

SKA-France

Monthly bulletin

January 2020

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News from Maison SKA-France

French participation to the 2020 SKA calendar

The [2020 SKA calendar](#) produced by SKAO presents a selection of exciting science results obtained thanks to twelve of the SKA pathfinder telescopes.

The month of February is dedicated to the French SKA pathfinder, NenuFAR (New Extension in Nançay Upgrading loFAR). This large antenna array, designed to observe the largely unexplored frequency window from 10 to 85 MHz, is described, together with one of its main scientific objectives: the study of pulsars, and in particular of the geometry of their magnetosphere thanks to NenuFAR’s large bandwidth.

French researchers are involved in several other results by international teams that are shown in the calendar, including: the beautiful images of galaxies and galaxy clusters obtained by the LOFAR Survey Team and the LOFAR detection of the radio ridge in a filament of the cosmic web (March page); the jet, detected using the VLBI technique, resulting from the merger of those two neutron stars that produced the first gravitational wave signal with an electromagnetic counterpart (July page); the spectacular MeerKAT image of the center of the Milky Way (September page).

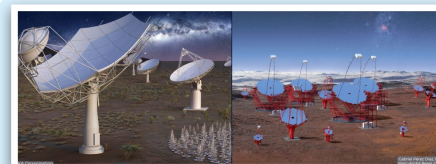
All SKA calendars, produced since 2013 and focusing on different aspects of the SKA project every year, are available at the [SKAO webpage](#).



Courtesy:
SKA Organisation

Calendar
2020

The Pathfinder View of the Sky



Signature of the SKA-CTA Cooperation Agreement

The SKA Organisation keeps growing its important collaborations with major astronomical and physics facilities. After the establishment of a Collaboration Agreement with CERN in 2017, a Memorandum of Understanding (MoU) was signed with the Cherenkov Telescope Array Observatory (CTAO) on January 29, 2020. In this exciting era witnessing the development of multi-messenger astronomy, the MoU is intended to facilitate knowledge and expertise sharing among these two future facilities, both Landmark projects of the ESFRI roadmap, which, by observing opposite ends of the electromagnetic spectrum, will complementarily probe the violent and variable universe. In addition to scientific objectives, the MoU is intended to facilitate exchanges in terms of technological developments and governance models.

Activities

Seminars about the SKA at the “Bureau des Longitudes”

On January 8, 2020, the “[Bureau des Longitudes](#)” invited C. Ferrari, SKA-France director, to present the SKA project in Paris.

A first seminar (“Towards the SKA: its technological, scientific and societal challenges”) was addressed to the members of this prestigious French scientific institution, funded in 1795 and in charge, among others, of the publication of the ephemerides elaborated by the French Institute for Celestial Mechanics and Computation of Ephemerides.

Another of its national missions being the dissemination of knowledge in the domain of the Sciences of the Universe, the Bureau des Longitudes organises a series of monthly conferences, hosted in the premises of École Normale Supérieure (ENS). In this framework, C. Ferrari was invited to present a second seminar about the SKA (“The Square Kilometre Array: a radio-telescope to study the dawn and the evolution of the cosmos”) to a broad audience interested by astronomy and related developments.

Meeting of the Cosmology SWG at École Normale Supérieure

From January 21st to 24, 2020, ENS (Paris, France) was hosting the annual meeting of the SKA Cosmology Science Working Group (SWG).

The meeting was attended by 35 members of the SWG, and the science sessions were open to the local astronomy community to attend. There were further attendees via remote connection who were able to drop into all sessions of the workshop as well as contributing to discussions. Y. Akrami (ENS), who is also a member of the SWG, acted as the local organiser of the meeting.

Participants in the Paris Cosmology SWG Meeting

Image courtesy: Y. Akrami (ENS)



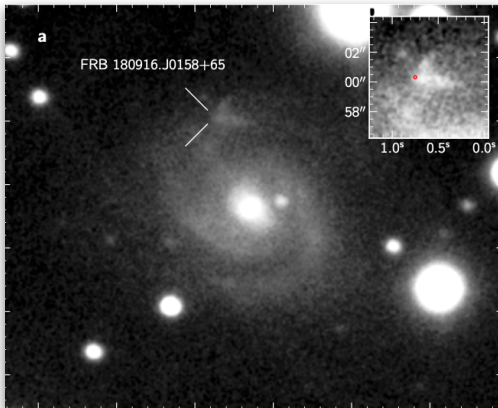
The meeting kicked off on Wednesday morning with an overview of the Cosmology SWG given by the co-chair L. Wolz. As first announcement of the meeting, the SWG welcomed S. Camera as the newly appointed co-chair after R. Battye stepped down from his role in November last year. This was followed by a presentation from A. Bonaldi, the SKAO Science Contact of the Cosmology group, who outlined the recent activities including the Observatory ratifications. She highlighted the imminent start of construction and the associated timeline for the science observations.

The remainder of Wednesday and Thursday morning were filled with brief updates by the Focus Groups chairs and contributed talks by the members of the SWG, with topics covering from weak lensing and galaxy surveys with the radio continuum as well as galaxy and intensity mapping from 21cm observations. Special attention was given to existing pathfinder surveys by ASKAP and MeerKAT, and the SWG discussed their impact on the preparations for the future SKA1 observations. Thursday afternoon was dedicated to discussion sessions within the individual Focus Groups. The meeting closed on Friday lunchtime, after the morning was spent on considering synergies within the SKA Cosmology surveys, with other SKA SWGs as well as Cosmology experiments in other wavelengths.



Announcements

News from SKA precursors and pathfinders



Fast Radio Bursts (FRBs), extremely energetic events lasting for just milliseconds, are keeping attracting the interest of the astronomical community, being currently identified as one of the most exciting class of objects observed by SKA pathfinders and precursors. Interestingly, most of the discovered FRBs appear as single burst of light (“non-repeating”), while in some other cases multiple bursts are observed (“repeating”).

*Image of the host galaxy of FRB 180916.J0158+65. The position of the burst is marked and shown in the zoom-in inset
Image courtesy: Marcote et al., 2000, Nature, 577, 190-194*

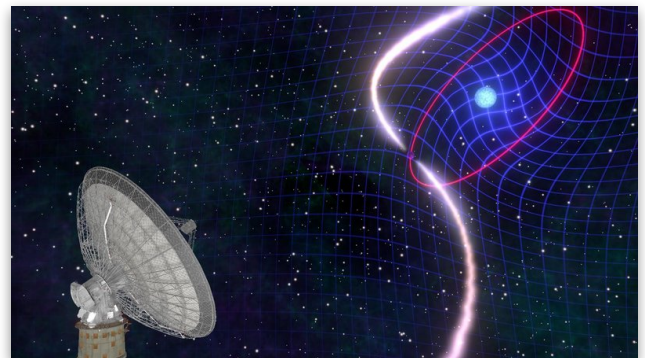
After the first four identifications of FRB host galaxies (see, e.g., the SKA-France bulletin issues of [October 2018](#) and [June 2019](#)), on **January 3, 2020**, [astronomers have announced](#) to have observed and precisely identified the position in the sky of a repeating FRB (named FRB 180916.J0158+65) thanks to the European VLBI Network (EVN). This has allowed follow-up observations with one of the world’s largest optical telescope (the 8-m Gemini North on Mauna Kea in Hawaii), revealing that the burst originated within a spiral galaxy located half a billion light years from Earth. In addition to the fact that having repeating and non-repeating sources suggests that the two classes could have distinct physical origins, this discovery opens new questions on the nature of FRBs: as described in the [associated Nature paper](#), repeating FRBs seem to have a wide range of luminosities, and originate from diverse host galaxies and local environments. This result is a beautiful example of the discovery space opened by new radio facilities spread around the world and intended to pave the way to the SKA. In this case, using a technique known as Very Long Baseline Interferometry (VLBI), eight EVN antennas observed simultaneously a repeating FRB that was discovered in 2018 by the Canadian radio telescope CHIME, a real “FRB-hunter” (see SKA-France bulletin of [January 2019](#)). This allowed to localise the region of the sky from which the burst was coming with a precision of approximately seven light years across: as stated in the EVN press-release, it is comparable to an individual on Earth being able to distinguish a person on the Moon!

Artistic view of the white dwarf-pulsar binary system observed by the Parkes radio telescope

Image courtesy: M. Myers/ARC Centre of Excellence for Gravitational Wave Discovery (OzGrav), Australia

On **January 30, 2020**, an international team led by scientists at the Max Planck Institute for Radio Astronomy in Bonn (Germany) announced to have measured the rotation of a white dwarf in a binary system with a radio pulsar through an effect predicted by Albert Einstein’s general relativity theory: the “swirling” of space-time in the vicinity of a rotating mass, also known as “frame-dragging”.

After Einstein’s realisation that the rotation of a mass drags the space-time in its vicinity, in 1918 J. Lense and H. Thirring calculated how the rotation of the Sun influences the movement of planets (that’s why the frame-dragging effect is known as “Lens-Thirring precession”). While the swirling associated to Earth’s rotation has been detected through the measurement of satellite slow precessions, it is of course impossible to send any instrumentation close to the white dwarf studied here, which is several thousands light-years away. Luckily enough, there is a radio pulsar orbiting the white dwarf and astronomers have been able to measure the precession of its orbit. It resulted that the white dwarf, an object a bit smaller than the Earth, but whose mass is similar to the Sun, has a rotational period of just 100 seconds. This rapid rotation allows astrophysicists to put constraints in the formation model of such binary systems and in the final stages of life of the massive star from which the pulsar originated. For more information, the interested reader can refer to the [press-release of the Max Planck Institute for Radio-astronomy](#) and the [SKA Organisation website](#). This result has been achieved thanks to observations conducted over a period of almost 20 years using two SKA pathfinders in Australia, the [Parkes Telescope](#) and the [Molonglo Observatory Synthesis Telescope](#).





Since **January 11, 2020**, another SKA pathfinder instruments is officially **operational**: the Chinese **Five-hundred-meter Aperture Spherical Telescope** (FAST, see image on the left). Built in a natural depression in the Southwest of China, FAST, whose nickname is Tianyan (天眼, “Eye of the Sky/Heaven”), is the world’s largest filled aperture radio telescope. After the beginning of construction in 2011, it saw its first light in 2016 and, since then, it has been undergoing testing and commissioning until the newly started operational phase. Its first discoveries (two unknown radio pulsars) arrived in 2017. Today more than 40 new pulsars have been detected by FAST.

SKAO Current Vacancies

In this intense phase of finalisation of the SKA design towards the beginning of the telescopes’ construction and the entering into force of the future Inter Governmental Organisation (IGO), a section of the SKA-France bulletin will be systematically devoted to the announcement of **new positions opened by the SKA Organisation**. Open positions currently include (with application closing date indicated within parenthesis):

- * [Project Schedule Analyst](#) - **Contract Type:** Permanent (February 10, 2020)
- * [SKA System Scientist](#) - **Contract Type:** Permanent (March 1, 2020)
- * [Project Risk, Issue and Change Analyst](#) - **Contract Type:** Permanent (March 1, 2020)
- * [Project Cost Analyst](#) - **Contract Type:** Permanent (March 1, 2020)

More information can be found at the [SKAO webpage](#). In addition, several positions are anticipated to go live in the next month, including:

- * RFI Specialist (End March 2020)
- * Network & Security Engineer (End March 2020)
- * SKA Operations Scientist/SAFe® Product Manager (End April 2020)

To be noted that interested readers can [register](#) to automatically receive an e-mail as soon as a relevant job is published.

First announcement of the 6th LOFAR Data Processing School

21-25 September 2020, ASTRON, Dwingeloo, The Netherlands

The aim of this School is to **introduce the LOFAR system to new members of the community** who will analyse both interferometric and high time resolution beam formed LOFAR data. Hands-on sessions will play a crucial role during the School giving attendees an opportunity to gain experience with real LOFAR data. Students, postdocs, and staff are all encouraged to attend. The School will cover the many aspects of the LOFAR system from the capabilities of the basic station hardware to the software pipelines and science products they produce. Lectures and tutorials will be presented by members of the LOFAR project team as well as staff from the many institutions involved in the collaboration.

The school will be hosted by ASTRON (Dwingeloo). The participants will be accommodated at the nearby Fletcher hotel De Borken, where they should make their own reservation and also pay for the accommodation themselves. Details on how to make the hotel reservation will be circulated at a later stage. We expect the participants to arrive on Sunday 20 September and depart on Friday 25 September. A registration fee of 175 Euro is requested, which will cover a welcoming reception, coffee/tea/lunches during the 5 days of the school, the School dinner on Monday evening, the visit to the LOFAR core, and a shuttle bus service between ASTRON and the railway station on 20 and 25 September. Food restrictions and dietary requirements can be specified at the moment of the registration. In exceptional cases, financial support may be available. In case you need financial support, we ask you to contact us at lofarschool@astron.nl. Note that registration to the School is on a first come - first serve basis and limited to approximately 50 participants. **Information about how to register will follow in a second announcement.**

LSST@Europe4

8-12 June 2020, Accademia dei Lincei, Rome, Italy

The LSST project is moving forward in the construction phase, and activities in the LSST Science Collaborations are vibrant and involve a significant European participation. The recent adoption of an “in-kind” contribution to regulate the access of International participants to the LSST data clearly represents a major paradigm shift for

the participation of the European astronomical community, with existing agreements that need to be re-negotiated by mid-2021. The LSST@Europe4 conference, right in the middle of this path, provides the community with a perfect opportunity to discuss proposals and plans.

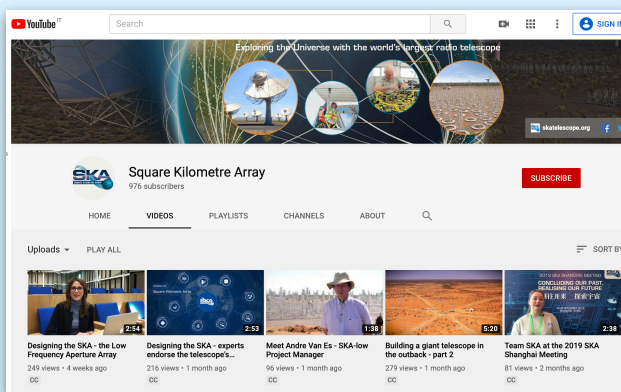
In this framework, the main objectives of LSST@Europe4 are to provide an update of the status of the LSST Project; foster and promote the participation of European scientists to the activities of the Science Collaborations; discuss opportunities and proposals to help European participants shape the “in-kind” contributions for the development of the LSST project; discuss potential common initiatives at the European level to support the participation of European scientists to LSST; provide an update description of the LSST data products of different levels; discuss the LSST science drivers: current perspectives and future developments; **explore synergies with other facilities** (e.g. a review talk about LSST-SKA synergies is programmed), with a special emphasis on the European ones. The conference is organised by INAF, the LSST Corporation, Accademia dei Lincei and La Società Astronomica Italiana. **Please note that registration is open with deadline March 15, 2020.**

Meeting website: <http://www.lssteuropa4.eu>

SKA in the French press

An interview about the SKA project with Catherine Cesarsky, Chair of the SKA Organisation Board of Directors, has been published in the January 2020 issue of the monthly magazine “La Recherche”.

The article provides a rich and complete overview of the project in all respects: its developments over the last thirty years, its actual and future governance model, its technological challenges and developments that are bringing to the definition of the first phase of deployment (SKA1), with of course a large space devoted to the scientific questions that the SKA Observatory will be uniquely able to address. In this respect, the interview explains how the SKA will be complementary with respect to current or future higher frequency observatories (such as ALMA or the ngVLA), and why it will overcome current radio-telescopes covering the same part of the electromagnetic spectrum (such as LOFAR and the VLA). The essential roles played, though, by precursors instruments is beautifully illustrated through the MeerKAT observations of the Milky Way’s centre recently published in the prestigious review “Nature”. The English version of the article will be available [on-line](#) soon.



SKA YouTube Channel

Videos presenting the SKA and SKA-related events, as well as interviews of people working within the project, can be found at the [SKA YouTube Channel](#). In January 2020, the video “[The Low Frequency Aperture Array](#)” has been released within the “[Designing the Square Kilometre Array](#)” category.

Chiara Ferrari
for the Maison SKA-France