SWG Chairs Telecon 16 November 2021

Participants: Abhirup Datta, Adriano Ingallinera, Andrei Mesinger, Anne Nelles, Aris Karastergiou, Barbara Catinella, Divya Oberoi, George Heald, Josep Miquel Girart, Jason Hessels, Laurent Lamy, Mark Sargent, Paolo Serra, Patrick Woudt, Sebastien Muller, Valentina Vacca

Apologies: Laura Wolz, Stefano Camera, Francoise Combes, Natasha-Hurley Walker

SKAO: Robert Braun, Anna Bonaldi (Notes), Philippa Hartley, Tyler Bourke, Harry Qiu

Update on SKA low array configuration
SKA Low (and relative infrastructure) array configuration was designed to fit within the acquired property and achieve the best possible (u,v) coverage. It became necessary to reconsider the configuration when it became apparent that a section of the property was not accessible for construction due to its cultural heritage significance. A neighbouring property without these sensitivities has now been acquired that allows for an updated configuration with enhanced $B_{max}=70km$ without significant increase of cost.

Andrei: does this impact the core? *Robert*: no, the core is not affected by this change, only the six outermost clusters of stations.

Update of SKA low station layout
Simulations of station layouts have resulted in an updated layout proposal that reduces bandpass resonances, while improving embedded element pattern homogeneity, station beam sidelobe levels, and maintenance access. An Engineering Change Proposal (ECP) will now be assessed for an "approval in principle" while more detailed analysis is undertaken that will inform a final decision.

Anna Nelles: can we get a machine-readable version of the station layout? *Robert*: yes, we can do that. Abhi: we are interested too. *Robert*: we will provide a link to an indicative OSKAR format model for 512 different stations that are variations of the new layout concept.

Divya: any updates on the issue with accessibility of the inner part of the station for maintenance? *Robert*: with the updated layout the accessibility is better. it was one

of the factors that were considered in the layout update. Minimum separation between antennas is now 2m.

Upcoming Science Data Challenges:

3-tier EoR challenge, Magnetism and radio transients are being progressed in close collaboration with the SWG members. We are progressing them to some degree in parallel, but we will stagger the release dates.

Regarding EoR Tier1 and 2, we are progressing on the sky model, which contains diffuse and point sources, the latter divided between "A-team" (the brightest) and the rest of them. We are treating diffuse and faint point sources with an image-based approach, while the "A-team" and other bright sources with a DFT to visibilities using OSKAR. "A-team" sources will need de-mixing, and a residual will be left to reflect realistic calibration errors. Some examples are shown. For the instrument, five short tracks spanning 4h have been used to approximate the coverage with lower computational cost, for testing purposes. For the final product, a more complete sampling will be adopted. Promising results so far that are semi-realistic

The final Tier proposed by EoR is Tier 3, which is to extract the ionisation fraction as a function of redshift, starting from either EoR power spectra or clean cubes. Eunsong Lee is working on this, with support from Andrei and teams - thanks very much for this support. Slide 9 shows a simulation of what we can expect form EoR with respect to different conditions. We are doing some tests at different redshifts to simulate the ionisation fraction, producing three power spectra. These are likely to be the input to the challenge, with the addition of noise plus possibly some foreground subtraction errors etc.

Eunsong has completed an exercise to investigate a scoring method for the challenge, as suggested by the EoR SWG. This will be based on submitted and true probability distributions. This would take into account possible offsets from true distribution and widths. We have calculated some preliminary computational requirements that challenge participants will need. These requirements can be quite demanding, especially in the case of using forward modelling. We have presented the estimates to our computational partners, who are very much willing to try to provide these resources for the challenge.

Magnetism SDC: is supported by Takuya Akahori in collaboration with magnetism chairs. A lot of progress has been made in defining the specs of the simulated survey and the objective. The focus is on constructing a RM grid as well as to resolve faint diffuse polarised sources. It would be a Band2 data product, possibly

complemented by other frequencies. Sky area around 100 square degs. There needs to be a good Galactic model as well as Faraday Rotation information, plus realistic population of background sources.

Valentina: we want to demonstrate that we can recover the properties of sources in polarization.

Upcoming meetings:

Robert: SPARCS meeting happening this week.

Jason: On the week of 3rd Dec there is the "Science At Low Frequencies" meeting. https://salfconference.org/salfviii/

Paolo: 25 Nov joint continuum /HI working group. just one hour, with two talks.

Aris: Planning a meeting "Timing and imaging of compact sources with SKA pathfinders". it should be May/June of September next year.

Tyler: VLBI SKA workshop in February, this week the deadline for abstract submission. https://whova.com/web/vlbis_202111/

AOB

Robert: recruiting is open on a science team Project scientist position, please circulate

Robert: we will probably skip the December meeting as a lot of us will be on leave. See you in the new year!