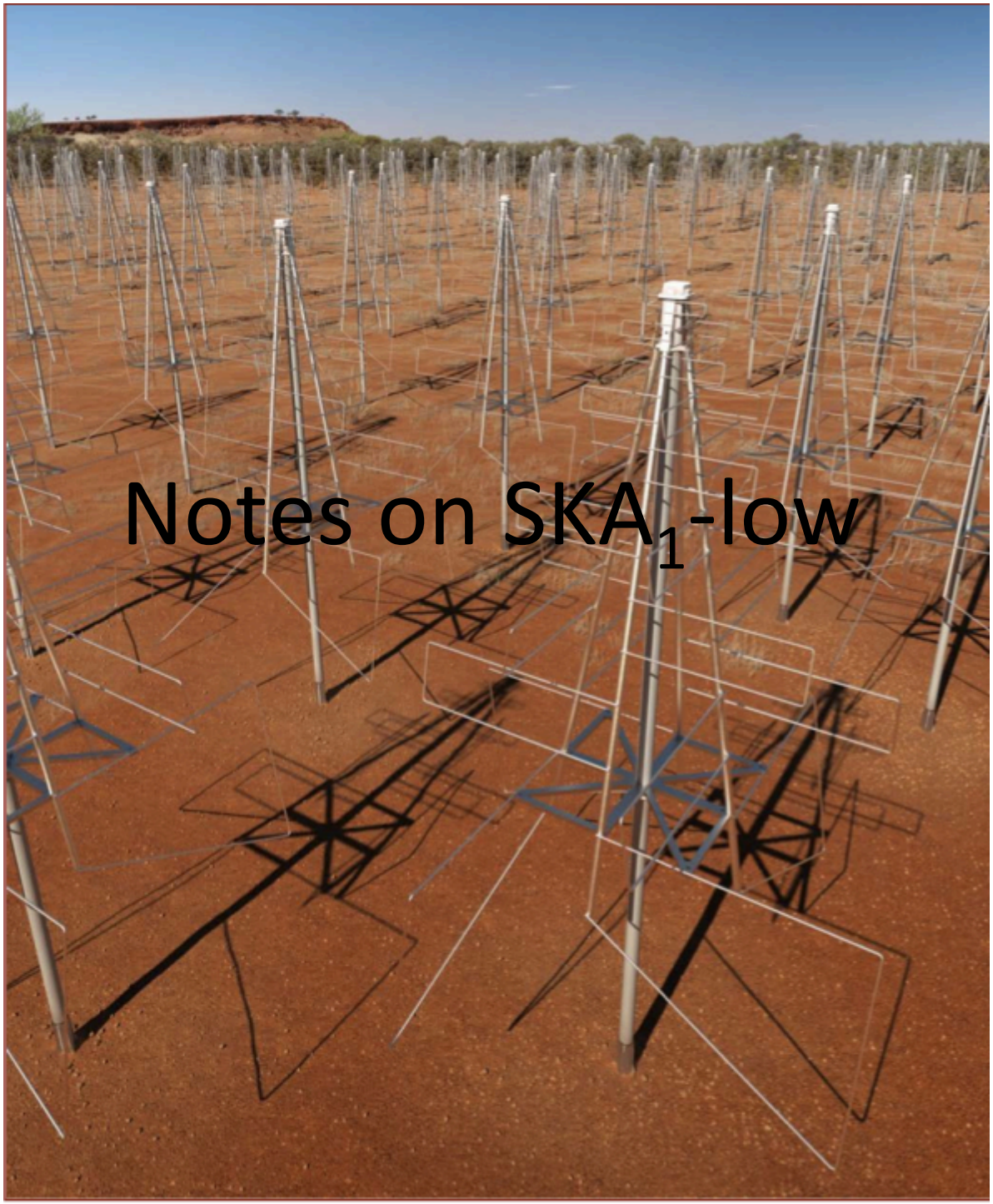
Notes on SKA$_1$-low

AA consortium proposal

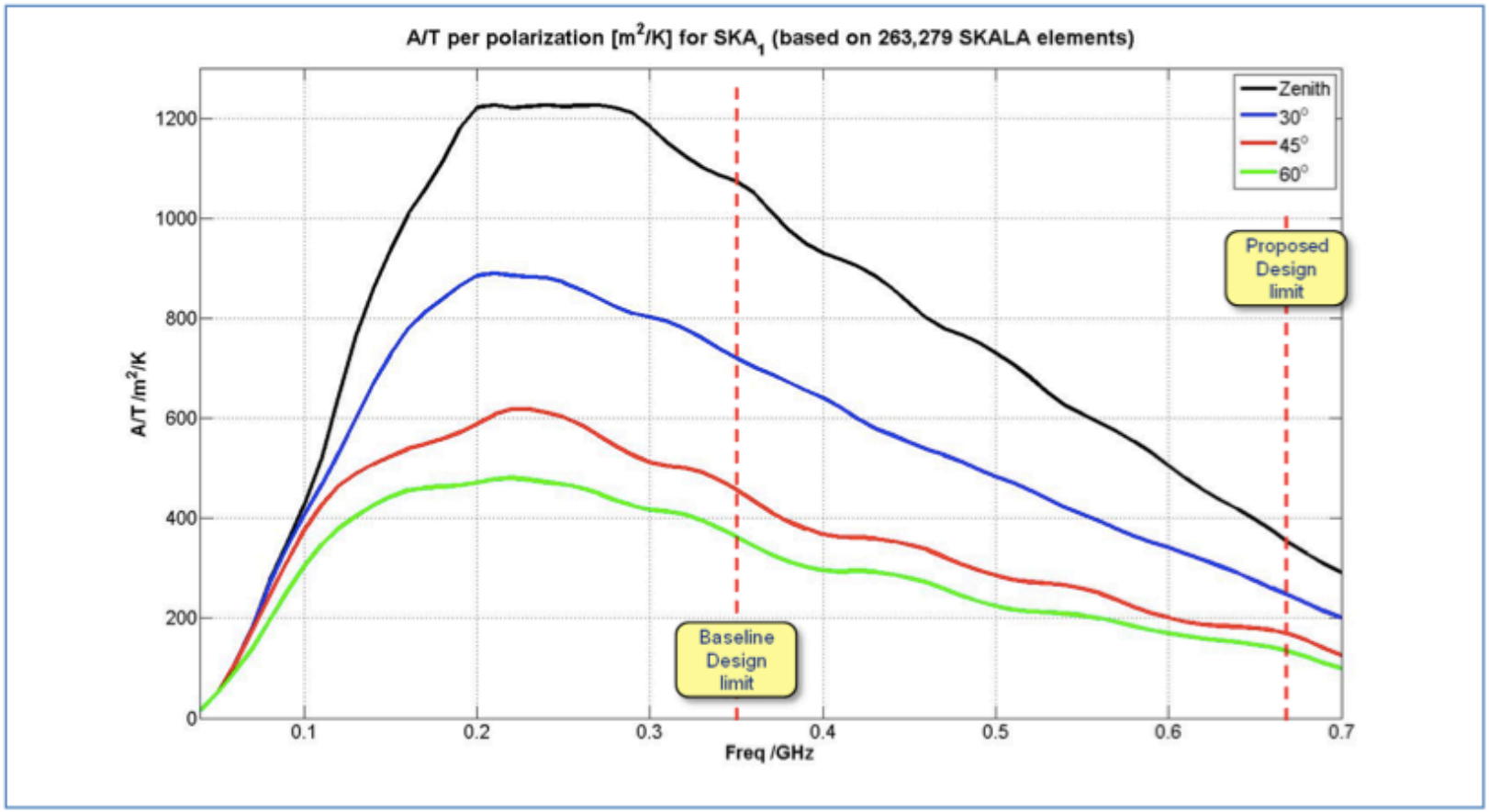

Figure 3: The sensitivity of SKA-low over frequency. This is as expected for the Baseline Design, limited to 350MHz and the sensitivity at higher frequencies is also shown for the Proposed Design, limited to ~650MHz. Note that there is still good sensitivity even to a scan angle of 60°.

Parameter	Baseline Design	Proposed Design	Comments
Number of antenna	262,144	262,144	250,000 antennas is for the core only. 911 stations of 289 antenna = 263,279. Rounded to 262,144 (2^{18})
Types of antenna	1	1	The full frequency range will be covered by a single element type, as with the Baseline Design. This is for lowest cost.
Frequency – low	50MHz	50MHz	Push the low frequency as low as reasonable without losing performance at 50MHz for future science capability.
Frequency – high	350 MHz	650 MHz	The increased frequency limit is accommodated by the element design. The LFAA operates well at these frequencies and avoids the dish system having a large, expensive LF feed and a very large sub-reflector, while maintaining contiguous frequency coverage.
Element separation	1.35m (λ/2 at 111MHz)	1.35m (λ/2 at 111MHz)	The spacing of 1.35m is taken from the Baseline Design. This may not be optimal for the science and needs checking early in Stage 1.
Station diameter	35m	20-100m	The "station" diameter, particularly in core, can be varied to suit the experiment. This is managed by the station processing. The variable station diameter should be able to mitigate central processing requirements for many of the experiments.
Polarisations	2 – linear	2 – linear	Essential to have a dual polarisation system
Number of bands	1	2	The full available bandwidth is divided into 2, which handle mutually exclusive science cases. This is similar to switching feeds on a dish.
Max instantaneous Bandwidth	250-300MHz	335MHz & 300MHz	Because the full frequency range is covered in two bands, the output bandwidth is essentially the same as the Baseline Design but is reused through using a switched-in first alias on the digitisation.
Data rate into Correlator/ Beamformer	10Gb/s per 35m Station 10Tb/s total	≥10Tb/s total	The performance of the SKA-low depends on the total data rate to the central processing. This can be increased as required.
Data flexibility	1 beam/station	Flexibly assigned to beams within a band	A great benefit of an AA is that data output can be assigned to arbitrary beamlets in arbitrary directions up to the total designed data rate. Then each experiment can be optimised, or concurrent experiments run.
Sample resolution	8-bit	4 or 8-bit capability	Many experiments will operate effectively with 4-bit data, hence doubling the total bandwidth for the same data rate. This needs to be agreed with the correlator and post processing groups.