

Proposed fit-out for ASKAP Mk II PAFs

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CSIRO is proposing the fit-out order for the first eighteen Mk II phased array feed systems on ASKAP. The expectation is that the six-antenna (Mk II) array will be used exclusively for commissioning and that early science will commence with twelve Mk II phased array feed array. The fit-out order proposed here attempts to conserve a reasonably uniform array footprint throughout, whilst successively growing the maximum baseline as the sensitivity of the array increases.

Batch 1: Antennas 4, 5, 10

Batch 2: Antennas 2, 12, 14

Batch 3: Antennas 13, 16, 24

Batch 4: Antennas 27, 28, 30

Batch 5: Antennas 31, 33, 35

Batch 6: Antennas 14, 19, 26

For ASKAP-6, ASKAP-12 and ASKAP-18 we present the uv -coverage and the naturally weighted synthesised beam for a 12 hour simulated 1.4 GHz observation at declination -60.0 (see Figures 1, 2 and 3 and Table 1). The simulations do not account for shadowing. To measure the synthesised beam sidelobes we subtract a fitted Gaussian from the synthesised beam and report the maximum and minimum pixel values on the resulting residual image

Table 1: A summary of the proposed ASKAP configurations and synthesised beam properties.

	6	12	18
Baseline length (m)	60-840	60-2300	60-4390
Synthesized beam (arcsec)	77.3×51.8	27.5×20.9	18.6×14.1
Synthesised beam sidelobe minimum (%)	-10.8	-3.8	-3.4
Synthesised beam sidelobe maximum (%)	25.4	11.7	18.7

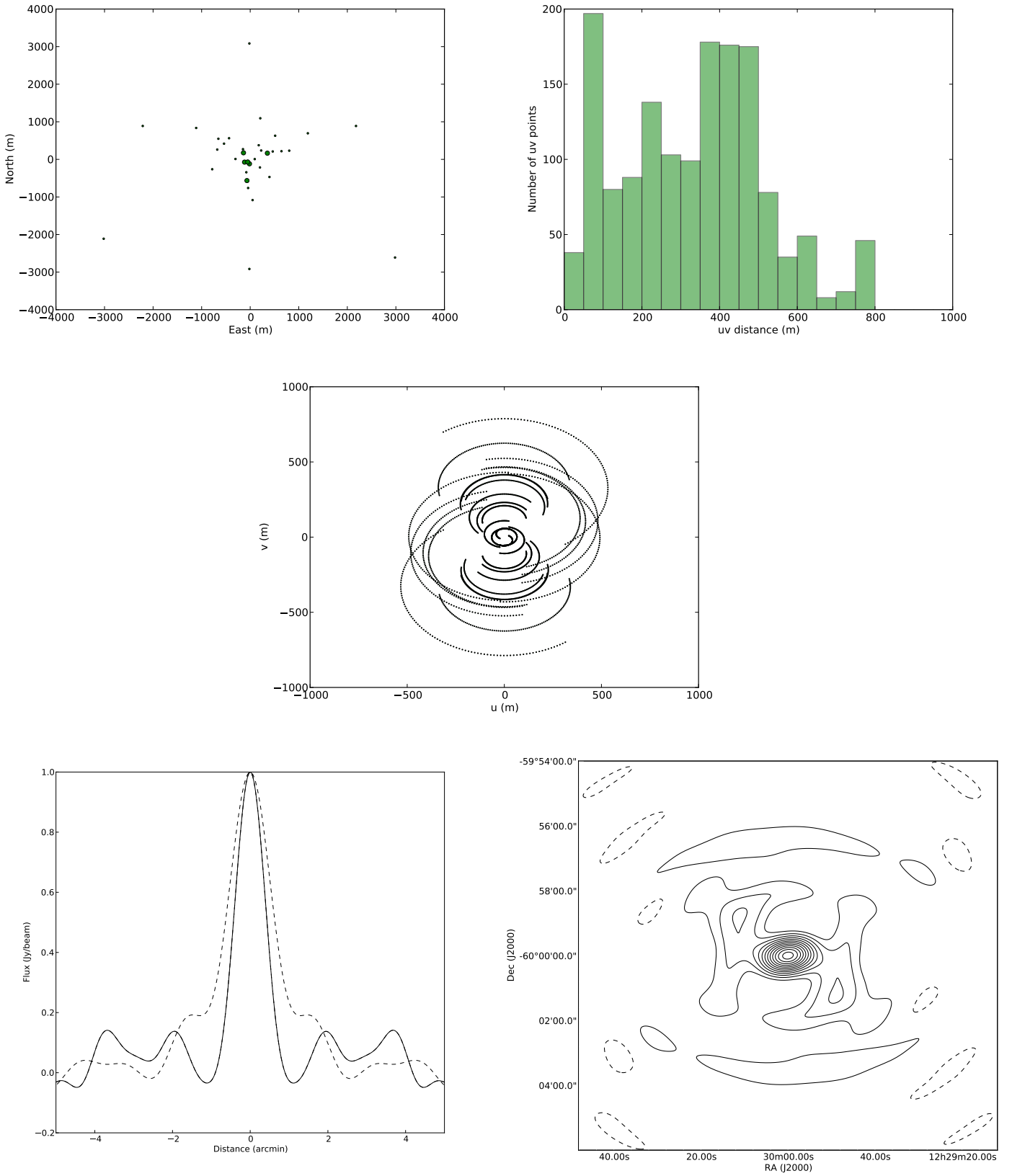


Figure 1: Proposed configuration of the first six Mk II PAFs (commissioning only). Top left: large green dots show antennas with Mk II PAFs, small green dots show the other antennas. Top right: the number of uv -points as a function of uv -distance, the total number of simulated uv -points is equal to 100 times the number of baselines. Centre: the uv -coverage. Bottom left: one-dimensional slices through the synthesised beam, dashed lines are along the right ascension axis and solid lines are along the declination axis. Bottom right: a $12' \times 12'$ two dimensional profile of the synthesised beam with contour levels at $(1,2,3,4,\dots) \times 8\%$, positive contours are solid lines and negative contours are dashed.

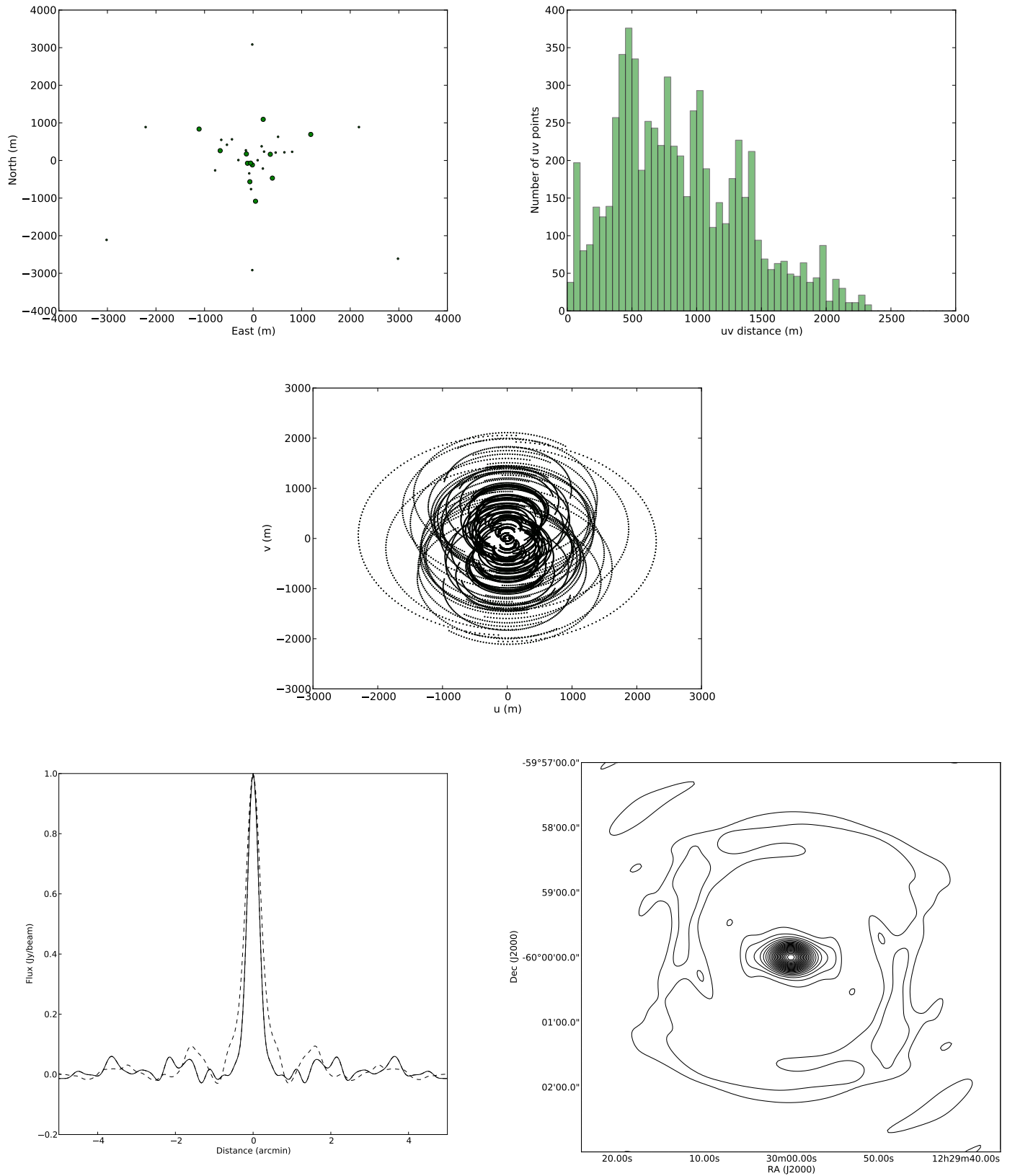


Figure 2: Same as Figure 1 but for the first twelve Mk II PAFs – the two-dimensional profile is now 6'×6' with contour levels at (1,2,3,4...)×4% rather than those used in Figure 1.

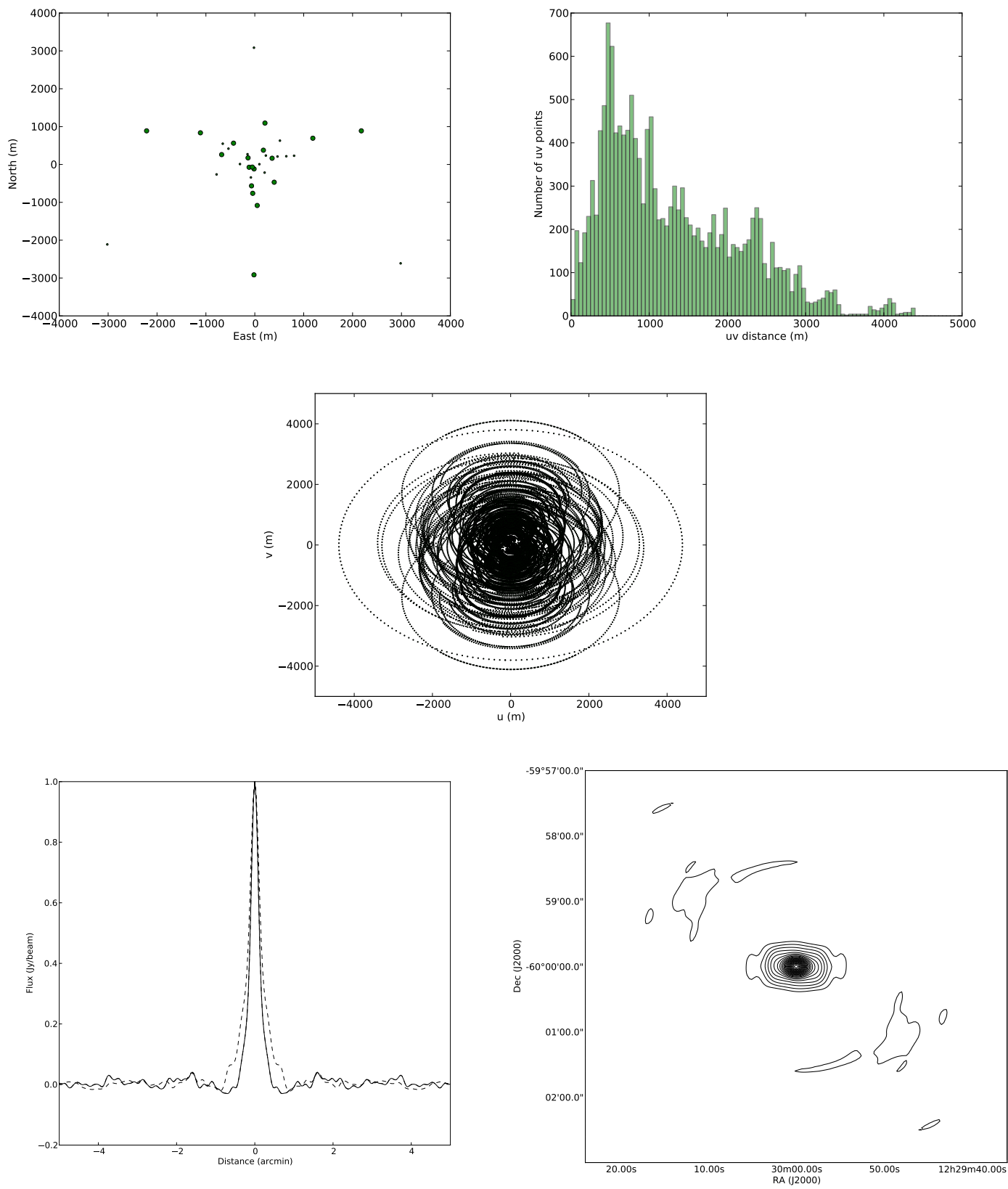


Figure 3: Same as Figure 1 but for the first eighteen Mk II PAFs – the two-dimensional profile is now $6' \times 6'$ with contour levels at $(1,2,3,4\dots) \times 4\%$ rather than those used in Figure 1