TECHNICAL INFORMATION
THE TELESCOPES

The Square Kilometre Array (SKA) is made up of arrays of antennas - SKA-mid observing mid to high frequencies and SKA-low observing low frequencies - to be spread over long distances. The SKA is to be constructed in two phases: Phase 1 (called SKA1) in South Africa and Australia; with Phase 2 (called SKA2) representing a significant increase in capabilities and expanding into other African countries, with the component in Australia also being expanded.

SKA1-mid
the SKA's mid-frequency instrument

Location: South Africa

Frequency range:
350 MHz
to
15.3 GHz
with a goal of 24 GHz

197 dishes
(including 64 MeerKAT dishes)

Maximum baseline:
150km

SKA1-low
the SKA's low-frequency instrument

Location: Australia

Frequency range:
50 MHz
to
350 MHz

~131,000
antennas spread between
512 stations

Maximum baseline:
~65km

SKA1 Telescope Expected Performance – Imaging

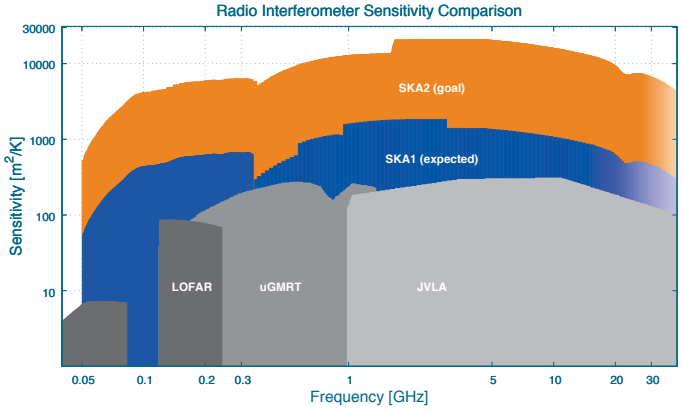
Nominal Frequency	110 MHz	300 MHz	770 MHz	1.4 GHz	6.7 GHz	12.5 GHz
Range [GHz]	0.05-0.35	0.05-0.35	0.35-1.05	0.95-1.76	4.6-8.5	8.3-15.3
Telescope	Low	Low	Mid	Mid	Mid	Mid
FoV [arcmin]	327	120	109	60	12.5	6.7
Max. Resolution [arcsec]	11	4	0.7	0.4	0.08	0.04
Max. Bandwdith [GHz]	0.3	0.3	1	1	4	5
Cont. rms, 1 hr [μJy/beam][a]	26	14	4.4	2	1.3	1.2
Line rms, 1 hr [μJy/beam][b]	1850	800	300	140	90	85
Resolution Range for Cont. and Line rms [arcsec][c]	12–600	6–300	1–145	0.6–78	0.13–17	0.07–9
Channel width (uniform resolution across max. bandwidth) [kHz]	5.4	5.4	15.2	15.2	61.0	79.3
Spectral zoom windows X narrowest bandwidth [MHz]	4 X 4.0	4 X 4.0	4 X 3.125	4 X 3.125	4 X 3.125	4 X 3.125
Finest zoom channel width [Hz]	244	244	190	190	190	190

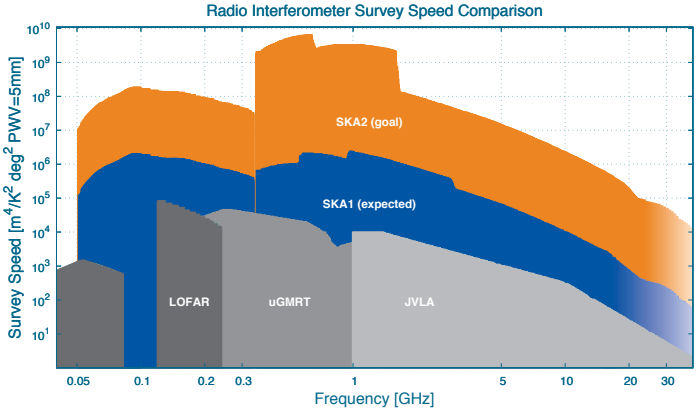
a. Continuum sensitivity at Nominal Frequency, assuming fractional bandwidth of $\Delta\nu/\nu = 0.3$

b. Line sensitivity at Nominal Frequency, assuming fractional bandwidth per channel of $\Delta\nu/\nu = 10^{-4}$ ($>10^{-6}$ will be possible]

c. The sensitivity numbers apply to the range of beam sizes listed **For more details refer to the document "Anticipated SKA1 Science Performance" (SKA-TEL-SKO-0000818 available on astronomers.skatelescope.org)**

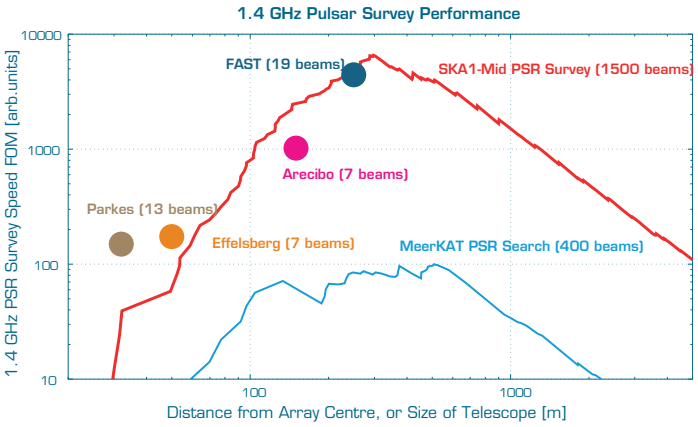
Observing capabilities

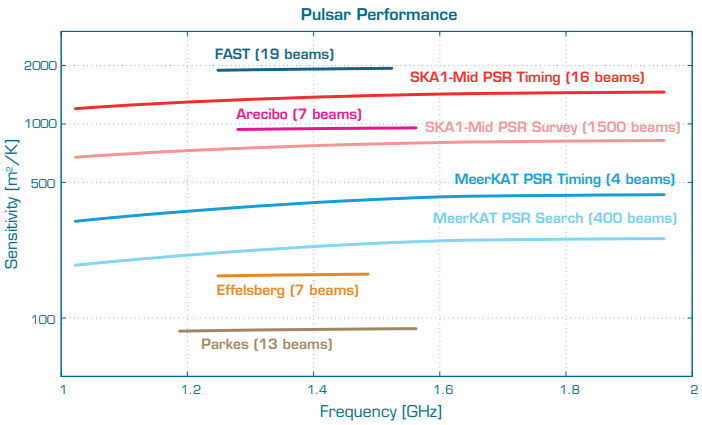




The fading out of SKA1 and SKA2 over 15.3 GHz in the sensitivity and survey speed plots is meant to represent the fact that these are aspirational and not yet part of design work.

Pulsar capabilities

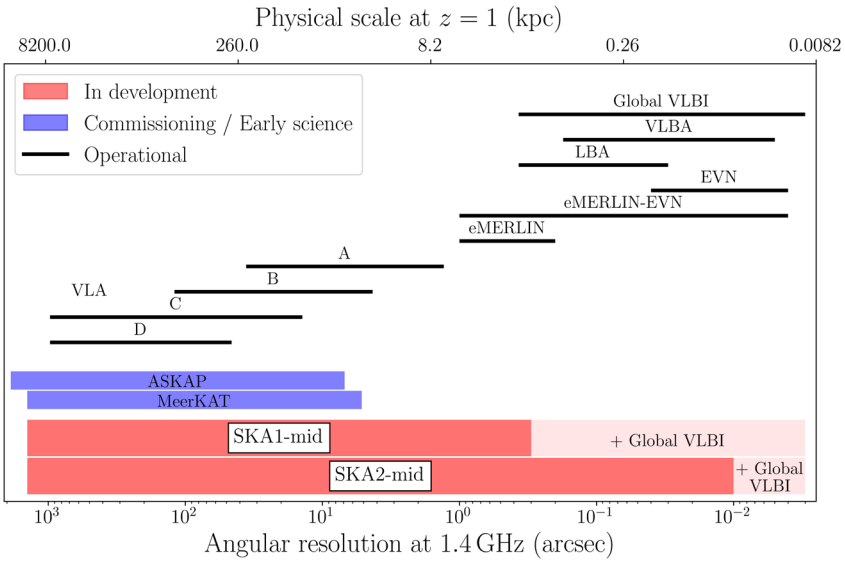




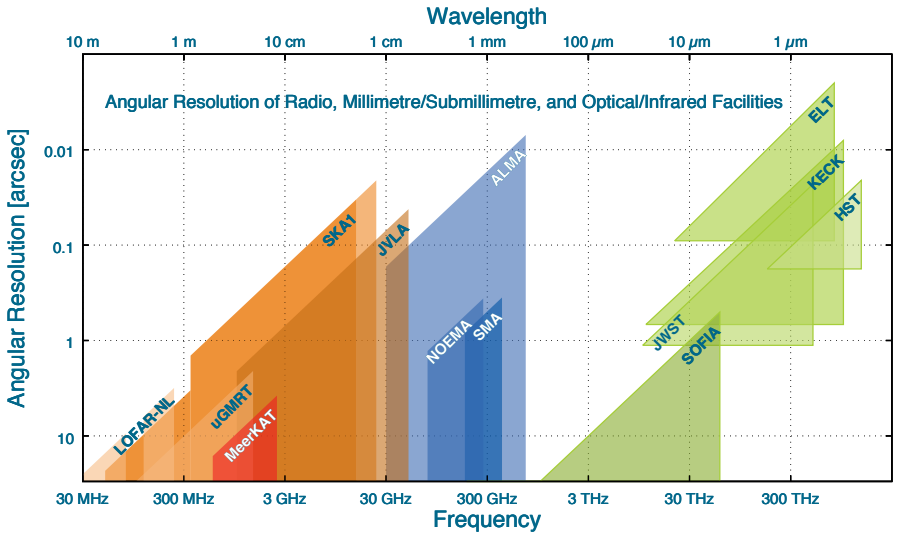
	Mid	Low
Pulsar & Fast Radio Burst Search beams	1500x300-MHz	500x100-MHz
Pulsar acceleration search	+/- 350 m/s/s	+/- 350 m/s/s
Fast Radio Burst real-time search	0-3000 pc/cc	0-3000 pc/cc
Transient voltage buffers	9 minutes	30 seconds
Timing precision	<5ns	<10ns

Comparison of SKA resolution with other facilities

The SKA telescope on its own improves considerably the angular resolution coverage compared with current radio interferometer arrays. The SKA will simultaneously provide multiple VLBI beams on the sky and interferometric imaging allowing different angular resolution views of the same field. When SKA VLBI beams are added to the Global VLBI network (SKA-VLBI) the resulting instrument achieves at least milli-arcsecond resolutions. The SKA will also provide an ultra-sensitive element (micro-Jy noise level) to the VLBI networks, allowing access to the Galactic Centre and the Southern Sky. SKA-VLBI will greatly broaden the science of SKA and many of its High Priority Science Objectives will benefit.



The Angular Resolution of SKA1 is unique at mid-radio frequencies, and complementary to that provided by other facilities at high-radio frequencies (e.g. JVLA), mm/submm (e.g. ALMA) and optical/infrared wavelengths (e.g. Keck, JWST, ELT).



For more, visit

astronomers.skatelescope.org

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