

# SKA-France

Monthly bulletin

May 2019

## SKA-France

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## News from Maison SKA-France

### French study of innovative options for SKA1-MID energy system funded

**Bertin Technologies** (a subsidiary of the CNIM company, member of SKA-France) submitted last month a study proposal "Sustainable Energy Supply for SKA Telescope" to a Private Sector Support Fund (FASEP-Etudes), to complement the earlier studies that SKAO, SARAO and their partners have already completed on SKA1-Mid energy issues. The objective of this new study is to help define a sustainable energy system, optimised in terms of cost, technical and environmental performance, for the South African part of the telescope. This project will evaluate and compare with the baseline configuration several innovative options for the energy system, with the aim of minimising the operational costs for the telescope operator, as well as the environmental impact of energy management as a whole (production / conversion / consumption of all needed energy vectors on site). The operation of SKA1-Mid requires a power of about 5MW, for consumption of electricity, heat and cold, and possibly hydrogen.

The proposal has been evaluated by a panel composed of representatives from the **Ministry of Finance/DG Trésor**, the **French Development Agency (AFD)**, the **Ministry of Ecological and Solidarity Transition (MTES)** and the **Environment & Energy Management Agency (ADEME)**, and approved for funding. The study is about to start and will mobilise engineers from Bertin Technologies specialised in sustainable energy technologies, as well as external experts. Completion is expected early 2020.

### Participation to TM and LFAA activities

As stated in the [April issue of this monthly bulletin](#), SKA-France is currently deeply involved in identifying how to efficiently contributing to bridging phase activities coordinated by SKAO. In addition to the SDP-related actions mentioned above, SKA-France partners have started to be officially involved on Telescope Manager (TM) and Low-Frequency Aperture Arrays (LFAA) post-CDR tasks.



### A new Director of Operations and a new Member for SKAO

Early May saw two important announcements from the SKA Organisation.

On May 6, [Dr Lewis Ball](#) has been appointed as the new [Director of Operations](#), in charge of overseeing the SKA design activities and construction preparations. L. Ball had key roles in leading astronomy research infrastructures within main radioastronomical organisations, such as NRAO (US) and CSIRO (AUS). As Deputy Director of the ALMA observatory in Chile, he oversaw its transition from construction to operations, and the successful delivery of Early Science.

On May 8, it was made public that, following a unanimous vote by the SKA Board of Directors at its 28<sup>th</sup> meeting (March 2019), the Max Planck Society, prestigious German research organisation, has become the [13th member of SKAO](#).

Based on its significant experience in TANGO deployments (the control system that has been selected for the SKA), **Thales Services is providing consultancy for SKAO**, in particular on topics that are of interest for SKA-related developments (e.g. scalability in the TANGO database, securing remote TANGO facilities, performance in TANGO devices developed in Python). On the LFAA side, after the solicitation from SKAO, **experts of the Nançay Radio Observatory and Subatech laboratory are currently working on comparative antenna simulations**, extended to the global electronics design in the case of Subatech.

## Activities

### SDP consortium concludes work

After the Science Data Processor (SDP) Critical Design Review (CDR) meeting that took place at the SKA Headquarters on January 2019, to which C. Perez (INRIA) and C. Tasse (Paris Observatory) participated as observers, the **SDP consortium has now formally concluded its engineering design work** started in 2013.

The consortium, lead by Cambridge University, was created to generate a design for the second stage of the SKA data processing, following the correlation and beamforming that takes place in the Central Signal Processor (CSP). Based on the results achieved and the recommendations of experts involved in the SDP CDR, SKAO is now taking the coordination role on remaining activities to integrate the work performed by the consortium within the SKA System CDR preparation. A series of bridging tasks are generated in order to implement the SDP needs in the final construction proposal, with any software bridging activities developed using the Scaled Agile Framework (SAFe). SKA-France academic and industry partners and collaborators are currently actively working to define a coordinated approach for contributing to SDP bridging work.

### First meeting of the SRCSC

The **first face-to-face meeting of the SKA Regional Center Steering Committee (SRCSC)** was held at the SKA Headquarters (“Bank, UK) on **May 8-9, 2019**.

This committee has a key role, since its aim is to define and create a long-term operational partnership for the SKA Observatory and an ensemble of independently-resourced SKA Regional Centres. Each member of the SKA Organisation has therefore been invited by the SKA Director General to nominate one SRCSC representative. In addition to SKAO Staff members (A. Chrysostomou, Head of Science Operations Planning, and R. Bolton, SKA Regional Centre Project Scientist), the committee includes: P. Quinn (UWA, Australia), S. Gaudet (NRC, Canada), T. An (SAO, China), J.-P. Vilotte (CNRS, France), H.-R. Klöckner (MPG, Germany), Y. Wadadekar (NCRA-TIFR, India), A. Possenti (INAF, Italy), M. van Haarlem (ASTRON, the Netherlands), S. Ratcliffe (SARAO, South Africa), L. Verdes-Montenegro (IAA, Spain), J. Conway (Chalmers, Sweden) and A. Scaife (Manchester University, United Kingdom). During the first FtF meeting, each member was invited to present the national framework related to SRC developments. P. Quinn was elected as Chair of the SRCSC and M. van Haarlem as Deputy Chair. The Committee will look to develop a White Paper to outline the broad principles (users, functions and operational model) for a network of SRCs.

### BDEC

An international workshop in the **Big Data and Extreme-scale Computing (BDEC) series** was organised by the EU Horizon 2020 project **EXDCI2** in Poznań (Poland) on **15-16 May, 2019**, in parallel with the **EuroHPC Summit Week**. The **workshop**, which gathered 50 participants from the scientific communities of China, Japan, the US and Europe (including 5 from France) focused on platforms, workflows, artificial intelligence / machine learning integration, and demonstrators, with the goal to define and create consensus around a shared cyberinfrastructure for science in the data-saturated world that is now emerging. A useful reference is the **2017 BDEC white paper**. The opening plenary session was held at the EuroHPC venue and was open to all EuroHPC participants.



Quoting the fundamentals of BDEC from their site: *“While the exascale initiatives have understandably focused on the big challenges of exascale for hardware and software architecture, the relatively recent emergence of the phenomena of Big Data in a wide variety of scientific fields represents a tectonic shift that is transforming the entire research landscape on which all plans for exascale computing must play out. [...] The BDEC community has staged a series of workshops that have endeavoured to map out and account for the ways in which the major issues associated with Big Data intersect with, impinge upon, and potentially change, the national (and international) plans that are now being laid for achieving exascale computing”*.

More practically, in its attempt to bring together research thinking and technological developments within a community-driven shaping strategy, the BDEC coordinators decided to discuss candidate Platform Demonstrators during the workshop. A demonstrator in this context means a proof-of-concept platform that we can in some way put together to demonstrate some common capabilities that some of the BDEC applications and application communities need. **Two working groups emerged to pursue the elaboration of two demonstrators: one aims at a global data logistics platform, the other at a machine learning everywhere platform.**

The global data logistics platform should deploy an international, cooperative network of nodes that will store, process and move data from major instruments in physics and astronomy (examples taken: Earth observation, SKA and LHC), as well as their secondary products as necessary, to make them seamlessly available worldwide regardless of source or current location or format, referenced by community specified metadata. The machine learning everywhere platform targets the world of smart cities, personal health and internet of things where it should demonstrate the use of ML(AI) in conjunction with Simulations and Big Data to learn Science Discoveries everywhere (from the edge to the cloud, or through the continuum, as they say).

The effort is meant to be followed up through recurring workshops and work by the participants in between. **This work will potentially leverage the development of the SKA Regional Centres.**

## OpenStack Day

An [OpenStack Day](#) was organised at CERN on May 27, 2019, on the theme “Accelerating Science with OpenStack”. [Speakers were invited to showcase large scientific projects that are either already using, or investigating the possibility to adopt OpenStack infrastructures to help drive the science.](#) C. Ferrari (SKA-France Director) introduced the main scientific objectives of the SKA, justifying the data and computing needs of this “ExaScale telescope”. In a second part of the talk, S. Telfer (Stack HPV CTO) illustrated current studies of possible OpenStack applications to the SKA.

Slides of the presentations and recorded videos can be retrieved at the [agenda web-page](#) of the meeting.



*First slide of C. Ferrari's and S. Telfer's talk*

## Announcements

### Whispers special session: Massive data processing and analysis in radioastronomy

26 September 2019, Amsterdam, the Netherlands

Datasets produced by the current and future generations of radio telescopes are becoming extremely large, due to the increase in sensitivity, instantaneous bandpass per pixel and number of pixels per receiver. This is true for the (sub)millimetre domain where the main instruments (IRAM-30m, NOEMA, ALMA, APEX, LMT, ...) now routinely process several tens of GHz with spectral resolutions of the order of 100 kHz (implying the measurements of about 500,000 frequencies simultaneously), as well as for the centimetre domain (VLA, FAST, LOFAR) and the foreseen SKA that will again represent a revolution in data rate. Data processing and analysis of these large volumes require the development of innovative methods based on the most recent advances in signal processing.

To get the best out of such powerful telescopes, and answer key questions on a wide range of astrophysical topics (from the origin of stars and planets, to cosmic dawn), requires to build bridges between the astronomy community and the applied mathematics / signal processing communities. **The proposed one-day session during the Whispers (Workshop on Hyperspectral Image and Signal Processing: Evolutions in Remote Sensing) workshop in Amsterdam aims at presenting the challenges encountered by the radio-astronomy community and the on-going activities to solve them.**

This event will be organised in 3 to 4 sessions of four to five 20-minutes contributed talks introduced by two invited presentations to set the field by A. Scaife (University of Manchester, UK; “Radioastronomy challenges in cosmology and galaxy evolution studies”) and S. Clark (Princeton, USA; “Atomic and molecular line imaging as diagnostics for ISM and star formation”). Posters will be presented during a flash session. The day will end with a round table to define directions for future collaborations. This table will be animated by C. Tasse (Observatoire de Paris, France), Y. Wiaux (Heriot-Watt, UK, *TBC*), and the SOC members (J. Bobin, France; C. Ferrari, France; M. Gerin, France; R. Klessen, Germany; J. E. G. Peek, USA; J. Pety, France).

The themes of the workshop include: single dish and interferometer data processing; filtering of artefacts and denoising; structure identification with or without velocity information; clustering; identification and quantification of temporal variations; data - model comparisons. The astrophysics focus is put on the topics benefiting from advanced radioastronomy observations, i.e. the relationship between interstellar medium properties and star formation, from the local universe to distant galaxies, and observational constraints on Cosmic dawn and the epoch of reionisation.

Registration is mandatory, with a reduced fee (190 euros) for the one day special session. The fee includes lunch and coffee breaks. Participants are invited to register and submit (by selecting the right session: "Massive data processing and analysis in radioastronomy") either an abstract, an already published paper, or an original paper for publication in IEEE.

**Conference website:** <http://www.ieee-whispers.com>

**Important dates before the meeting:**

- \* Submission deadline: June 28, 2019 (This is the actual deadline for this special session. Please disregard the website deadline)
- \* Final program: July 15, 2019
- \* Registration deadline: September 10, 2019

## Cosmic turbulence and magnetic fields: physics of baryonic matter across time and scales

4-8 November 2019, Cargèse, France

Gravity drives the evolution of the universe, but the gas dissipative dynamics is a central, yet unsolved, issue in the theory of galaxy formation. Current theories succeed in reproducing the observed mass distribution of galaxies only by introducing powerful stellar and black hole feedback that alleviate the rapid gas cooling and condensation into stars. An emergent alternative is that a large fraction of the gas internal energy is stored in turbulent motions instead of being radiated away and lost. Turbulence however adds a huge level of complexity to the physics of baryonic matter because cosmic turbulence involves magnetic fields and the plasma nature of the gas and because it pervades all the thermal phases from the hottest at more than one million Kelvin to the coldest at about 10 Kelvin in which stars form. The prodigious development of new facilities on the observational side, and the fast increase of computing power on the modelling side are opening up the field, calling for new multi-disciplinary approaches.

**This conference will gather astrophysicists, observers and theorists of the local and high-redshift universe, and experts of turbulence and plasma physics.** The goal of the meeting is to facilitate cross-pollination of research in fields of astrophysics and physics that are usually discussed separately. We expect the conference to open new kinds of collaborations for the benefit of the young generations.

Two main themes will be developed in parallel along the week, with ample time dedicated to discussions:

- \* Astrophysical challenges: Universe reionisation, Galaxy formation and evolution, Star formation and Interstellar medium
- \* Physical processes: Turbulence, Plasma physics, Cosmic rays, Astrochemistry

The pre-registration and abstract submission are now open. There will be no registration fee. The attendance being limited to 100, participants will be selected on the basis of the acceptance of their abstract by the SOC.

**Conference website:** <https://mist2019.sciencesconf.org>

**Contact point:** [mist2019@sciencesconf.org](mailto:mist2019@sciencesconf.org)

## 6th annual Science at Low Frequencies conference

9-11 December 2019, Tempe, Arizona, USA

The Science at Low Frequencies (SALF) conference series features presentations and discussions on all types of science and project updates from radio telescopes operating below approximately 1 GHz, including e.g. LOFAR, LWA, HERA, MWA, CHIME, VLA, GMRT, Tianlai, lunar missions, and others. Science topics include Earth atmospheric events and ionosphere, solar physics and space weather, Galactic and extragalactic astrophysics, and 21 cm cosmology. The SALF meeting this year will be followed immediately by an MWA Project meeting on December 12-13, 2019 in Tempe.

**Conference website:** <http://salfconference.org>

## SKA in the French news

The May issue of the French science outreach magazine “Sciences et Avenir” includes a nice overview of current studies of galaxy properties, focusing in particular on the information on their formation and evolution that we can derive by observing their morphologies, luminosities and distance.

Certifying once more the interest raised by the SKA in the French press, **the SKA is one of the major observatories highlighted in the insets of the reportage**, together with the James-Webb Space Telescope (JWST, conceived to spot the formation of the first galaxies mostly in the infra-red part of the electromagnetic spectrum) and the Event Horizon Telescope (EHT, which allowed to produce the first image of the shadow of the event horizon of a black hole around the nucleus of the galaxy M87).

The amazing survey speed of the SKA is mentioned, explaining that its unprecedented capacity to detect weak objects in wide regions of the sky will be key in the search of distant galaxies.



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