

SKA-France

Monthly bulletin

July 2017

SKA-France

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News from the SKA-France coordination

Interest of international partners on code development and optimisation developed in France

During the last SKA Engineering Meeting, the algorithm optimisation work coordinated by SKA-France between its industry and academic partners has been presented to members of the Science Data Processing (SDP) SKA consortium, who have appreciated the originality of approach as well as the expected impact on SKA performances.

In this framework, on July 13, 2017, John Bancroft (Director of INTERACT Project and Manager of Industry Engagement in the Research and Innovation Office of Auckland University of Technology, and SDP member) presented at the last meeting of [New Zealand SKA Alliance \(NZA\)](#) an [overview of the work performed in France by the ATOS-Bull Center for Excellence in Parallel Programming \(CEPP\) on C. Tasse's \(OBSPM\) imaging code "DDFacet"](#). The slides, provided to John by ATOS-Bull and SKA-France, are available [here](#) for interested readers.

In addition to the very intense collaboration on radio interferometric algorithm development with SKA South Africa (see the [April 2017 issue of SKA-France Bulletin](#)), this opens interesting perspectives of collaboration with New Zealand for SDP-related code optimisation.

Very importantly, a **collaboration exists already between the team of J. F. Nezan (INSA, Rennes), the French company Kalray and the New Zealand Alliance**. NZA involved the French partners for optimisation studies within the Central Signal Processing (CSP) SKA consortium.

All these activities are now collectively followed by SKA-France in order to have a coordinated approach towards a possible official French participation to the SDP and CSP consortia.



The SKA-France coordination is working with international collaborators to identify where and how France could play a role in the SDP and CSP consortia.



Big Data: SKA and CERN collaborate

SKA1 is expected to generate ~300 PB of data products every year, resulting from the huge raw data rate of ~10 Tb/s. On the other hand, the LHC at CERN has collected more than 200 PB of raw data over the past seven years, with in perspective the High-Luminosity LHC estimated to exceed this level every year.

In order to achieve the expected huge steps forward in the physics and astrophysics domains, these two fantastic projects therefore face the same Exascale computing and data storage challenges. For this reason, [CERN and SKA Director Generals signed on July 13, 2017 an agreement formalising their collaboration in the area of extreme-scale computing.](#)

Activities

SKA activities of the microelectronics team at Nançay Radioastronomy Station

The microelectronics team based at Nançay Radioastronomy Station (jointly operated by Paris Observatory, CNRS and Orléans University) has been deeply involved for many years in the R&D for the SKA and its pathfinders, with a particular implication in the design of specific integrated circuits for the SKA dense aperture arrays. This R&D activity resulted in their early and still existing involvement in the Mid Frequency Aperture Array (MFAA) SKA consortium, as demonstrated by the active participation to the last SKA Advanced Instrumentation Program (AIP) meeting (ASTRON, see [SKA-France June Bulletin](#)).

In the last months, thanks to joint discussions between SKA-France and the Low Frequency Aperture Array (LFAA) consortium, it emerged a great interest for having the Nançay microelectronics team involved also in the work-packages of the consortium related to the development of radio-frequency microelectronic design for Low Noise Amplifiers (LNA) and analogue electronics. Based on this activity, the official procedure for the team to join the LFAA consortium has been started in the last weeks.

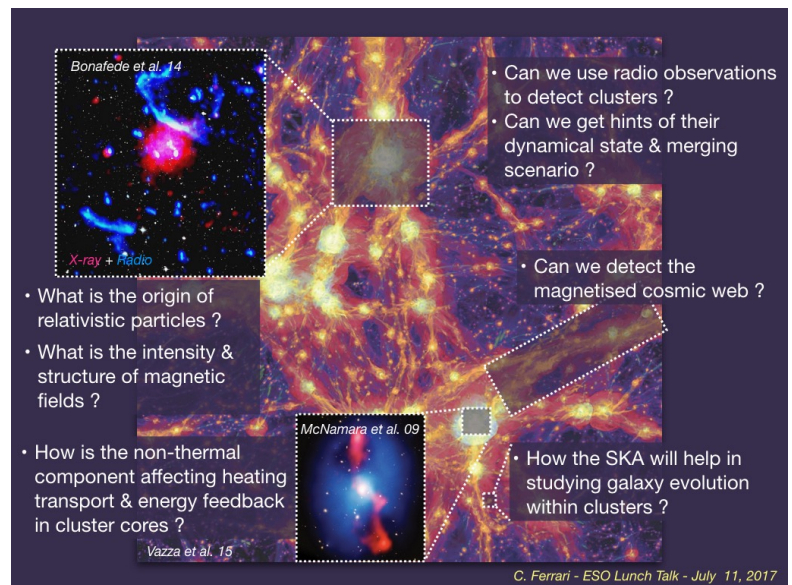
New SKA perspectives at the Laboratoire d'Astrophysique de Bordeaux

In addition to its expertise in the digitisation and digital processing of large-band radio-astronomical signal and its consequent already existing technical involvement in the SKA project (with on-going and past activities related to DISH, WBSPF and MFAA SKA consortia), on the astrophysical side the Laboratoire Astrophysique de Bordeaux (LAB) has put forward two areas where SKA would be especially valuable to LAB researchers: stellar formation and very long baseline interferometry. On July 17, Pascal Bordé (LAB director) has thus sent to the SKA-France coordination a [new version of the LAB declaration of interest](#) in the SKA project, which strengthens the participation of this institute to SKA-France related activities even further.

Lunch talk about the SKA at ESO

On July 11, 2017, Chiara Ferrari (OCA, SKA-France coordinator) gave a lunch talk at ESO Garching Headquarters about the huge perspectives opened by the SKA on the study of galaxy clusters and large-scale structures.

As illustrated in several chapters of the SKA Science Book (“Advancing Astrophysics with the Square Kilometre Array”) and summarised in one of the slides of C. Ferrari’s talk, the exquisite sensitivity and angular resolution of SKA1, as well as its huge frequency coverage, will allow us to address a huge variety of open questions about galaxy cluster formation and evolution, going from the origin and physical properties of their non-thermal Mpc-scale components (magnetic fields and cosmic rays), to the effect of Active Galactic Nuclei feedback on gas cooling at the cluster centre and to the mechanism driving galaxy evolution within these “dense” environments. Even the elusive cosmic web could possibly light up in SKA1 very deep images due to its expected extremely faint synchrotron radiation.



Important synergies exist for galaxy cluster studies with major future observational facilities at other wavelengths, such as LSST, Euclid, Athena and, indeed, existing and future ESO instruments. The **nearly simultaneous construction of SKA1 and ELT** make their joint use particularly attractive for this science case, and not only, of course!

Announcements

21SSD: THE 21CM SIMULATED SIGNAL DATABASE



A database for the scientific preparation of the SKA has been released by the team lead by Prof. Benoît Semelin (OBSPM). The “[21cm Simulated Signal Database](#)” is a publicly available repository of 21cm signal lightcones from the Epoch of Reionization (EoR), one of the most exciting SKA science case.

Lightcones were produced with a number of large radiative-hydrodynamics simulations, which are described in the recently submitted paper: “[21SSD: a public database of simulated 21-cm signals from the epoch of deionization](#)”, by B. Semelin, E. Eames, F. Bolgar and M. Caillat. All the authors work at Paris Observatory.

Contact person for questions concerning the simulations and the data: [Benoît Semelin](#)

Contact persons for questions concerning the usage of the web site database: [Benoît Semelin](#) or [Michel Caillat](#)

Next important steps

Before wishing happy (northern hemisphere) summer holidays to our readers, we recall some of the main activities of the SKA-France coordination expected in the last months of 2017, in view of the revision of the French roadmap for research infrastructures:

- * the finalisation of the French SKA White Book, expected for end of September 2017 and followed by the organisation of an SKA-France Day
- * the evolution of the SKA-France coordination towards a more extended partnership between public research institutes and private companies
- * the continuous enhancement of French participation to the scientific and technological preparation of the SKA, both at national and international level
- * the follow-up of inter-disciplinary activities in France related to the SKA project



Chiara Ferrari
for the SKA-France coordination