SWG Chairs Telecon 19 October 2021

Participants: Abhirup Datta, Andrei Mesinger, Barbara Catinella, Francoise Combes, Adriano Ingallinera, Anne Nelles, Barbara Catinella, Eduard Kontar, Fernando Camilo, George Heald, Josep Miquel Girart, Jason Hessels, Mark Sargent, Natasha-Hurley Walker, Paolo Serra, Phil Edwards, Sebastien Muller, Stefano Camera, Tao An, Valentina Vacca

Apologies: Divya Oberoi

SKAO: Robert Braun, Anna Bonaldi, Philippa Hartley (Notes), Jeff Wagg

Council meeting 4

RB: Very successful meeting. One of the highlights was the physical signing of the hosting agreements for construction and operation of both telescopes. There was also an update on membership, with additional countries well on their way to getting their memberships formalised, plus countries with interim cooperation agreements in place.

Jason: What does a hosting agreement mean in practice?

RB: High level government agreement that allows us access to the sites for SKAO purposes. There is still an indigenous land use agreement that needs to be completed in Australia, and some land acquisition for parts of the outer spiral arms in South Africa. If all goes well then full access expected from April in Australia and November in South Africa.

AAVS Calibration work

Recent progress by Ravi Subrahmanyan who has recently returned to CSIRO. He has demonstrated very effective AAVS (the SKA Low prototype station) calibration using a sky model consisting of the Sun together with GSM2016 (2017MNRAS.464.3486Z). GSM2016 is based on a principal component analysis applied to the subset of surveys with the most extensive coverage and overlap, supplemented with an iterative mechanism to incorporate all additional sky surveys with only partial sky coverage and overlap. GSM2016 does not yet include SPASS (2019MNRAS.489.2330C) which would be a significant improvement in the 2 - 5 GHz range.

Ravi makes use of numerical simulated embedded element patterns (EEP) rather than the average element pattern (AEP) and this yields great improvements in

solution stability. With these EEPs we can get very good predictive antenna responses for the individual antennas within a station, and therefore high-quality station beams.

Anne Nelles: Have done a similar thing with LOFAR data. It's interesting to see how much scatter there is when using the AEP rather than the EEP; this scatter, while expected, has not been seen in LOFAR data when doing the same type of comparison.

RB: This may be due to the dense (256 antennas inside 38m diameter) pseudo-random antenna distributions of the LOW prototype station, resulting in great variability in the degree of mutual coupling between the more closely and more coarsely spaced antennas.

AN: Lower effect in LOFAR station may also be related to the small relative bandwidth of the LBA antennas (peaking between 50 and 70 MHz), unlike the SKALA antennas which have both higher forward gain and extremely broad frequency coverage.

RB: EM simulations for LOW have predicted a great variability in EEPs below 100 MHz based on location in the station. It would be interesting to see the predicted variability for the LBA case. (What may be relevant is that the LBA antenna density is much lower, only 96 antennas inside 87m diameter of which only about half are inside 38m.)

AN: Environment may also be a consideration, eg. vegetation control will be important if the antennae are particularly sensitive.

RB: Vegetation control at the SKA-Low site is much less of an issue than in the Netherlands.

SWG Co-chair updates

Josep Miquel: Submitted session proposal to next year's EAS conference: "SKA approach to galactic star formation"

George: Organising "VLBI in SKA era" symposium next year, will be sponsored by SKA, together with other sources. SOC of the conference is keen to broaden the scope of the conference beyond the traditional scope. Want to dig into SKA science cases that can be strengthened and enhanced by VLBI using SKA itself. Even if you are not a VLBI expert, we would particularly encourage you to take part.

Abhi: The previous SKA science data challenge being over, we have had a meeting with all the people interested in the upcoming EoR data challenge. We would like one person from SKAO connecting with us for each of the three tiers we have defined.

After two months' leave from our monthly EoR/CD telecon; this is starting up again this month.

RB: We are continuing preparatory work for the EoR data challenge, including modelling of diffuse foregrounds. This should have immediate application for other data challenges, such as transients, cosmic magnetism, etc.

Abhi: Also, other SWGs could participate in Tier 1 part of the EoR challenge.

Jeff: Thank you very much to all SWG chairs and members for their SRC survey answers; we will provide a more extensive update on the survey outcomes in the next few months.

Adriano: Our Galaxy SWG met recently with former chairs to discuss possible core membership and focus group definition within the SWG. The VLBI meeting will provide an opportunity to speak on high resolution applications for the SWG. Thanks to George for this opportunity.

AnnaN: We have filled in the SRC questionnaire (sent out by Jeff) recently, and have also submitted a cosmic particle use case.

Barbara: Have also filled in the SRC questionnaire and have added another representative to the SRC working group. Organising HI-continuum workshops in November - still collecting abstracts.

Paolo: Two weeks ago we had a week-long SKA Italy conference, ~200 people attended. Touched on all SKA science topics; partly talks about pathfinder results, partly on INAF's involvement with precursors. Broad interest within Italian astronomy community to use SKA, but only a smaller fraction are familiar with radio data: opportunity for training and enabling people to propose for and use SKA data.

Adriano: This meeting was just one in a series of Italian meetings following the progress of SKA.

Eduard Kontar: Have also completed the SRC survey. Q: for SKA meetings, suggest it would help if the science meetings could happen at a fixed time of the year

RB: SKA Science meetings in the past have happened every 18-24 months. With travel restrictions only slowly easing, we are still thinking about when the best time might be for the next one. Possibility of a joint SKAO meeting with ngVLA in 2022, but no decisions have been made on this. Would an annual SKA science event be welcome by the SWGs and should that be tied to a particular time of year?

Eduard: Different science areas and organisations appear to have fixed time in the calendar for their big meetings. A roughly fixed time would help for planning.

Jason: Tend to agree. In terms of building a stable community and providing a timeframe for research completion.

RB: We'll give this some thought and come back with some suggestions to consider.

Fernando: Observations with MeerKAT are going well, currently preparing next call for proposals. Getting lots of publications now. DDT has been 2.5 percent of time, but has resulted in 8 percent of publications. Infrastructure work to add 16 extra dishes (of SKA design) as MeerKAT+ has begun.

Jason: Are there prospects for Meerkat becoming involved in VLBI in coming years?

Fernando: Hope to start VLBI commissioning in coming years. Have done some tests and want to achieve this capability.

Francoise: NenuFAR Pathfinder in Nancay: second user meeting in November will provide new results from commissioning. Results on pulsars, AGN and absorption lines, also EoR. Will include lots of practical days for data reduction techniques. Also very interested in VLBI. One question to George on VLBI: could there be more details on SKA-VLBI observations for future users?

George: We would like to provide this asap.

Robert: We will check the commissioning plan to see at what point VLBI will be commissioned as a mode. The VLBI mode will be fully supported by the observatory. May be shorter term commissioning capabilities. (Jeff checked the commissioning plan, and this indicates SKA VLBI availability toward the end of the array assembly roll-out process for both Low and Mid.)

Fernando: The current Google Maps/Earth photo of the Karoo is quite recent (8/27/2020) and shows the prototype SKA-MPI dish as well as the HERA array.

George: We have also responded to the SRC questionnaire, in addition to providing a use case. Have also been starting to think about optimum low frequency survey parameters from a magnetism perspective.

Valentina: We have had a few new members in the last few weeks with good geographical diversity. Still working on a data challenge with Takuya Akahori. A recently accepted paper, now on arXiv, https://arxiv.org/pdf/2102.01709.pdf, demonstrates the work that SKA will allow us to do.

Mark: Also completed SRC questionnaire in Continuum group. Two new use cases came from this; a multifrequency survey use cases, plus using galaxy clusters for gravitational lensing. Previously had prioritised Mid Bands 2 and 5 but have now expanded to look at Mid Band 1 as well as a LOW survey. The need for commensality has therefore broadened even further. Focus Group leadership for galaxy clusters and large-scale structure is being changed next month. Several new members have joined the SWG, some of them working together with current SWG members on radio emission from direct collapse back holes at high z; this could be synergistic with science questions addressed in the EoR SWG. Note again the joint meeting with HI in November.

Phil: ASKAP pilot surveys phase 2 are getting underway. All the survey science teams are working on their proposals, to update the original ones from 10 years ago. There has been a flurry of recent ASKAP papers. We will be celebrating 60th birthday of Parkes this month.

Sebastien: Regarding the SKA use cases: are these the same as the Reference Science Plan defined for ALMA and are the use cases available online?

Jeff: The ALMA Reference Science Plan was at an earlier stage. The SKA Use Case document is a living document intended to provide up-to-date examples of the most relevant observing strategies and is available on the SKA astronomer's site. https://astronomers.skatelescope.org/wp-content/uploads/2014/02/SKA-TEL-SKO-0000015_Rev_03_SKA1_Science_Use_Cases_Combined-part-1-signed.pdf

Stefano: No major updates from cosmology. New SWG telecon in early November. Lots of activity on precursor data, involving intensity mapping. Have also set up a new group for simulations, will gather requirements of various focus groups in order to produce simulations.

Jason: LOFAR2.0 Large Programmes call for expressions of interest: https://www.astron.nl/events/lofar2programmes/
Please distribute within your SWGs!