SKA-France

Monthly bulletin

February 2020

News from Maison SKA-France

SKA Board Mid-Term Meeting

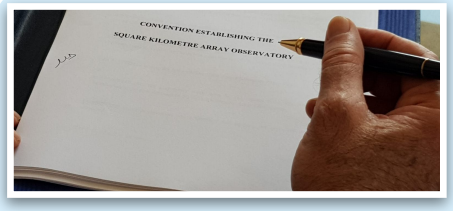
Members of the SKA Board of Directors at the mid-term Board meeting.

Image courtesy: SKAO

On **February 28, 2020**, C. Cesarsky, Chair of the Board, welcomed directors and invited guests to the **Mid-Term Meeting of the Board of Directors of SKA Organisation**, which was held at the SKA Headquarters.

A complete overview of the key points addressed during the meeting (concerning Policy, Engineering, Operations, Administration and Governance, as well as Reporting from the Finance Committee and the Science and Engineering Advisory Committee, SEAC) is available through the **Notes from the Chair** published at the SKAO webpage.

Among the most relevant discussions, we report here that, *"after receiving advice from the Council Preparatory Task Force (CPTF) and the SEAC, together with feedback from Science Working Groups (SWGs), the Board confirmed that both the Construction Proposal and the Observatory Establishment and Delivery Plan should be drafted with the aim of realising the full Phase 1 scope of the SKA by delivering the agreed Design Baseline for two transformational telescopes, SKA1-Mid in South Africa and SKA1-Low in Australia"*.



Italy ratifies the SKA Observatory Convention

A very good news has been announced on February 5, 2020: Italy, the country that led the multilateral negotiations on the text of the SKA Observatory Convention, has become the second country to ratify the treaty establishing the SKA as an intergovernmental organisation.

The announcement followed the decision of the Italian Senate, which, on January 30, 2020, passed the law that authorises the President to ratify the Convention. An Italian financial commitment of 120 million euros over 10 years for the project was also announced.

We recall that the convention will enter into force once five signatories, including the three hosts Australia, South Africa and the UK, have ratified the text.

Congratulations to the Italian colleagues!

In this framework and following the recent System CDR, J. McMullin (SKAO Programme Director and Deputy Director-General) presented an update on Construction Planning to the Board, which will have "*to set out the required timing for the delivery of funds from the Members by efficiently staging the deployment of facilities with a clear commitment to complete the full Design Baseline of SKA1 in a timely manner*".

Important schedule updates about the establishment of the SKA Observatory were provided by T. Devaney (SKAO Head of Business Development and Change). The target dates are July 16-17, 2020, for the first SKA Observatory Council meeting, and December 14, 2020, for the execution of the transition from SKA Organisation to the SKA Observatory.

Very timely with respect to similar initiatives taken by the astronomical community all over the world (such as the European Southern Observatory and the French Society of Astronomy and Astrophysics), P. Diamond (SKAO Director General) updated the Board on the work currently taking place to investigate the potential impact of the various Low Earth Orbit satellite mega-constellations on SKA1.

European SKA Forum

European countries that are members of the SKA Organisation and/or signatories of the SKA Observatory Convention (France, Germany, Italy, Portugal, Spain, Sweden, Switzerland, The Netherlands, United Kingdom) have unanimously decided to launch a new coordination structure called **European SKA Forum (ESKAF)**.

After the important activities coordinated by the previously existing European SKA Consortium (ESKAC) to stimulate European collaboration in the initial phases of the SKA Organisation, ESKAF aims today at providing a platform to promote joint European SKA-related initiatives in view of the beginning of the SKA Observatory construction.

As a first step, representatives of the nine countries currently in ESKAF were required to nominate and vote for a Chair and Vice-Chair person. On **February 24, 2020**, it was announced that **C. Ferrari** (Observatoire de la Côte d'Azur/CNRS, FR) and **M. Van Haarlem** (ASTRON, NL) have been **elected as ESKAF Chair and Vice-Chair, respectively**.

Activities

SKA-France at the SDHP Multilateral Meeting

On **February 3, 2020**, **SKA-France representatives attended the Multilateral Meeting** convened by UK Research and Innovation (UKRI) Science and Technology Facilities Council (STFC) at the SKAO Headquarters **to organise contracts relating to the SKA Scientific Data Handling and Processing (SDHP) software**. SKA-France expressed the interest of French partners in the corresponding hardware part, and the wish to collaborate with international colleagues developing software in order to create a synergetic development of these two essential components of the SKA.

French participation to the NZ Radio Astronomy School & C4SKA Colloquium 2020

From **February 10 to 14, 2020**, the **Institute for Radio Astronomy & Space Research (IRASR) of Auckland University (AUT) in New Zealand hosted the Computing for SKA Colloquium (C4SKA) 2020**. This two-days annual event alternates presentations and discussions on topics around algorithms and computing systems for the SKA project. For the first time, a Radio Astronomy School was organised before C4SKA. This three-day school, hosted at the Warkworth Radio Astronomical Observatory and at AUT City Campus, was pitched at an introductory level, suitable for advanced undergraduate students, post-graduate students, and professionals with limited experience in radio astronomy. Each day included a mixture of lectures and practical sessions, ranging from the fundamentals of signals and the astrophysical radio sky, to the configuration and operation of observatory instrumentation. This event was a great opportunity for **N. Monnier**, who is currently starting his **PhD at Central Supelec L2S laboratory under the supervision of N. Gac in collaboration with Atos Bull,** to present his work previously done at Atos Bull and dealing with the **parallelisation of DDFacet on a distributed memory HPC system**. DDFacet is the wide-band wide-field spectral deconvolution framework initiated by C. Tasse from Paris Observatory in collaboration with SKA South Africa and Rhodes University. **J.-F. Nezan**, from the **Institut d'électronique et de télécommunications de Rennes (IETR)**, presented a talk focusing on the **importance of computation models for the development of SKA algorithms and their scalability in the final high-performance computing system**.

French participation to the program Increment Meeting #6

The **sixth edition of the "Program Increment Meeting" (PI#6) of the software engineering** activity coordinated by the SKA Organisation during the Bridging Phase was held from **February 24 to 28, 2020**. Organised in Perth (Australia) by the International Centre for Radio Astronomy Research (ICRAR) and Commonwealth Scientific and Industrial Research Organisation (CSIRO), the meeting saw some participants who attended remotely from the SKAO Headquarters. Among them, V. Lanore, an Inria research engineer working with SKA-France since January 2020 and focusing on High-Performance Computing (HPC) challenges of the SKA.

Participants in the PI#6 meeting (Perth, AUS)
Image courtesy: SKAO

Together with international colleagues and under the leadership of M. Deegan (SKAO), V. Lanore will work in the newly formed “Platform Team”, in charge of defining a roadmap of Science Data Processor (SDP)-related benchmarks, deploying and running them. With a strong interest in France for conducting hardware/software co-design for the SKA, V. Lanore will coordinate future French contributions to the Platform Team.

News from France in the last issue of the SKA magazine

Courtesy:
SKA Organisation

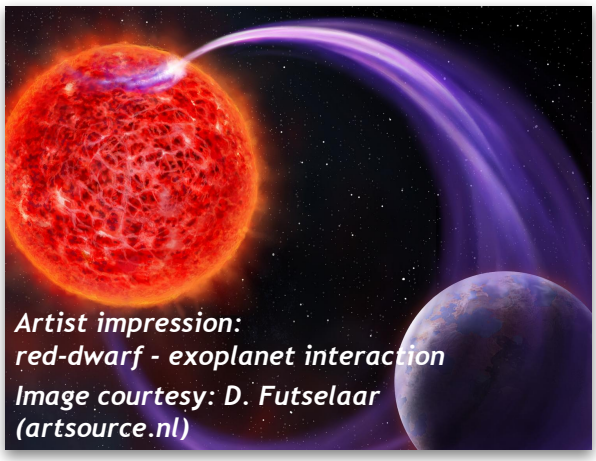
The third issue of “Contact”, the new SKA magazine, has been published in December 2019 by the SKAO Communication team.

Once more, the magazine provides a beautiful overview of some exciting scientific results from existing radio telescopes, recent news about SKA technical developments, reports about meetings and outreach initiatives, as well as highlights of SKA related activities within different countries involved in the project preparation. In this framework, the interview article to the Chair of the SKA Board (C. Cesarsky) by the French journal “La Recherche” is highlighted, and the issue contains a short interview of the SKA-France Director (C. Ferrari). Some of the SKA-related scientific results included in the Magazine see French researchers involved. Among them, the cover page refers to a recent publication of a team working on LOFAR surveys, which is also summarised in the next section of this SKA-France Bulletin.

Announcements

News from SKA precursors and pathfinders

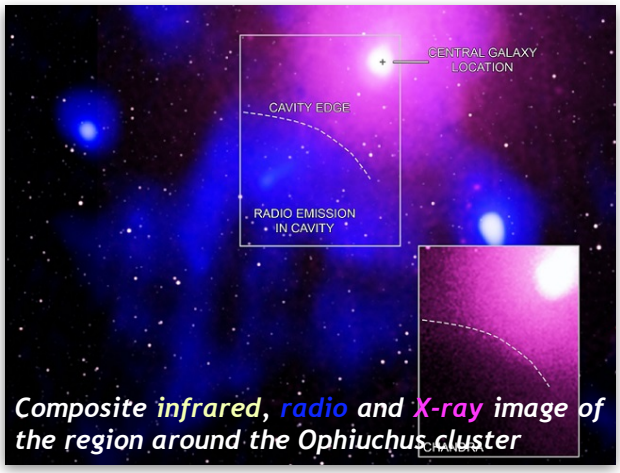
On **February 17, 2020**, a **team of researchers including C. Tasse, astronomer at Paris Observatory - PSL**, has announced the **detection of low-frequency radio emission from a nearby star of our Galaxy**, named GJ 1151. This object falls in the category of red dwarfs, that are the most abundant type of stars in the Milky Way and are characterised by much smaller sizes and lower temperatures than the Sun.



Artist impression: red-dwarf - exoplanet interaction
Image courtesy: D. Futselaar (artsource.nl)

More relevant for this discovery is the fact that red dwarfs can have much stronger magnetic fields than our star, with the consequence that nearby planets, exposed to intense magnetic activity, can be heated and subjected to an erosion of their atmosphere. These effects can be quantified through measurements of the radio emission from the nearby red dwarf, as this radiation is also related to the star's magnetic field. As declared by H. Vedantham (ASTRON), the lead author of the study, *"the motion of the planet through a red dwarf's strong magnetic field acts like an electric engine much in the same way a bicycle dynamo works. This generates a huge current that powers aurorae and radio emission on the star."* Within the solar system, the lower magnetic field of the Sun and its larger distance from surrounding planets prevents this to happen, while a similar phenomenon is observed in the case of the interaction between Jupiter's moon Io and Jupiter's magnetic field. This discovery opens a new way to detect exoplanets and study their environment, showing in particular the capacity that this kind of observations offers to determine what impact the star's magnetic activity has on an exoplanet's habitability.

The discovery was made possible through the analysis of the LOFAR Two Meter Sky Survey, LoTSS, an ongoing project to observe electromagnetic radiation in the frequency range between 120 and 168 MHz from the whole Northern sky, using the SKA-pathfinder telescope LOFAR. For more information, interested readers can refer to the scientific paper published on Nature Astronomy, press releases from Paris Observatory and ASTRON, as well as watch at the YouTube video providing a very clear explanation of this discovery.



Composite infrared, radio and X-ray image of the region around the Ophiuchus cluster

Credits: X-ray: NASA/CXC/Naval Research Lab/Giacintucci, S.; XMM:ESA/XMM; Radio: NCRA/TIFR/GMRTN; Infrared: 2MASS/UMass/IPAC-Caltech/NASA/NSF

Low-frequency observations of the sky from two other SKA pathfinder/precursor instruments - the Giant Metrewave Radio Telescope (GMRT) in India and the Murchison Widefield Array (MWA) in Australia - allowed another major discovery, published on **February 27, 2020**, in The Astrophysical Journal.

By revisiting archival GMRT and MWA observations of the **galaxy cluster Ophiuchus**, an international team has discovered the existence of an **extended radio source**, whose emission is due to relativistic electrons (elementary particles moving at nearly the speed of light) and weak magnetic fields, in the central region of the cluster. The fact that this enormous radio emission shows up only at the lowest radio frequencies indicates that it is a "fossil" source, associated to acceleration of particles by a blast from a super-massive black hole that happened several hundreds millions years ago.

We know since decades that the space between the thousands of galaxies contained in clusters is not empty: in addition to the radio emitting plasma, the intracluster volume is filled with hot and tenuous gas that we detect through X-ray satellites. What is very interesting here, is that the low-frequency giant radio source is filling a cavity in the distribution of the X-ray emitting gas and that, in order to explain the observed X-ray and radio properties of this structure, the authors have estimated an outburst black-hole energy that make it "***the biggest explosion in the history of the Universe***", as announced in many recent articles in the press reporting this scientific result.

SKAO Current Vacancies

One SKAO position is currently open: **SKA Operations Scientist/SAFe® Product Manager** (closing date: April 30, 2020).

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.

SKA-related PhD opportunity at Observatoire de Paris - PSL

A **PhD position** on the topic **"Search and study of exoplanets in radio with NenuFAR and SKA"** is available at **Observatoire de Paris - PSL**, under the supervision of P. Zarka. The project aims at achieving unambiguous detection of low-frequency exoplanetary radio signals with NenuFAR, the French SKA pathfinder, and to perform associated detailed physical analysis (access to exoplanetary magnetic fields, comparative exo-magnetospheric physics, star-planet plasma interactions, constraints on planetary rotation, habitability…).

The deadline for applications is April 23, 2020 and the PhD contract will start on October 1st, 2020.

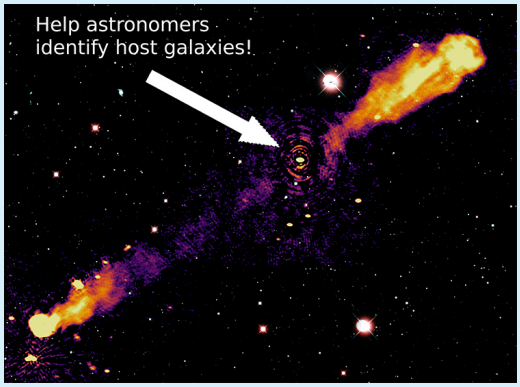
All information, including a detailed description of the research project and the required profile and skills are available at the announcement web-page.

Towards a comprehensive model of the Galactic magnetic field

6-10 July 2020, Lorentz Center, Leiden, The Netherlands

The workshop, hosted by the IMAGINE Consortium, aims to **coordinate and facilitate the efforts of a diverse group of researchers in the broad areas of the interstellar medium, Galactic magnetic fields and cosmic rays.** The goal of the workshop is to discuss the present research on these topics, to review available computational tools and the observational database, and, most importantly, to identify further directions of research and promote active collaborations between participants. The organisers (J. R. Hörandel, NL; T. Ensslin, DE; F. Boulanger, FR; T. Jaffe, US; J. West, CA) welcome participation of existing and potential new collaborators, as well as those interested in attending the discussions. The maximum number of attendees is limited to 55. Since a balanced mix of participants is envisaged, with at least half of our participants being junior, an application based process to select the attendees will be used, in the event of oversubscription. **All interested scientists are encouraged to apply by March 31, 2020, through the on-line form.**

Meeting website: https://www.lorentzcenter.nl/modelling-the-galactic-magnetic-field.html



LOFAR Radio Galaxy Zoo

The LOFAR Radio Galaxy Zoo is a new citizen science project launched worldwide. In France, it is Coordinated by Paris Observatory - PSL, CNRS and the University of Orléans.

This exciting program gives anyone with a computer the opportunity to help the scientific community to understand the origin of the hundreds of thousands of sources which have been detected by the LOFAR radio telescope.

Have fun and be useful!

Chiara Ferrari
for the **Maison SKA-France**