

SKA SWG Chairs meeting – March 2025

Minutes/Notes

Participants:

Chairs: Jason, Viviana, Marc, Nicola, Betsy, Fatemeh, Catherine, Ian, Eleonora, Tim, Katie, Bhal Chandra, Fernando, Tessa, Jun Yang, Jacco.

SKAO: Wendy, Anna, Tyler, George, Philippa, Robert L., Omkar

Tyler. **Construction update -Low** AA0.5 is complete and consists in 4 stations. All stations are populated in that cluster now, but not all switched on. There was a change of layout for AA2 which is when SV will happen. A delay in getting the CPF on site which will service the core means that no stations in the core will be integrated in AA2. This means longer baselines will be available but no pulsars tied-array beam from the core.

Jason: when tied-array beam is expected? George: as a capability we can do tied-array beam between stations that are in the same spiral-arm cluster but calibration will be more difficult. Jason: in LOFAR the pulsars study was a big part of understanding how the array worked. George: I will cover this in my talk. Getting tied-array mode working is recognised as a strong priority.

Construction update -Mid: slightly behind but progressing well. Second dish erected and two more in progress. 7 more dishes are on site. Fringes by the end of the year. As part of integration test, the SKA dish can be combined with MeerKAT.

George: Commissioning update - Low

Commissioning approach. Science commissioning is separate from engineering commissioning, with the former being astronomical observations. We talked with LOFAR2.0 about the commissioning process and we learned a lot. We established a number of tests, like finding fringes, calibrating, making images and tied-array beams. In terms of system performance, we have very specific procedures to calibrate, or "focus", each of the stations. Jason: are calibration solutions stable in time? George: largely, we suspect some flow changes, maybe temperature related. we are monitoring.

George: pointing and tracking of the station: we point ahead of the sun, track the sun when it enters. we check that the beam shape is what we expect. We have been pointing at 12 known pulsars with single stations to verify that we obtain known pulsar properties. Sent data through PSS and PST. PST limited by how well we can coherently form a beam but still producing results. In progress.

Bhal Chandra: are you monitoring the pulsars on regular cadence or one-off?

George: we are monitoring but for monitoring system performance (station sensitivity) rather than the pulsars themselves.

BC: have you checked the stability of time-sampling and ToO?

George: we have not been doing it recently, we will do it more explicitly later on.

interferometry: fringe milestones achieved months ago, data on a single baseline is very high S/N so it's good to check correction of geometric delay. Residual delays due to cable

length differences are now included in the delay model. We demonstrated phase closure with 3 stations.

uv coverage not great yet, 2 stations in the same cluster so only 3 locations with good baseline length. Visibilities on a single baseline demonstrate a very strong sensitivity. We can correct cross-pol response and thermal variation with models. even before flagging and calibration the data looks already very good.

SKA-low image from the 4 stations: very bright calibrator in the centre, 25 MHz bandwidth, 7h integration, image noise 5-6 mJy/beam and resolution of 70". Cross-match with GLEAM-X. Image much more clean than I would have thought at this early stage. Still there are artefacts, as doing self-cal with 4 stations is limited. Fluxes comparison with GLEAM (85 sources in common) are Gaussian-distributed. The self-calibration process appears to be working very well, the fluxes are within prediction with no prior information being entered. There was no guarantee that the sky model would converge to something reasonable and consistent with the know sky, at this stage. We are 25% though the planned SC tests and so far all very encouraging.

Tyler: congrats for your efforts and the good results!

Robert Laing: Commissioning Update - Mid

Mid is 1y behind Low for AA0.5. The reason for the slip on Mid is to do with dish manufacture, and RFI from cranes interfering with MeerKAT. AA0.5 will prove minimal capability before expand to later AAs. Also develop the team to bring everything together going forward. Mid ITF: going well, production correlator on its way, testing signal chain on the lab. On site: 3 dishes as of yesterday have now had their "big lift". Re-design process for the dish was because the pointing requirement under wind load was non-compliant. There was a significant redesign to stiffen up dish the structure. Now a much better design on paper; we are doing a series of tests on the real dishes. Currently testing on dish SKA063.

Jason: What about pointing accuracy of the existing meerkat dishes? Robert: they meet their original specifications, which were not quite so tight - also because they are smaller.

SC group in SA is getting set up and we have positions that will be advertised shortly. Please advertise to people with interest in dish commissioning and that would like to work in SA.

Philippa: science meeting

The meeting will include plenary sessions, parallel sessions to facilitate internal discussion and collaborator opportunities, and the operations-led sessions. We are trying to fit a lot in, but we hope it will be interesting and useful for you.

Talk selection outcome has been communicated last Friday. The program will be published next Friday. it is an exciting program representing a lot of science areas. We accommodated a large number of talks (212) but still very oversubscribed. You should soon receive a google from to let Sci-Ops know what you need from the tailored Sci-Ops presentation at the splinter sessions.

Fernando: will the capabilities for AA* been described? Philippa: this is what the sci-ops led presentations will be about.

Anna: Science data challenges update.

SDC3a results paper out today on arXiv and submitted to journal. it assess errors committed in cleaning Ska-Low simulated data from foregrounds from all the competing teams. We have another paper in preparation on the simulations and we will release all data and codes used to make the simulation as well. SDC3b underway, with deadline of 30th April, on inference of EoR properties from EoR power spectra.

Tyler: acknowledge Robert Braun's contribution to the project both before and after his time as Science director of SKAO.

Camillo: what will the science team look like after Robert's retirement?

Tyler: the science team will move under science operations reporting to the deputy director of operations A Chrysostomou. A lead will be identified within the science's existing members in the next few weeks. SWG chairs meeting will continue, we will let you know of any changes in connection details etc.