

SKA-France

Monthly bulletin

June 2019

SKA-France

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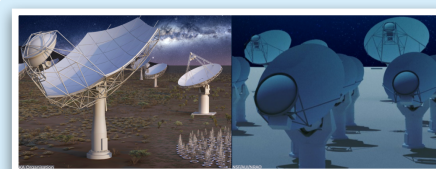
Visit of the LAB team in South Africa

University of Bordeaux is involved in the SKA bridging phase through its contribution to the SKA1-Mid band 5 receiver development. The key component of this receiver has been selected in March 2019 after a 3-months test campaign at Laboratoire d’Astrophysique de Bordeaux (LAB). The selected device is a component-off-the-shelf (COTS) analog-to-digital converter circuit with a resolution of 4-bit and a maximum sampling frequency at 16 GHz. The clock module, which provides the sampling clock at 9 GHz and 16 GHz to, respectively, digitise the bands 5a and 5b, has been designed and fabricated by the French company FEDD and tested at LAB.

In June 2019, the LAB team has visited South Africa for a one-week test campaign at SARA0 facility building in Cape Town. The French team received a warm welcome and could conduct complete tests of the clock module in the SARA0 reverb chamber to measure the Radio Frequency Interferences (RFI), with the most efficient support of South-African experts. Some improvements, finalised to increase the RF shielding of the clock module enclosure, have been brought by adding conductive epoxy on the SMA connectors and feedthrough capacitors.

These tests have permitted to estimate the shielding effectiveness of the receiver enclosure in which the clock module will be included. A similar test campaign in the SARA0 reverb chamber should be done with the digitiser module in next December.

The mechanical design and fabrication of the SKA1-Mid band 5 receiver enclosure are carried on in the LAB mechanical workshop. The French team is especially grateful to George Smit and Samsunissa Fataa from SARA0 for their help.



Exploration of a scientific alliance SKA & ngVLA

On June 26, 2019, the [SKA Organisation](#) announced that [discussions are currently undergoing between the SKA and the ngVLA \(Next Generation VLA\) projects.](#)

The possibility to establish a scientific alliance between the two major radio facilities is under investigation. This may result in an exchange of observing time that, thanks to a total frequency coverage of the electromagnetic spectrum spanning three orders of magnitude (from 50 MHz to 116 GHz), would provide the possibility of observing a wider and wider variety of astrophysical phenomena.

Details of this ambitious alliance are still unresolved and to be further investigated. The interest of having a first joint SKA/ngVLA scientific meeting in 2021 emerged as a first important step. Details will be provided to the community in due course.

Activities

SKA related internship at TAS

Since 2018, Thales Alenia Space (TAS) has been providing active support to the SKAO Assembly, Integration and Verification (AIV) team, which is of critical importance for a large and complex project like the SKA. **This support is being reinforced with the recruitment by TAS of a trainee engineer who will be able to stay for extended periods at SKA-HQ starting this summer.** Current activities are relative to the requirements for the Integration and Testing Facilities and the preparation of the Integration Verification and Validation (IV&V) plan.

TAS has a long successful record of system engineering, construction management and AIV of large facilities, space and ground based. Recent examples include the Galileo Mission Segment (GMS) and the Iridium constellation of telecom satellites.

SKA at the last conference of the “Mastodons” program

The last conference of the challenge “Mastodons - Big Data in Research” was held at the CNRS Headquarters (Paris) on June 13 and 14, 2019.

Launched in 2012 with the support of the CNRS MITI (Mission for Transverse and Interdisciplinary Initiatives), “Mastodons” lasted until December 2018. The aim of the program was to identify and support research actions mandatorily needing an effective synergy between scientists of different disciplines. Supported projects covered scientific challenges posed by the large-scale use of data (semantics, storage, research, visualisation, etc.), as well as studies of the societal impact induced by the proposed technologies (protection of privacy, preservation of knowledge, ...).

About fifty participants attended the concluding conference of the funding program, including Mastodons principal investigators, their teams and colleagues, students and post-docs, as well as people from industry. **A talk about the SKA data challenges was presented** by C. Ferrari, SKA-France Director and former member of a Mastodons project (DISPLAY, lead by A. Ferrari from the Lagrange Laboratory of Observatoire de la Côte d’Azur). Her talk, as well as all those presented during the two-days meeting, are available at the meeting web-page.

SKA workshop on galaxies in Paris

As announced in the SKA-France monthly bulletin of last April, a **workshop focusing on SKA capabilities in galaxy evolution and cosmology research areas** was organised by F. Combes (astrophysicist at Paris Observatory, professeur at Collège de France, as well as co-chair of the “Extragalactic Spectral Line” SKA Science Working Group - SWG) and took place in the **“Salle du Conseil” of Paris Observatory on June 14, 2019.**

A few dozens of participants animated the discussions, which started with a complete overview of the on-going organisation of the SKA Regional Centres presented by a foreign invited guest, L. Verdes-Montenegro, Spanish representative at the SKA Regional Center Steering Committee (SRCSC) and co-chair of the “HI Galaxy Science” SWG. Thirteen additional talks allowed to present the SKA scientific perspectives at the light of current multi-wavelength and theoretical studies related to a wide range of astrophysical topics (large scale structures, Baryonic Acoustic Oscillations, lensing, galaxy evolution as a function of the age of the Universe and of the local environment, interstellar and intergalactic medium, ...). Most of the presentations are available on-line at the conference web-page.

SKA at the EWASS19 meeting in Lyon

The SKA Special Session **“The role of European-led surveys in guiding future SKA1 science”**, organised by J. Wagg (SKAO), C. Ferrari (OCA, SKA-France) and R. Braun (SKA) during the 2019 European Week of Astronomy and Space Science (EWASS19); hosted by Lyon University, France), took place on **June 26, 2019**. The successful session saw about 50 participants throughout the day and was animated by review talks that demonstrated how current multi-wavelength European facilities, as well as SKA precursors and pathfinders, might help to define future SKA1 survey strategies. The workshop was a great success also in terms of national representation (in particular from European countries), with speakers from Croatia, France, Germany, Italy, the Netherlands, Switzerland and the UK. **All presentations are available on-line** at the conference web-page (click on SS29a, SS29b, SS29c to see a list of all talks and get the links to the slides in pdf format). The organisers express a big thank to all participants and in particular to speakers, who resisted to the extremely hot temperature registered in Lyon during the meeting.

During the plenary session of June 27, 2019, the **Merac Prize in Observational Astrophysics** was attributed to **E. Keane**, Project Scientist at the SKA Organisation, for his works on Fast Radio Bursts (see below for new discoveries on these exciting objects). Congratulations to Evan from all the Maison SKA-France team!

AENEAS SRC Design Workshop

The Management Team (MT) of the [H2020 AENEAS project](#), made up by the leaders of the different Work Packages and the chair of the AENEAS General Assembly, convened in **Lyon (France) on June 27 and 28, 2019**, kindly hosted in one of the meeting room of CC IN2P3. The aim of the [workshop](#) was to **discuss and develop further the European SRC Design documents** that will be the main final product of the AENEAS project and a good starting point for the initial activities of the SRCSC.

[Participation in the meeting](#) was by invitation. In addition to the MT members, several representatives of the SKA SWG and European members of the SRCSC could bring their expertise and put forward scientific requirements that will need to be taken into account.

Program Increment meeting #3

The Persistent Systems Company (India) hosted the **third edition of the "Program Increment" meetings (PI#3)** of the SKA Software Engineering activity at its offices in **Pune from 4 to 7 June 2019**. These meetings schedule the work of the different teams contributing to the collective work on software components for SKA during the Bridging Phase, on a quarterly basis. The current highest priority activities are targeted towards the System Critical Design Review at the end of the year.

SKAO has adopted the "Scaled Agile Framework" (SAFe) methodology for all teams of developers, who have to acquire and practice the SAFe work principles.

Aware of the interest of Maison SKA-France in participating more and more actively in the Bridging Phase, **SKAO invited French potential partners to attend this meeting in order to observe the functioning of the Software Engineering activity, its practices and its progress.**

In this context, THALES Service, under the impetus of Sandrine Roux, accompanied by fellow engineers and Michel Caillat from SKA-France, was able to attend the PI#3 sessions accessible remotely. This experience was rich in lessons learned, particularly in terms of sharing the work already done between the teams and identifying how French participants could efficiently bring their expertise.

The next PI meeting, PI#4, will most likely see SKA-France partners enter the SKAO's Software Engineering activities.

Announcements

RDA France Meeting 2019

12-13 September 2019, Paris, France

The **second annual meeting of RDA France** will be held in Paris on **September 13, 2019** at **CNRS Headquarters**. It is opened both to people already involved in the [Research Data Alliance](#) (RDA) organisation and to those who want to learn or who plan to participate in its activities.

The RDA France Day will be anticipated on **September 12, 2019**, by thematic workshops, including RDA for newcomers, dataverse and certification of data warehouses, and health data.

Meeting website: <https://rdafrance2019.sciencesconf.org>

SKA-VLBI Key Science Projects and Operations Workshop

14-17 October 2019, SKA Global Headquarters, Jodrell Bank Observatory, Cheshire, United Kingdom

The aim of the workshop is to introduce the VLBI capabilities and observing modes of the SKA to the community, and present the latest results in the SKA high priority science areas where VLBI will make an impact. Ideas and possible strategies for major SKA-VLBI Key Science observing programmes will be discussed, together with the impact of global VLBI observations for astronomical research in the future in general. In addition, the role of SKA Regional Centres for SKA-VLBI will be explored.

There are opportunities for a limited number of contributed talks, allocated on a competitive basis by the scientific organising committee. Interested persons are encouraged to submit their abstract [on-line](#). A limited amount of funding is available for partial travel support for the conference, please contact the [organisers](#) for more information and for applying for the travel funding.

Conference website: <https://indico.skatelescope.org/event/539/overview>

Important dates before the meeting:

- * April 10, 2019: First announcement, registration and abstract submission opens
- * June 24, 2019: Second announcement
- * July 15, 2019: Third announcement
- * August 15, 2019: Abstract submission deadline

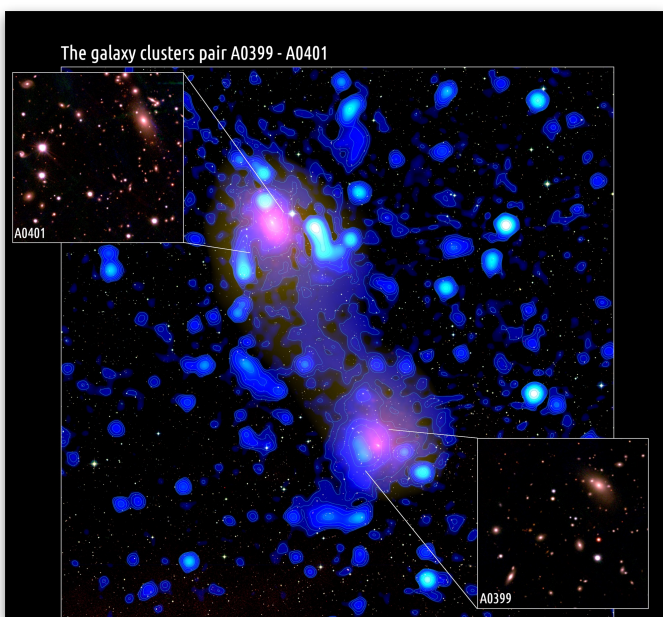


Artist impression of the relativistic jets produced during the binary neutron star merger GW170817, as they break out of the kilonova ejecta [Credit: Beabudai Design].

SKA-related discoveries

Two important discoveries, made by the scientific community thanks to SKA pathfinder and precursor instruments (LOFAR and ASKAP), have been announced to the community during the month of June.

On **June 7, 2019**, a significant study appeared in the prestigious review “Science”: an international team led by F. Govoni (INAF, Cagliari Observatory, Italy) identified a 10 million light-years long “**stream**” of **magnetic fields and relativistic electrons along a filament that connects two clusters of galaxies**. Thanks to the data collected by the **LOFAR** (LOW-Frequency ARray) radio telescope in Europe, it was possible to discover and measure this phenomenon in radio waves for the first time. For more information in French, you can read the [CNRS](#) and [OCA](#) press-releases, as well as listen the [France-Inter interview](#) of C. Ferrari (French co-author of the publication).



Composite image of the galaxy clusters pair Abell 0399 and Abell 0401. The cores of the two galaxy clusters are permeated by a high-temperature plasma that emits in the X-rays (red tones). The low-frequency image in the radio waves (blue tones) reveals several bright discrete sources associated to individual galaxies and two diffuse radio halos towards the centres of the two clusters of galaxies. A ridge of radio emission is visible along the filament connecting the two clusters.

Credits: DSS and Pan-STARRS1, XMM-Newton, PLANCK satellite, F.Govoni et al. 2019, Science (radio)

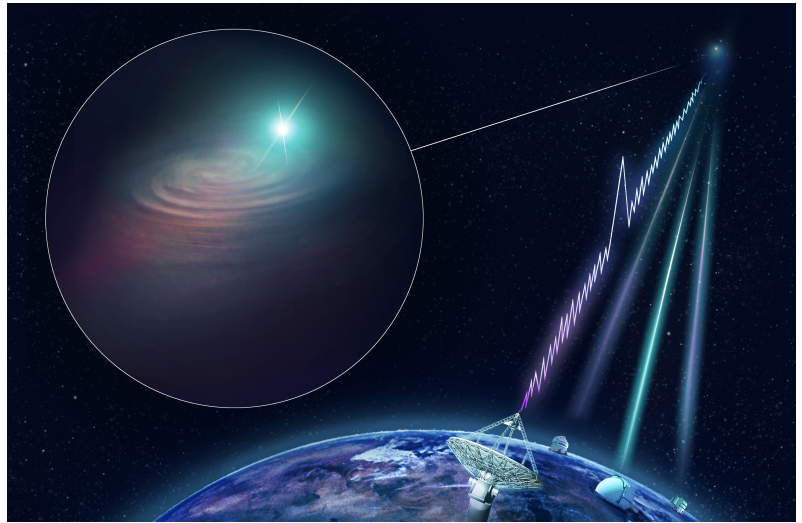
Image by M.Murgia, INAF

As more extensively explained in the [October 2018 SKA-France bulletin](#), extremely energetic events, lasting for just milliseconds but releasing an amount of energy equivalent to what the Sun releases in about 80 years, are detected at radio wavelengths and named Fast Radio Bursts (FRB). An important element to solve the mystery of their physical origin is the ability to identify the objects that emit them. On **June 28, 2019**, a PhD student, W. Farah (Swinburne University, Melbourne, Australia) announced at the EWASS2019 meeting in Lyon that an Australian-led international team has been able to **determine the precise location of a FRB**, which was discovered thanks to the CSIRO’s new Australian Square Kilometre Array Pathfinder (**ASKAP**) radio telescope in Western Australia.

Follow-up observations with some of the world's largest optical telescopes (Keck, Gemini South and ESO's Very Large Telescope) allowed to **image the galaxy from which the burst originated**. This discovery, published in "[Science](#)", was allowed by a new technology developed by the team to freeze and save ASKAP data less than a second after a burst arrives at the telescope. More information at the [SKAO web-page](#).

Artist's impression of CSIRO's Australian SKA Pathfinder (ASKAP) radio telescope finding a fast radio burst and determining its precise location. The KECK, VLT and Gemini South optical telescopes joined ASKAP with follow-up observations to image the host galaxy

*Image Credit: CSIRO/Dr Andrew Howells
Caption Credit: SKAO*

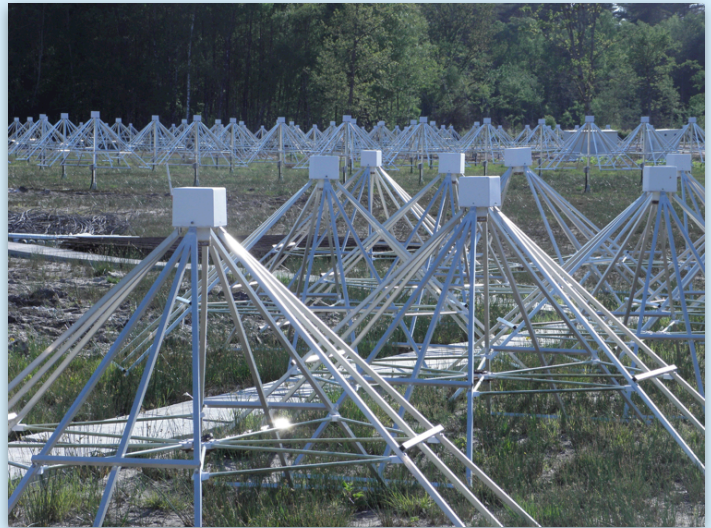


NenuFAR enters Early Science phase

The [NenuFAR radio telescope](#), one of the SKA pathfinders, has started its Early Science phase on July 1st, 2019. NenuFAR (acronym for "New Extension in Nançay Upgrading LoFAR"), operating between 10 and 85 MHz, is a phased array consisting of nearly 2,000 antennas deployed over an area of 60,000 m² in the station de radioastronomie de Nançay (Observatoire de Paris - PSL / Université d'Orléans/ CNRS).

For this phase, scheduled until the end of 2021, 15 Key programs and pilot programs were proposed by 140 French and foreign scientists. Three Key programs target the radio detection and study of exoplanets orbiting around other stars; the observation of the Cosmic Dawn, the moment of the formation of the first stars and galaxies, 100 to 200 million years after the Big Bang; and the study of pulsars. Many other studies are planned: radio stellar emissions, galaxies and galaxy clusters, spectral lines in the interstellar medium, lightning from planetary storms, radio bursts from the Jupiter magnetosphere and the Sun...

The Early Science phase, will combine scientific observations with the completion of the construction and development of the instrument. The official inauguration of NenuFAR will take place on October 3, 2019.



Chiara Ferrari
for the [Maison SKA-France](#)