Correlator responses per baseline

Sensitivity response ("Synthesized beam")
Visualizing visibilities

Cosine response

Sine response

Long baseline

Short baseline
“Dirty beam” (synthesized beam) in 2D

Number of antennae: 2

[no amplitude or phase info from real source]

$V(u,v)$

$V^*(-u,-v)$

u,v plane

Point spread function of synthesized beam
“Dirty beam” (synthesized beam) in 2D

Number of antennae: 3

u,v plane

Point spread function of synthesized beam
“Dirty beam” (synthesized beam) in 2D

Number of antennae: 4

- **u,v plane**
- **Point spread function of synthesized beam**
“Dirty beam” (synthesized beam) in 2D

Number of antennae: 8

u,v plane

Point spread function of synthesized beam
“Dirty beam” (synthesized beam) in 2D

Number of antennae: 8; Track source for 7 hours

- u,v plane
- Point spread function of synthesized beam
u,v distance and sparse sampling

Amplitude vs. uv distance

- Minimum uv spacing
- Many gaps in uv coverage
- Maximum uv spacing

$(u^2 + v^2)^{1/2}$ (kilo-lambda)

(Projected baseline, B)
A kid game for PhD students...

Which "snapshot observation" u,v plane goes to which telescope?

(note, this one has observed for a few minutes, not a snapshot)
In the right order...
1.5 GHz (20cm) image from Australia Telescope Compact Array

\[ \theta \approx \frac{\lambda}{D} \]

\[ \frac{0.2 \text{ m}}{22 \text{ m}} = 0.009 \text{ rad} \ (\sim 30 \text{ arcmin}) \]
How long was the largest baseline for this observation?

$$\theta_{\text{resolution}} \approx \frac{\lambda}{B} = 1 \times 10^{-4} \text{ rad}$$