT and illustrative models. The event includes exhibits and live demonstrations from various research institutes and science popularisation groups, as well as teaching institutions and various national laboratories. There are also programmes to interact with well-known scientists and engineers, and film shows on astronomical topics of current interest.

In recent times, we have expanded our outreach activities to popularise the SKA. In 2019, we plan to participate in the year-long exhibition organised to showcase the various science mega-projects India is involved in, SKA being one of them. The exhibitions will be held in science museums in four cities in different parts of the country and are expected to attract a large number of visitors. This will be an excellent opportunity to create awareness on the SKA among future scientists, engineers and the public.

NCRA
From parents to little kids: In Italy, who doesn’t love SKA?!

The Italian National Institute of Astrophysics has a remarkable tradition in the field of radio astronomy and many scientists and engineers are involved in the Square Kilometre Array project. Researchers from INAF’s many observatories travel all over Italy to teach students of all ages (and adults too) about what the SKA will do for us in just a few years’ time. Communicating radio astronomy means talking about how radio telescopes work and how we produce images (or any kind of representation) out of radio data. Researchers from INAF’s Institute of Radio Astronomy have designed two activities with the aim of presenting to the youngsters the future radio astronomical facilities (mainly the SKA) using this fascinating way of studying the Universe. They designed a new unique map of the invisible Universe obtained from radio and spectroscopic data, engaging three senses: sight, touch and hearing. The exhibit, called “Sense The Universe”, has been selected as part of the “Inspiring Stars” IAU exhibition. INAF also delivered an educational lab that makes use of pegs and pegboards (very familiar toys for children) to experiment and look into the concept of digital image resolution. The image to be reproduced with the pegs is placed under the pegboard, which is used as a colour sampler. When the pegs are too big, fine sampling is not possible therefore we get low-res representations.

Future innovative instruments like the SKA will be revolutionary for many astronomy fields, in particular for the study of radio pulsars and their usage as tools for fundamental physics. The importance of SKA in opening new frontiers in pulsar research was the main subject of an open day organised in Cagliari last October. “Cosmic Beasts” was part of the celebrations for the 50th anniversary of the discovery of the first pulsar, and 15 years since the discovery of the first – still unique – double pulsar. Guests of honour at the event were the two “queens of pulsars”: Jocelyn Bell Burnell, who discovered the first pulsar, and Marta Burgay, discoverer of the double pulsar. Several hundreds of people attended the public talk and enjoyed “speed dates” with researchers, attended public lectures and planetarium shows about Italy’s contribution to the SKA project, and had fun with hands-on activities (in the picture, some kids with their DIY pulsars).

Italy is one of the founding countries of the SKA Organisation (SKAO) and is currently coordinating the negotiations phase for the establishment of the SKA Observatory as an inter-governmental organisation, which will lead to the construction phase of the telescope.

INAF
Powering on business partnerships in New Zealand

Celebrating the benefits and future potential of SKA – in space and on Earth – is key to the approach of the New Zealand Alliance (NZA), led by AUT (Auckland University of Technology). Receiving the Research and Business Partnership Award at the 2016 KiwiNet Awards in July provided an opportunity to underline the contribution the team is making to the development of the unprecedented computing power behind the world’s largest radio telescope.

Collaboration between business and researchers; providing smart young New Zealanders the chance to work on globally significant science and computing projects; and the insights for NZ companies into where technology is heading were just some of the reasons the NZA SKA Alliance received the award.

The Kiwi Innovation Network (KiwiNet) is New Zealand’s network of public research organisations, working together to transform scientific discoveries into marketable products and services. The awards are high profile, attended by senior government officials and reported on in various mainstream and specialist media outlets.

New Zealand Alliance
SKA South Africa: Our heritage, our future

Like other ancient people, the San People of the Northern Cape in South Africa looked up at the moon and the stars and wondered how these came to be. To help them make sense of the night sky, the San made up stories. According to Xam star lore, for example, the Milky Way was created when a young girl scooped up a handful of ashes from the campfire, and flung them into the night sky to light the way so that her people could always find their way home at night.

Today, the ancestral ground of the San is home to the 64-dish array MeerKAT radio telescope, a precursor to the Square Kilometre Array radio telescope (SKA). Inaugurated in July 2018, MeerKAT has already produced unprecedented images of the centre of the Milky Way, the very subject of the story first told by the Xam people so many campfires ago.

The South African Radio Astronomy Observatory (SARAF) leads Africa’s participation in the preparation and design of the SKA. Within SARAO, the Science Engagement unit promotes the public awareness, understanding and appreciation of MeerKAT and the SKA, as well as their innovative technologies and scientific output. The Science Engagement unit, in partnership with other science engagement professionals around the world, communicates with more than 125,000 people in South Africa.

Through SARAO’s agreement with the San Council of South Africa, SARAO has implemented, and will continue to implement, various science engagement events and programmes for the young San People in the Northern Cape. The objectives of our engagements are to promote scientific literacy, create an awareness of science, engineering and technology-related studies and careers, and allow the benefits of MeerKAT and SKA to be available to these young people and their communities, while encouraging them to hold on to the stories created by their ancestors.

SARAO
Reaching the Spanish speaking world with the SKA

The Instituto de Astrofísica de Andalucía (IAA-CSIC) has been leading the SKA outreach activities in Spain from Granada since 2011, as one of the members of the SKA Communications and Outreach Network (SKACON). The SKA has been the subject of dozens of talks, publications and interviews in Spain. IAA-CSIC also maintains the Spanish SKA minisite (spain.skatelescope.org), where the public can access the main information about the SKA in Spanish. This broadens the scope of the outreach of the project to all Spanish speakers. We know, for example, according to the Ahrefs SEO tool, that approximately half of the visitors to the Spanish minisite came from South American/ Central American countries during 2018.

This selection of pictures shows several outreach activities that have taken place in Spain in recent months and years. In particular, an important recent activity was a talk given by the coordinator of Spanish participation in the SKA as part of the “Desgranando Ciencia” event, the biggest scientific outreach event in Andalucía that has taken place every year in Granada since 2013. The talk showed how the SKA, as an observatory distributed across continents and time zones, is a truly global project powered by the collaboration of partners around the world.

The remaining pictures show several outreach activities that have taken place in Spain in recent months and years.
Inspiring high school students at Sweden’s Onsala Space Observatory

A guided tour at Onsala Space Observatory means experiencing the scale of radio astronomy at first hand. Onsala Space Observatory, Sweden’s research infrastructure for radio astronomy, is a centre for SKA development in Sweden. In this photo, a group of high school students are getting a first-hand experience of the observatory’s oldest working telescope, the iconic 25-metre telescope built in 1963. Onsala is also home to several other telescopes, including a station in the SKA pathfinder LOFAR and the Onsala Twin Telescopes for space geodesy (their 13.2-metre dishes give a feel for how big the SKA-mid telescope dishes will be). For high school students – or anyone! – another option is to try out Onsala’s small SALSA telescopes: two small antennas that are free to connect to and observe from anywhere in the world. SALSA and guided tours are just two of many ways that Onsala Space Observatory connects with schools and the public. During 2019, work on an exciting new visitor centre is planned to start.

Credit: Onsala/Chalmers
Girlsday at ASTRON, the Netherlands

On 12 April 2018, 32 high school girls visited ASTRON for the annual Girlsday. From soldering and coding to building galaxies with 3D pens and searching for pulsars with the Dwingeloo Telescope, the programme, in collaboration with JIVE, NOVA and CAMRAS, offered many fun hands-on activities.

Girlsday is a national initiative to encourage girls to opt for studies and careers in science, technology and IT. ASTRON offers the general public many other opportunities to get acquainted with the work we do and astronomy in general. From guest lectures by astronomers at schools and associations to the yearly Open Day, when everyone can visit ASTRON to take a peek behind the scenes and participate in experiments.

The public can also take a tour along the Milky Way path in the forest near Westerbork. On this path visitors walk along a scale model of the Solar System with information about the different planets. Each stop represents about 2.5 million kilometres. The path ends at the Westerbork Synthesis Radio Telescope, one of the SKA pathfinders. Visitors can also get a coordinated tour of the Low Frequency Array (LOFAR) core, our other SKA pathfinder. The Dwingeloo Telescope was built in 1956 and is maintained by the CAMRAS foundation. They organise tours for high school students and during weekends volunteers are often present at the telescope to talk to visitors. In 2019 we will open the Open Science Hub in Dwingeloo, where the public can experience what radio waves are and how the Universe, and our place in it, can be investigated.

ASTRON
Where science, art and music meet: bluedot festival, United Kingdom

Each year Jodrell Bank welcomes tens of thousands of festivalgoers to the award-winning bluedot festival. Against the backdrop of the iconic Lovell Telescope the festival combines live music from artists like The Chemical Brothers, Orbital and Underworld with interactive family science shows, expert talks and awe-inspiring artworks. The festival’s Star Field is positioned near to the Global Headquarters of the SKA and provides visitors with a fantastic opportunity to engage with scientists not only in astronomy but across other areas of science, from particle physics to environmental science. With the wide variety of attractions on offer, bluedot provides a unique opportunity to engage with truly diverse audiences.

The SKA is a regular feature at bluedot with expert talks from SKA scientists and engineers, and a stand in the Star Field where festivalgoers can learn about the unique challenges of the SKA, take part in hands-on demos and activities and meet some of the inspiring people involved in the project.

The Jodrell Bank site is also home to the e-MERLIN National Facility for high-resolution radio astronomy observations. Operated by the University of Manchester on behalf of the Science and Technology Facilities Council, e-MERLIN is also a pathfinder for the SKA.

Now in its fourth year, bluedot will return from 18-21 July 2019, and with Kraftwerk 3-D announced as a headline act, it promises to be as awe-inspiring as ever. The bluedot festival is an annual highlight of nationwide SKA outreach activities that are run by universities and other institutions involved with the SKA project across the UK.

SKA UK, STFC