

SKA SWG Update

Anna Bonaldi, SKAO project scientist

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Science Meetings

- Now ON: Cosmology SWG meeting, 14-16 January, Porto
- MeerKAT @ 5, 20 – 23 February 2024, Stellenbosch
- SPARCS Workshop, 26 – 27 February 2024, Stellenbosch
- Interstellar Frontiers: Bridging SETI, Astrobiology, and the SKA, 11-15 March, Perth
- Cosmology in the Alps, 18 – 22 March 2024, Les Diablerets
- CTAO Symposium, 15 – 18 April 2024, Bologna
- Cosmic Magnetism in the pre-SKA Era, 25-31 May 2024, Kagoshima
- African Astronomical Society Conference, 15 – 20 April 2024, Marrakech
- SPARCS XII: Pushing toward the final frontier, 6 – 10 May 2024, Bologna
- New: EAS SS31, The Square Kilometre Array Observatory: pathway to science operations, 1 – 5 July 2024, Padova
- IAU GA, August 2024, Cape Town, SKAO Day and various Symposia
- SKA Science Conference, June 2025, Gorlitz, planning underway



Construction Strategy

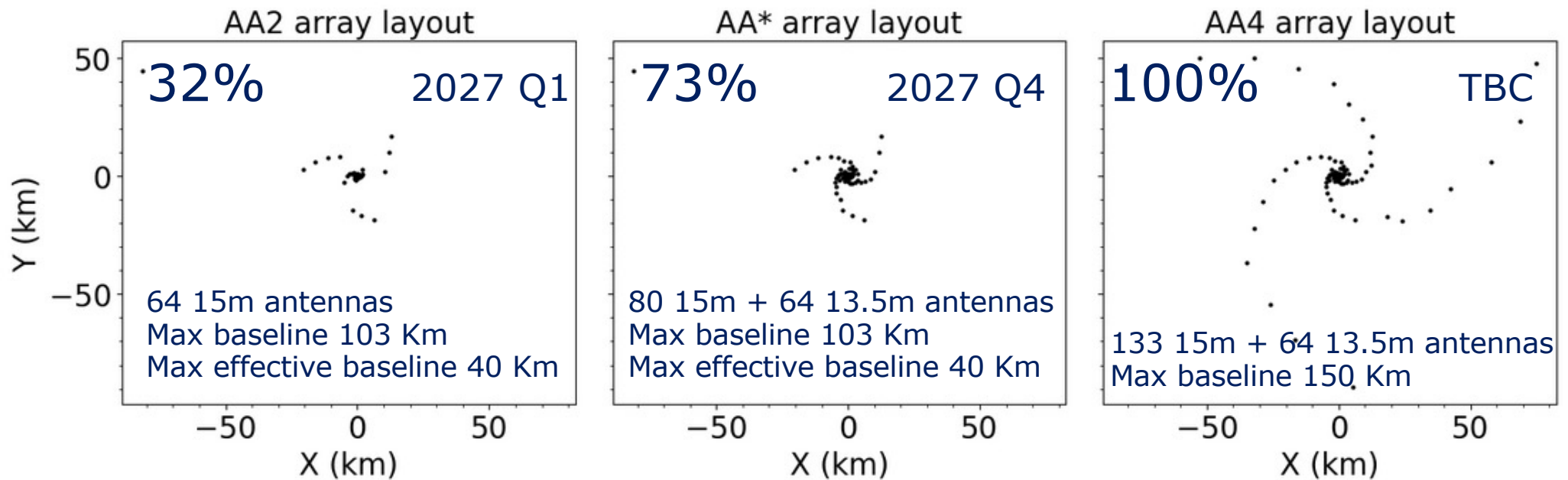
- **Target:** build the SKA Baseline Design: AA4)
- Not all funding yet secured, therefore following Staged Delivery Plan (AA*)

Milestone Event		SKA-Mid	SKA-Low
AA0.5	4 dishes 6 stations	2025 Q1	2024 Q4
AA1	8 dishes 18 stations	2026 Q1	2025 Q4
AA2	64 dishes 64 stations	2027 Q1	2026 Q4
AA*	144 dishes 307 stations	2027 Q4	2028 Q1
Operations Readiness Review		2028 Q1	2028 Q2
End of staged delivery programme		2028 Q3	2028 Q3
AA4	197 dishes 512 stations	TBD	TBD

First data release to the community expected in 2026/27 (for science verification)



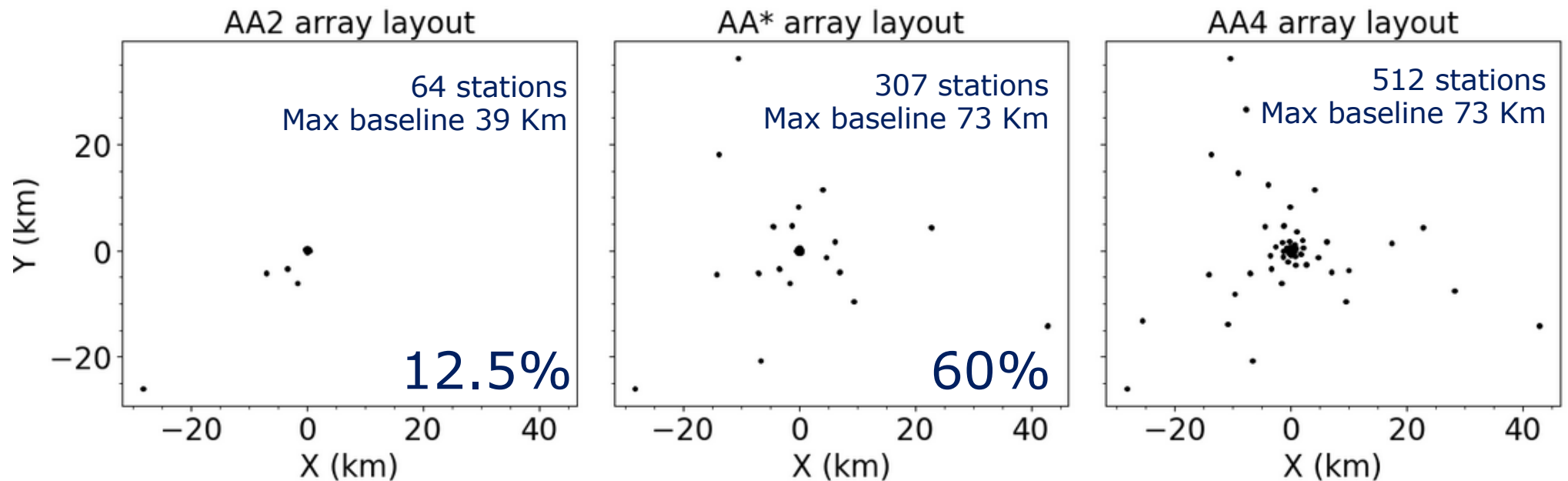
AA* vs AA4 – SKA Mid



Staged delivery memo, python package and Jupiter notebook at <https://www.skao.int/en/ska-subarrays>



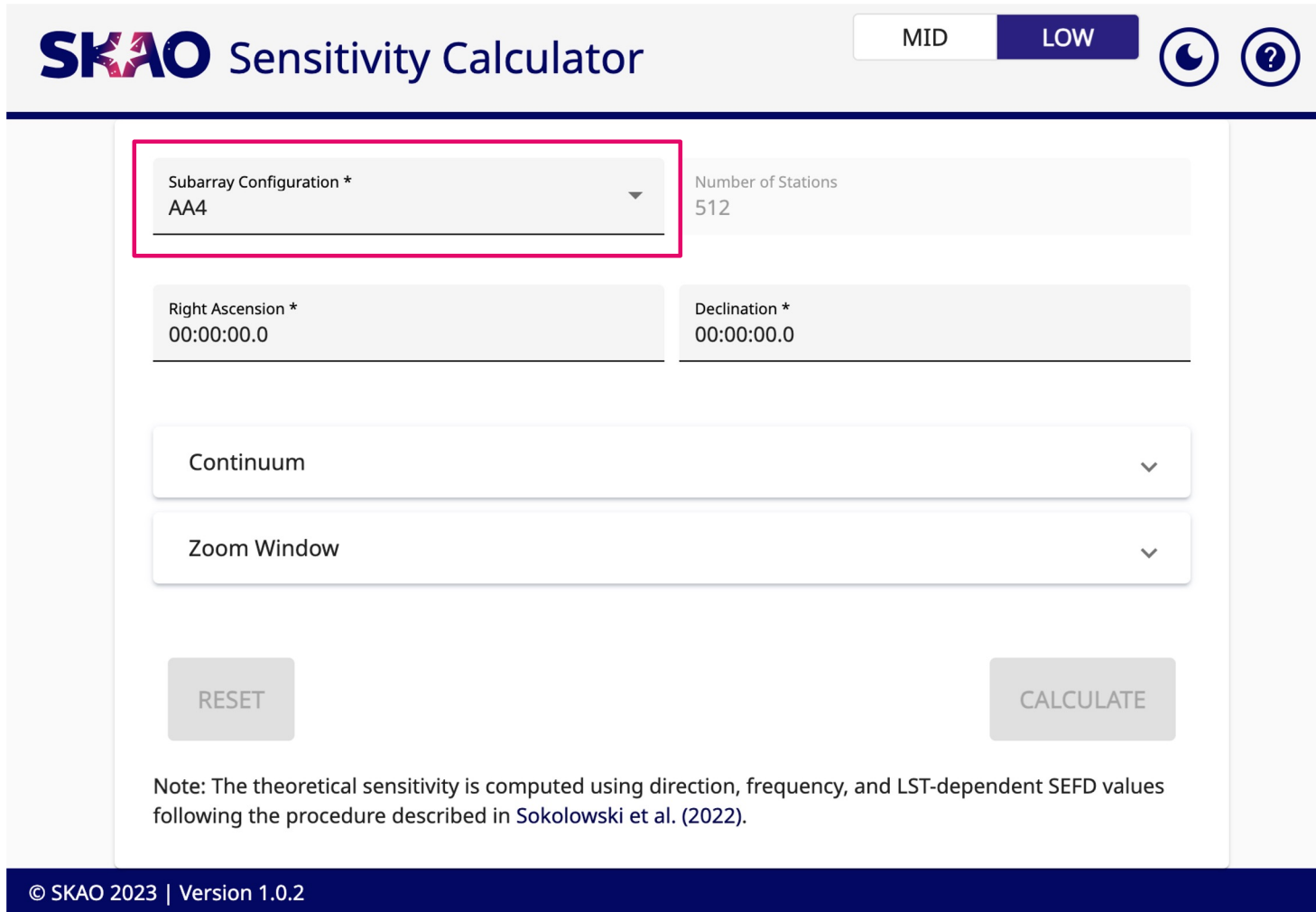
AA* vs AA4 – SKA Low



Staged delivery memo, python package and Jupiter notebook at <https://www.skao.int/en/ska-subarrays>



SKA-Low sensitivity calculator



SKAO Sensitivity Calculator

MID LOW

Subarray Configuration *
AA4

Number of Stations
512

Right Ascension *
00:00:00.0

Declination *
00:00:00.0

Continuum

Zoom Window

RESET CALCULATE

Note: The theoretical sensitivity is computed using direction, frequency, and LST-dependent SEFD values following the procedure described in Sokolowski et al. (2022).

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More subarrays will be added as we come up subarray templates

Web interface at <https://sensitivity-calculator.skao.int/low>.



SKA Low sensitivity calculator

Continuum

Integration Time *

1

hours

Central Frequency *

200

MHz

Continuum Bandwidth *

300

MHz

Image Weighting *

Uniform

Results

Weighted continuum sensitivity

82.48 μ Jy/beam (15.18)[†]

Continuum confusion noise

1.04 μ Jy/beam

Total continuum sensitivity

82.49 μ Jy/beam

Continuum synthesized beam-size

3.9" x 3.0"

Continuum surface-brightness sensitivity

214.38 K

[†] Weighting correction factor (30% bandwidth)



SKA Mid sensitivity calculator

SKAO Sensitivity Calculator

MID LOW

Advanced: OFF ON

Subarray Configuration *
AA4

Number of SKA antennas
133

Number of MeerKAT antennas
64

Right Ascension *
13:25:27.60

Declination *
-43:01:09.00

Elevation *
45 degrees

Observing Band *
Band 2 (0.95 - 1.67 GHz)

Weather (Precipitable Water Vapour) *
10 mm

Shared MeerKAT and SKA1 frequency range

More subarrays will be added as we come up subarray templates

Web interface at <https://sensitivity-calculator.skao.int/mid>.



SKA Mid sensitivity calculator

- First release, feedback welcome!
- Modes available: continuum and spectral line

Continuum

Supplied * Integration Time ▼	Integration Time * 600 s ▼
Central Frequency * 1.31 GHz ▼	
Continuum Bandwidth * 0.72 GHz ▼	
Number of sub-bands (Optional) Enter value... ⌵	
Spectral Resolution 13.44 kHz (3.1 km/s)	
Spectral Averaging * 1 ▼	Effective resolution 13.44 kHz (3.1 km/s)
Image Weighting * Uniform ▼	Tapering * No tapering ▼

Results

Weighted continuum sensitivity
49.62 uJy/beam (14.04)†
Continuum confusion noise
0.00 Jy/beam
Total continuum sensitivity
49.62 uJy/beam
Continuum synthesized beam-size
0.194" x 0.181"
Continuum surface-brightness sensitivity
1007.90 K

Weighted spectral sensitivity
5.60 mJy/beam (6.84)‡
Spectral confusion noise
0.00 Jy/beam
Total spectral sensitivity
5.60 mJy/beam
Spectral synthesized beam-size
0.325" x 0.297"
Spectral surface-brightness sensitivity
41230.08 K

† Weighting correction factor (30% bandwidth)

‡ Weighting correction factor (single channel)



SKAO Construction Status (end Oct 2023)

- 28 months into ~7 year construction phase: 75 contracts awarded; €617M total value.
- Majority of remaining contracts to be placed by end 2023.
- Progress: 18.9% complete, compared with 21.4% planned and 18.8% spent (i.e. behind schedule but on budget).
- SKA-Low and Mid infrastructure works well underway
- AA0.5 components either delivered or in manufacture



SKAO Construction Status: Mid



- Contractor camp



SKAO Construction Status: Mid



- First four AA0.5 production dishes nearing completion and shipping to site



SKAO Construction Status: Low



- “Fly” camp (103 beds) complete to support build of full camp (first beds by late October)



SKAO Construction Status: Low



- “Turkey’s nests” (water dams), borrow pits and tracks in progress
- Mesh, fibre and power cables delivered to on-site laydown yard



SKAO Construction Status: Low



- AAVS3 deployed using SKAO staff, in lead-up to full deployment



*We recognise and acknowledge the
Indigenous peoples and cultures that have
traditionally lived on the lands on which
our facilities are located.*

SKAO

www.skao.int