

SKA-France

Monthly bulletin

November 2020

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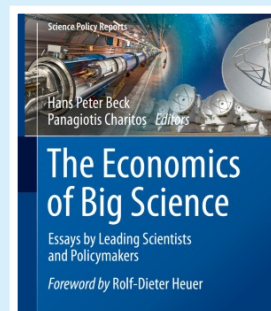
The place of SKA in the collaboration between Africa and Europe

On **November 18, 2020**, AERAP, platform for the collaboration in science between Africa and Europe, organised a briefing on-line ("**Opportunities for Enhanced STI Cooperation between the Europe & Africa**") on the EU support for cooperation with Africa on science, R&D, innovation and education, for the period between 2021 and 2027.

The webinar was organised in the framework of the communication "**Towards a comprehensive Strategy with Africa**", published in March 2020 by the European Commission and setting out a strategy of collaboration that will be built on five partnerships (green transition and energy access; digital transformation; sustainable growth and jobs; peace and governance; migration and mobility), with science and research being an important component in each of the them.

The meeting started with introductory talks by representatives of European and African Union Commissions, the South African Department of Science and Technology, and the European Parliament. Keynote speeches from the cabinet Commissioner Urpilainen and DG Research and Innovation (RTD) followed, focusing on the EU -Africa Strategy and high-level policy dialogue, with a presentation of priorities of the next Portuguese Council Presidency. The program included then talks by representatives of EU Directorates General, research infrastructures, scientific and economic organisations, divided in four sessions about the key areas identified within a recent European Union - African Union Research & Innovation Ministerial meeting: public health, green transition, innovation and technology, capacities for science. This latter session included a **presentation of the SKA project by C. Ferrari** - SKA-France Director and chair of the European SKA-Forum - who highlighted the important role that the SKA and radio astronomy are playing and will keep developing not only in terms of capacities for science, but also in the domains of green transition, and innovation and technology.

The meeting was concluded by a session on Data and Regulation for Science, Technology and Innovation (STI).



SKA in "The Economics of Big Science" volume

A volume collecting the proceedings of the workshop "The Economics of Science" (held in June 2019 in Brussels in the framework of the Future Circular Collider (FCC) Week) has been freely published on-line. It includes an essay by S. Berry (Director of Corporate Strategy of the SKA Organisation), named "The SKA Approach to Sustainable Research". The chapter gives an overview of the benefits and impact that the SKA project will have not only in terms of scientific return, but also in key societal, technological and political areas, such as sustainability, governance of long-established intergovernmental infrastructure organisation, innovation and industrial return, forefront developments in the Big Data domain, education and employment opportunities.

Activities

SKA-France in international meetings

November 2020 has seen the participation of SKA-France representatives in several meetings of international committees:

- * the **Council Preparatory Task Force (CPTF)**, tasked with bridging the SKA Observatory towards the first meeting of the SKA Council, met on **November 4 and 5, 2020**;
- * the **European SKA Forum (ESKAF)** discussed about coordinated European actions related to the SKA Regional Center network during its meeting of **November 17, 2020**.

Members of Maison SKA-France at ADASS XXX

On behalf of a collaboration involving, among others, MSF members (ATOS and Observatoire de Paris), **N. Monnier**, PhD student at Université Paris-Saclay, CNRS, Centralesupelec, L2S (France), **presented an SKA-related work** ("Parallelisation of the wide-band wide-field spectral deconvolution framework DDFacet on distributed memory HPC system") at the **Astronomical Data Analysis Software and Systems conference (ADASS XXX)**, held on-line from **November 8 to November 12, 2020**.

Links are provide for the [abstract](#), [pre-print article](#) and the [poster](#).

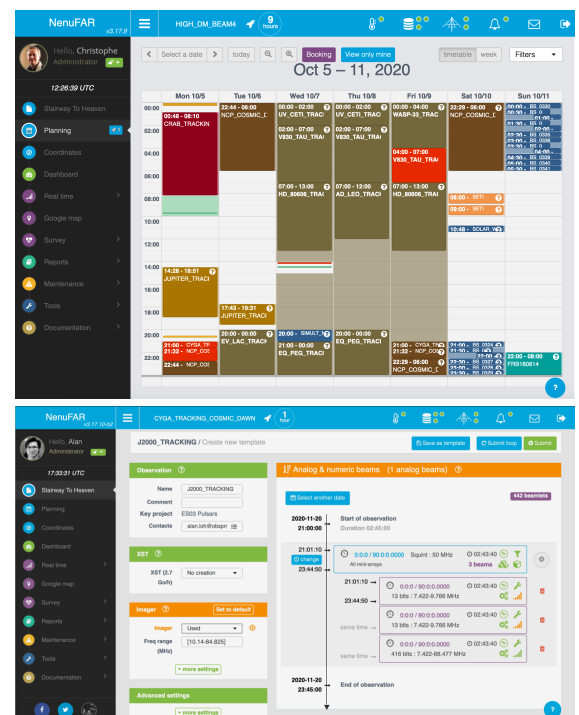
Announcements

News from NenuFAR

NenuFAR, the French SKA pathfinder, is a new low-frequency radio array of 2000 antennas (crossed dipoles), in end of construction and start of operation at the Nançay Radio Observatory, France. It allows to observe according to several modes (beams, imaging, waveform...) associated to a large variety of setups. As described by **C. Taffoureau** and **A. Loh** (Paris Observatory), interviewed for the SKA-France bulletin this month, the instrument flexibility, added to its international use (12 key scientific programs active in the "Early Science" phase), motivated the **development of a graphical control interface that is both powerful and easy to use**. Based on Web technologies and accessible from various media (computer, smartphone, tablet), this interface called **VCR (Virtual Control Room)** allows the management of observations and monitoring of the telescope.

Via a simple web browser, the researcher can program and manage his/her observations within reserved areas (associated with access rights management) defined via a semester schedule of the key programs. The sources to be observed are chosen among several astronomical catalogs online or via their coordinates, according to their visibility, and all the observation parameters are then defined (frequency band, receiver configuration, selection of mini-arrays, coupling to the LOFAR instrument, definition of different viewing directions, etc.). The observer can use predefined templates, modify some parameters, replay observations and access the quicklooks once the data has been recorded. An automatic verification system provides guidance throughout the process while ensuring configuration compliance with NenuFAR specifications.

The monitoring of the instrument and its radio environment is done in real time by visualizing low rate data (spectra). Housekeeping data from the telescope (temperatures, voltages, state of programs and servers, analog and digital subsystems) is ingested by relational (MySQL type) and "time-series"-oriented (InfluxdB) databases. The use of specific software tools (Grafana, Telegraf, Chronograf) helps not only to supervise the entire telescope operation, but also to visualise all the information needed for monitoring the instrument, and feeds an automatic alert system. Test observations, triggered automatically, guarantee efficient maintenance management.



Two « user » screens of the NenuFAR VCR web interface. Courtesy: NenuFAR team

Visualisation of the results on a map gives an instant overview of possible problems. A technician can then remotely modify the telescope's configuration by activating or deactivating faulty elements until repair.

This web application results from the combined experience of the engineers of [Nançay Radio Observatory](#) and its associate astronomers, who have been managing and operating the Observatory's radio astronomy instruments for several decades. NenuFAR's Virtual Control Room has become an indispensable tool both for the day-to-day management of the instrument and for its long-term reliability.

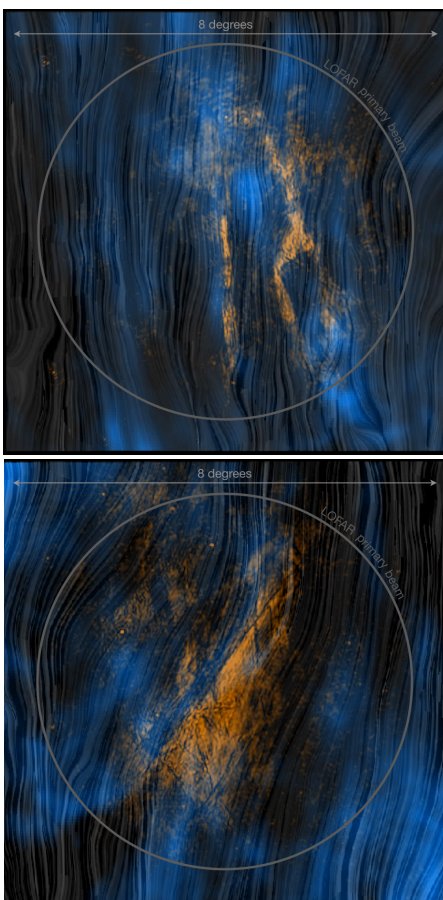
Recent results from SKA precursors and pathfinders

The observation of diffuse synchrotron emission from our Galaxy at low frequency in the radio band indicates the presence of relativistic particles and magnetic fields in the interstellar space. These are two of the main ingredients that compose the so-called **interstellar medium**, that is to say, the **tenuous medium filling the space between stars in the Galaxy**. Despite the rather low popularity compared to other more fashionable areas in Astronomy (e.g., black holes and gravitational waves), **the physics of the interstellar medium is of key importance to address one of the fundamental questions of modern Astrophysics**, notably, how do stars form in present-day galaxies? This remains an unsolved clue in the star-formation history during the cosmic evolution, as today galaxies generate almost one order of magnitude less stars than in the past, when the universe was only one third of its present age. The detailed mechanisms that convert gas into stars have to be found in the physical processes that govern the evolution and composition of the interstellar medium. The problem is to understand how diffuse and hot interstellar matter can cool down and become dense enough for gravitational forces to win against the action of magnetic fields and turbulent dynamics and give birth to new stellar objects. The study of the formation process of cold interstellar gas in the magnetised interstellar medium is therefore a primary step into the investigation of the initial conditions of star formation in our Galaxy.

In a work published in **November 2020**, a **team lead by A. Bracco** (Ruđer Bošković Institute, Croatia) and including French researchers (**M.-A. Miville-Deschênes** from laboratoire AIM and **E. Bellomi** from Laboratoire de Physique de l'Ecole Normale Supérieure and LERMA, Paris Observatory) focused on the analysis of state-of-the-art observational data at radio frequencies that allowed them to trace the cold interstellar gas through spectroscopic measurements of the 21-cm line emission of atomic hydrogen, which corresponds to the lightest and most abundant element in the interstellar medium that traces neutral gas in the Galaxy.

The authors combined for the first time these spectroscopic data with observations of synchrotron emission below 200 MHz obtained with the **LOFAR telescope**, a European network of radio interferometers that anticipates what the SKA will be able to do in the future. They targeted diffuse fields of view at intermediate Galactic latitudes and found an undoubted positive correlation between the 21-cm line emission of atomic hydrogen and the linearly polarised synchrotron emission detected with LOFAR (as shown as an example in the figures on the left).

These results, which suggest an **unprecedented association of the complex structure of the cold interstellar gas with synchrotron radiation in the diffuse interstellar medium**, possibly motivated by the presence of strong interstellar magnetic fields, show how the novel exploration of the radio sky at low frequency challenges the theory of the evolution of the interstellar gas and our understanding of synchrotron emission from the diffuse interstellar medium.



Composite image showing the visual correlation of the 21-cm line emission from atomic hydrogen (blue) with the LOFAR synchrotron polarised emission (orange). As an example two LOFAR fields of view are shown. The drapery pattern traces the magnetic-field orientation in the cold interstellar medium as probed by the Planck satellite. The gray circle in each panel traces the size of the primary LOFAR beam

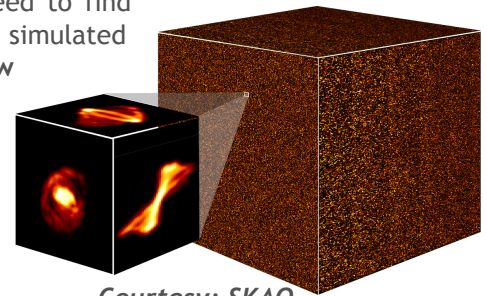
From Bracco et al. 2020, to appear In Astronomy & Astrophysics

Second SKA Data Challenge

As announced in the [SKA-France bulletin of August/September 2020](#), the Office of SKAO has organised a second Science Data Challenge (SDC2): participants will need to find and characterise radio sources of neutral hydrogen (HI) by analysing a simulated SKA 3D dataset of 1TB size. The Official registration for SDC2 is now open and registration will close promptly at 5 P.M. UTC on December 11, 2020, or earlier in the event of computational provision reaching capacity.

Participants are required to register in teams following detailed instructions at the [SDC2 web-page](#). The full challenge data set will be hosted by [international computing facilities](#) (including the [French GENCI/IDRIS centre](#)).

For any queries, please contact the [SKA Organisation SDC2 team](#).



Courtesy: SKAO

SKAO Current Vacancies

The following SKAO positions are currently open:

- * [Treasury Manager](#) - Contract Type: Permanent (closing date: January 11, 2021)
- * [SKA Regional Centre Architect](#) - Contract Type: Permanent (closing date: January 8, 2021)
- * [System Engineer](#) - Contract Type: Permanent (closing date: January 25, 2021)
- * [SKA-Mid Telescope Director](#) - Contract Type: Permanent (closing date: February 8, 2021)
- * [SKA-Low Telescope Director](#) - Contract Type: Permanent (closing date: February 8, 2021)

Particular emphasis is put here in the new architect position for the science-driven data and computing platform that should be deployed and supported across the global SKA Regional Centres Network (SRC Network) for advanced scientific analysis of the SKA observation data products. This is an exciting challenge and a position that will see a strong collaboration with computing infrastructure providers all over the world.

Interested readers can [register](#) to automatically receive an e-mail as soon as a relevant job is published. More information can be found at the [SKAO webpage](#). Future planned roles about to be advertised from December, include: SKA- Low Telescope Director (AU), SKA- Mid Telescope Director (ZA), Procurement Specialist (Software and ICT), Senior Contract Specialist (NEC expert), SKA-Low Product Assurance Engineer SKA-Mid Product Assurance Engineer.

We draw attention also on SKA Organisation secondee opportunities within both the Human Resources and Communications & Outreach teams:

- * [Two Host Country HR Specialists](#) (one based in South Africa, one in Australia) - 6 month secondment
- * [Two Communication, Education and Outreach Interns](#) (UK based) - minimum 6 month secondment

[Fiona Davenport](#) and [William Garnier](#) respectively will be able to answer any questions about the two secondment positions.

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