

LWA SKY, U,V & GALAXY COVERAGE



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- Presentation by: Kurt Weiler (NRL)
- Originally prepared March 8, 2002.

Assumptions/Parameters

(Sky & u,v Coverage in Dec)

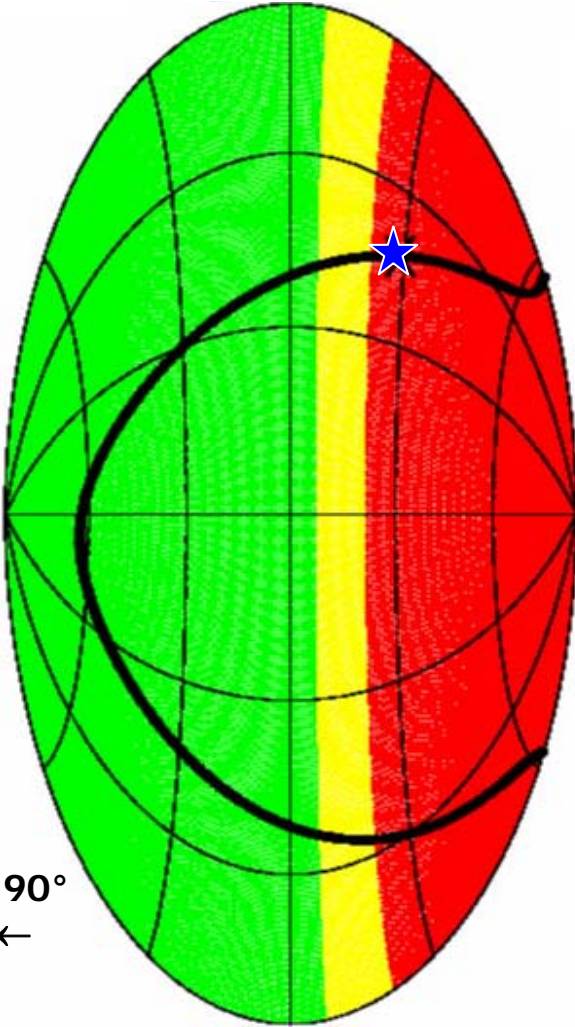
LWA beam (assumed $\pm 60^\circ$ to half power)

- LWA Sensitivity Weighted Integration/day
(normalized to zenith)
 - GREEN = effective integration/day > 60 min
 - YELLOW = 5 min < eff. integration/day < 60 min
 - RED = effective integration/day < 5 min
 - BLACK LINE = Galactic plane (★ at center)
 - Percent coverage is above -15 dB point
- LWA Config. & Snapshot u,v coverage
 - 99 stations; 400 km diam.; 540 deg spiral; $\# \propto r^{-3.4}$
 - VLA $\# \propto r^{-1.7}$
- LWA u,v Coverage in declination (7° elev. ~ -15 dB)
 - BLUE = elevation > 30°
 - RED = 7° < elevation < 30°

Sens. Weight. Integ. In Dec

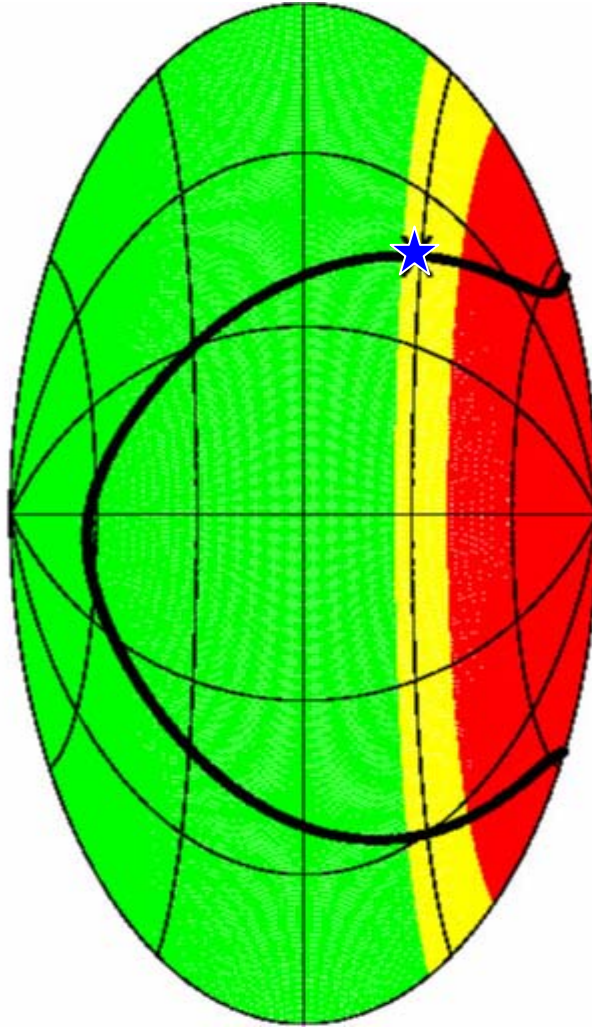
NL

(lat = +52.5 °)



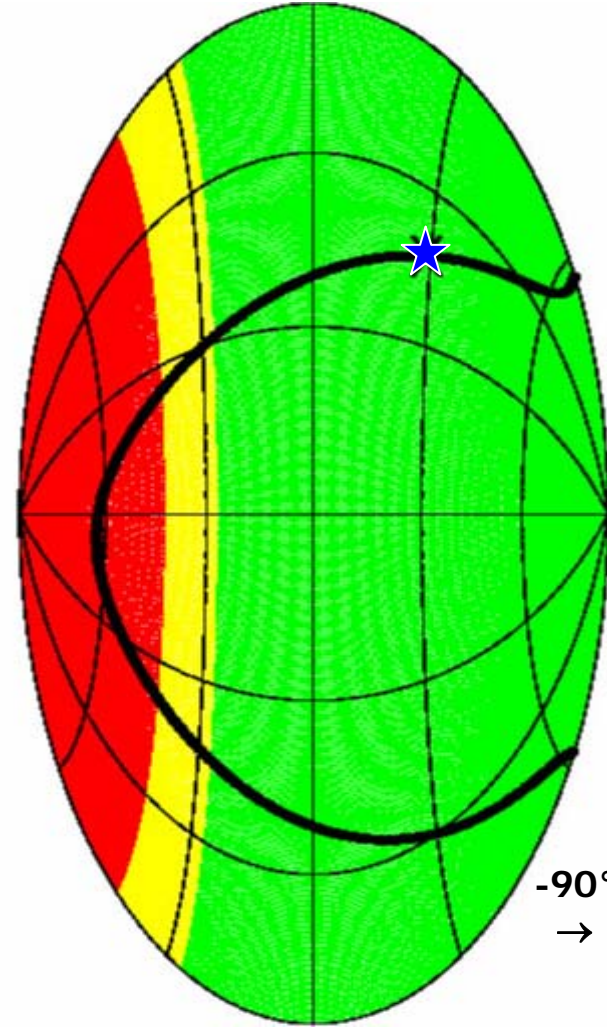
US-SW

(lat = +34.1°)



WA

(lat = -26.7°)



Sky Coverage to -15 dB = 75%

Sky Coverage to -15 dB = 87%

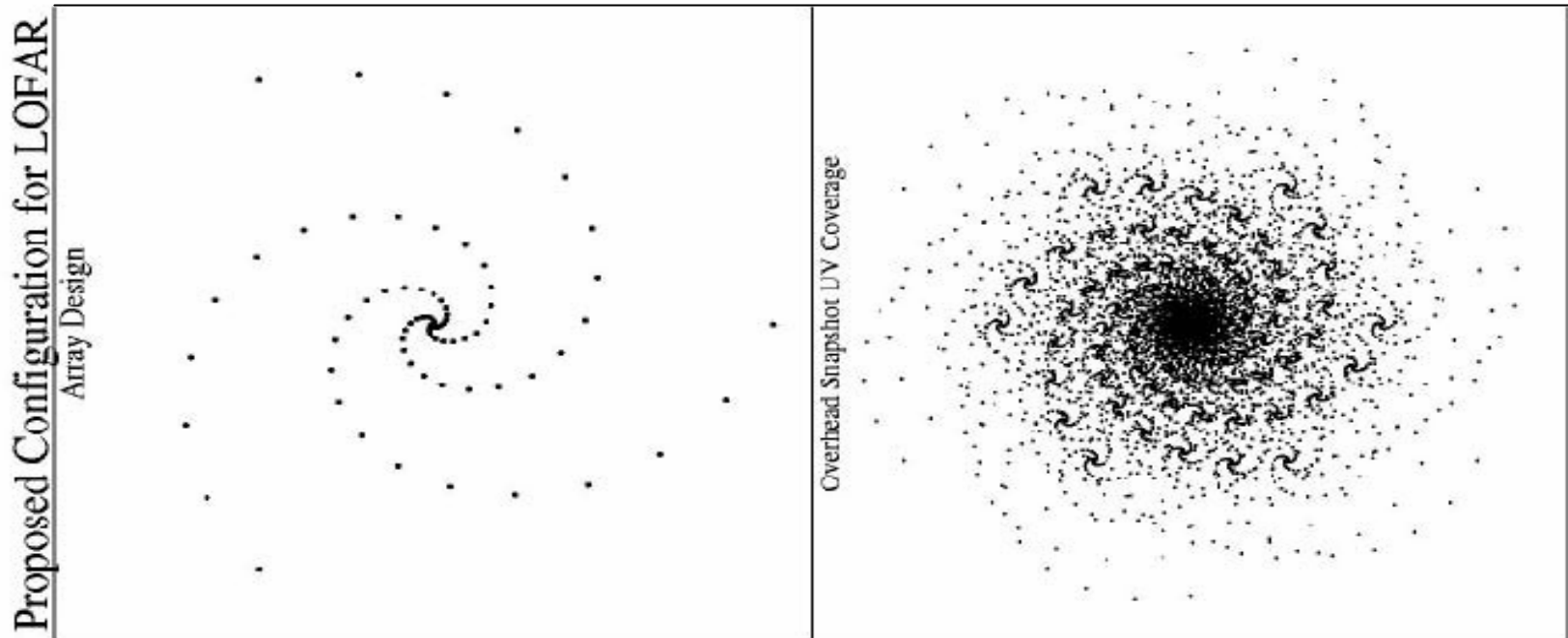
Sky Coverage to -15 dB = 88%

LWA Configuration & Snapshot u,v Coverage

*99 stations; 400 km diameter; 540 degree spiral; $\# \propto r^{3.4}$
(VLA $\# \propto r^{1.7}$)*

Array Layout

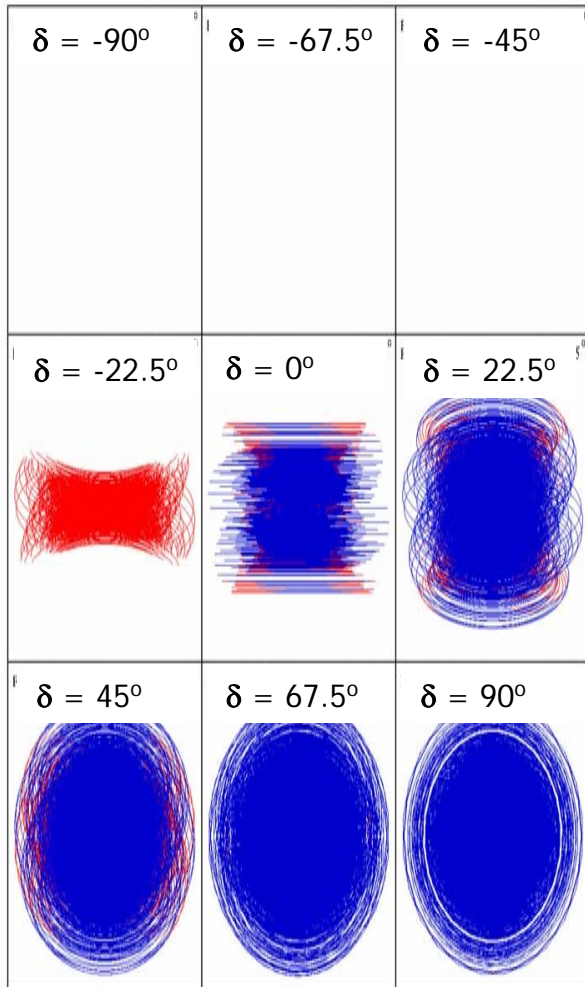
Snapshot u,v coverage



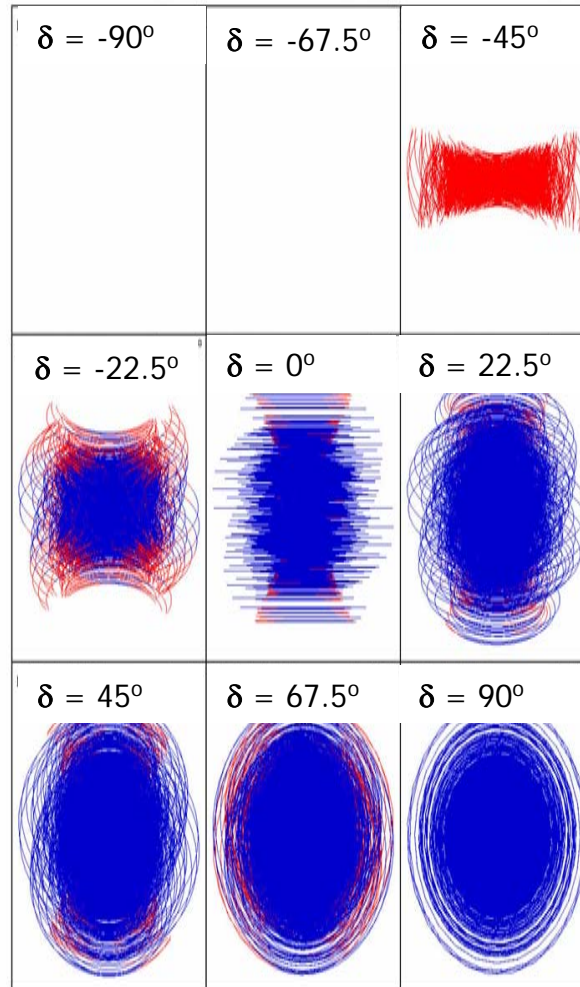
LWA u,v Coverage in Declination

($\delta = -90^\circ$ to $\delta = +90^\circ$)

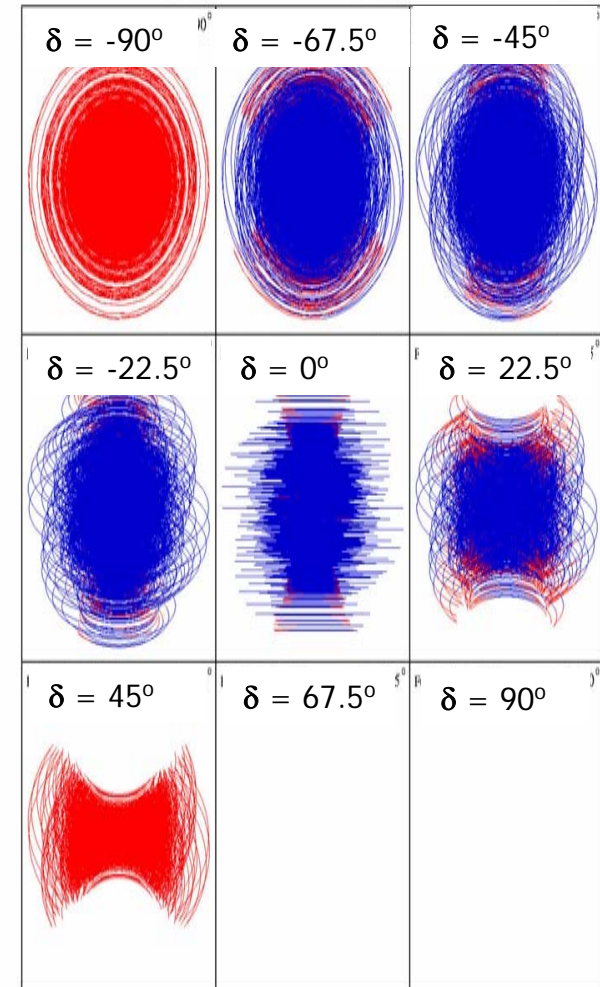
NL (lat=+52.5°)



US-SW (lat=+34.1°)



WA (lat=-26.7°)



BLUE = elevation $> 30^\circ$; **RED** = $7^\circ < \text{elevation} < 30^\circ$

Assumptions/Parameters

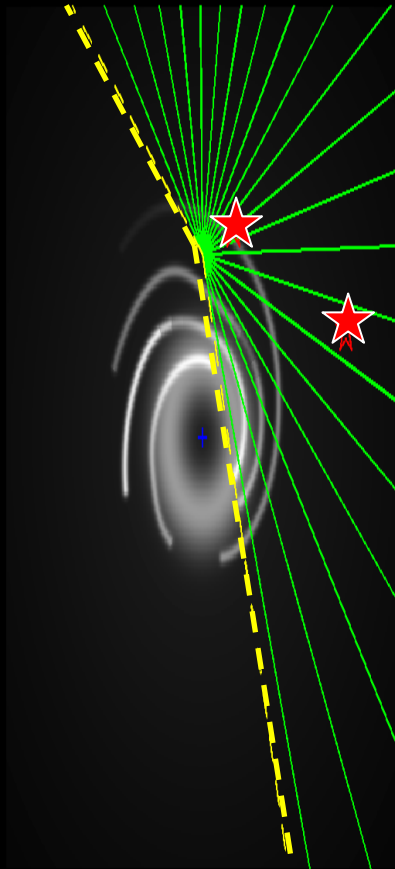
(Galaxy & u,v Coverage in Long.)

LWA beam (assumed $\pm 60^\circ$ to half power)

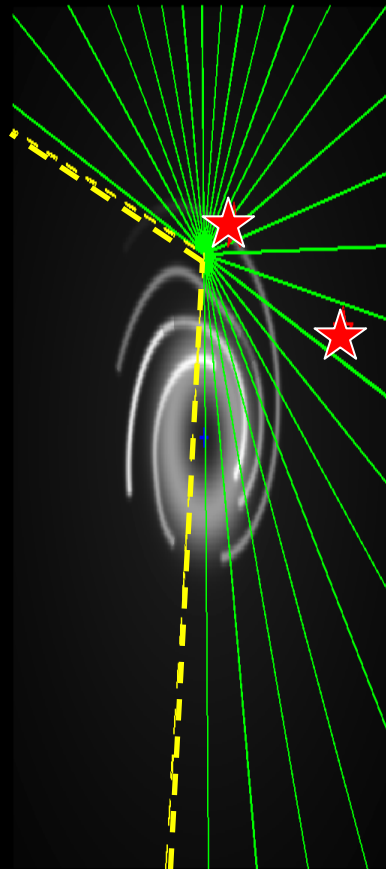
- LWA Galaxy Coverage
 - Grayscale Galaxy is Taylor & Cordes Model
 - GREEN LINES = lines of galactic longitude
 - YELLOW LINE = -15 dB limit on beam sensitivity
 - RED STARS (★) = Cas A and Cyg A
- LWA u,v Cover in Galactic long. ($l = 0^\circ$ to $l = +180^\circ$)
 - BLUE = elevation $> 30^\circ$
 - RED = $7^\circ < \text{elevation} < 30^\circ$
- LWA u,v Cover in Galactic long. ($l = 0^\circ$ to $l = -180^\circ$)
 - BLUE = elevation $> 30^\circ$
 - RED = $7^\circ < \text{elevation} < 30^\circ$

LWA Galaxy Coverage

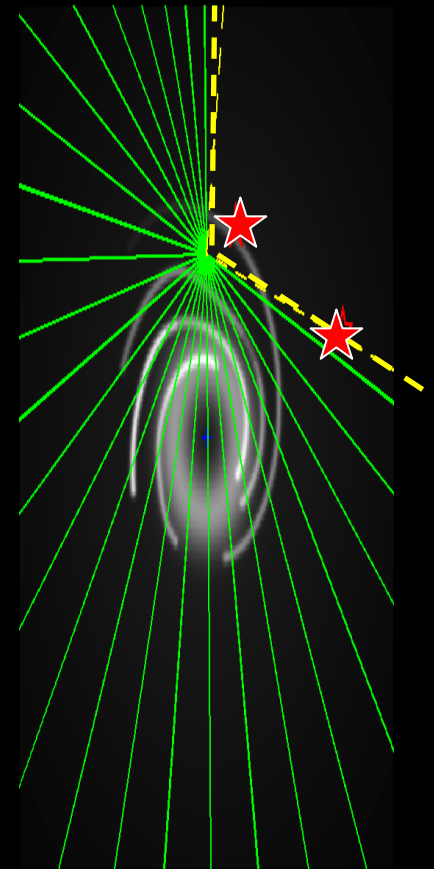
NL (lat = +52.5°)



US-SW (lat = +34.1°)



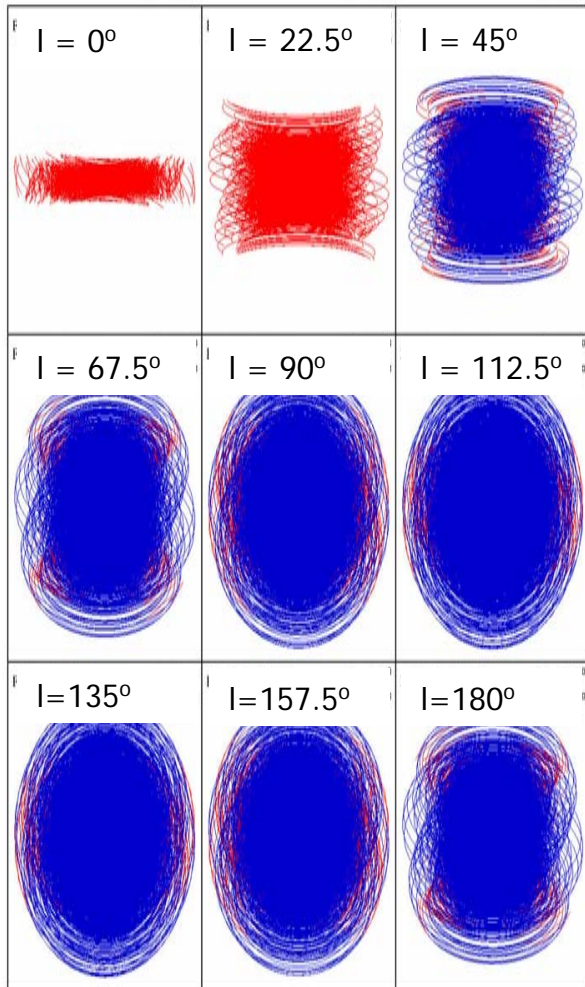
WA (lat = -26.7°)



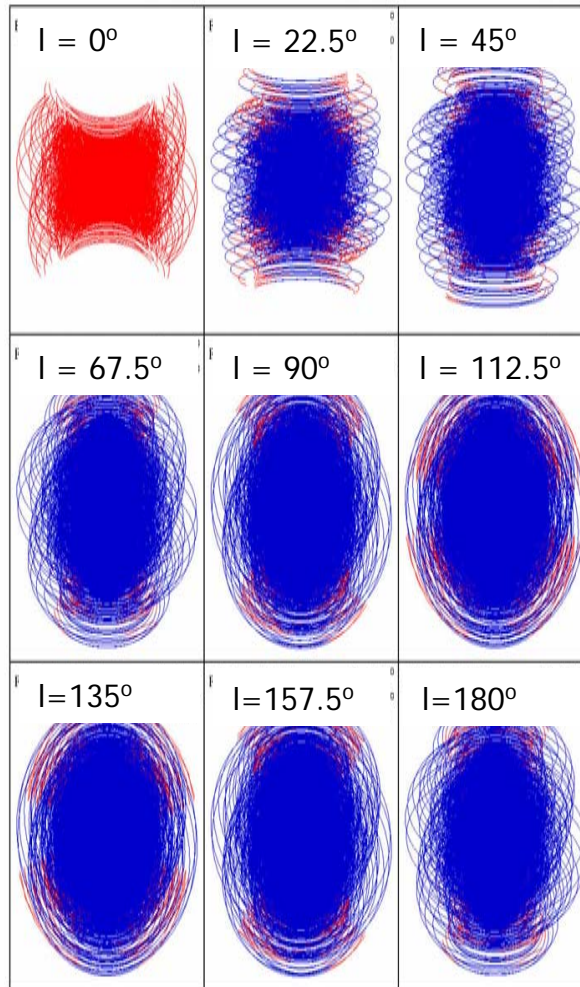
LWA u,v Coverage in Gal Long.

($l = 0^\circ$ to $l = +180^\circ$)

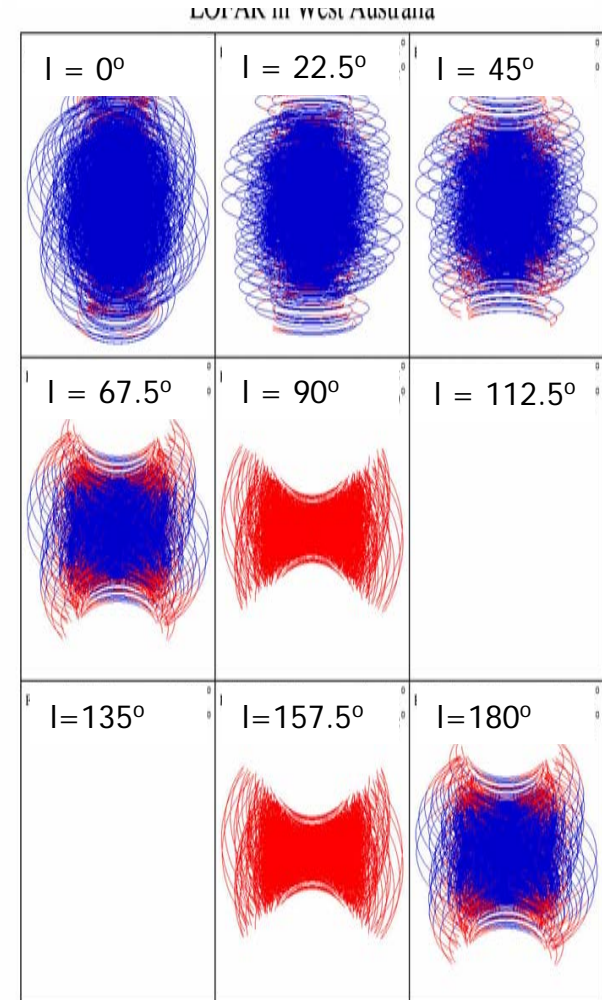
NL (lat = $+52.5^\circ$)



US-SW (lat = $+34.1^\circ$)



WA (lat = -26.7°)

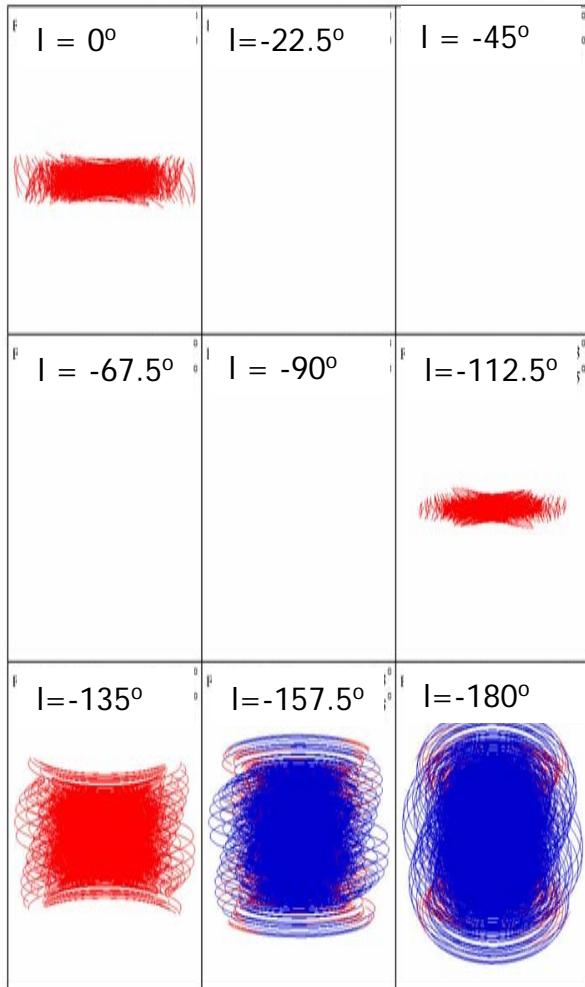


BLUE = elevation $> 30^\circ$; RED = $7^\circ < \text{elevation} < 30^\circ$

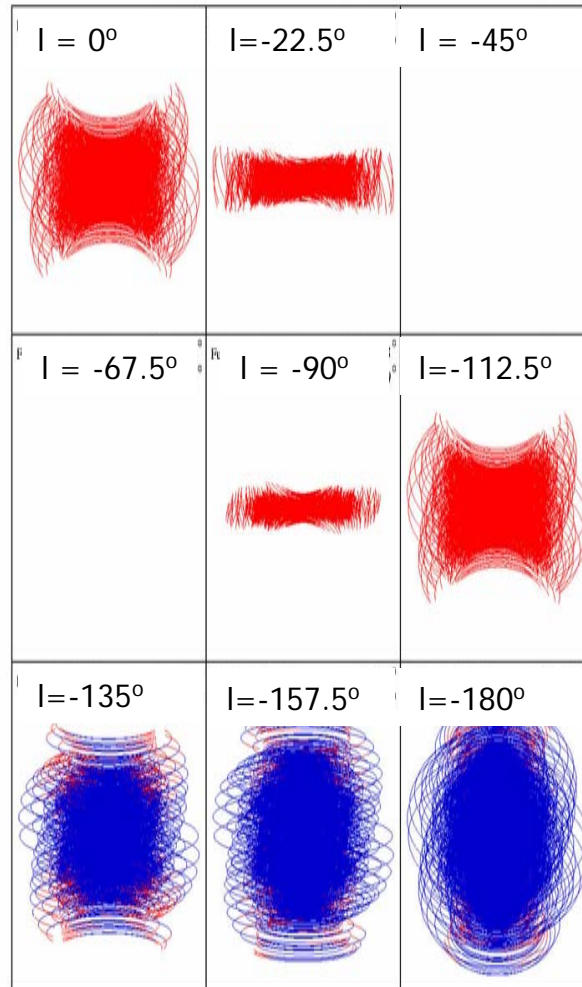
LWA u,v Coverage in Gal Long.

($l = 0^\circ$ to $l = -180^\circ$)

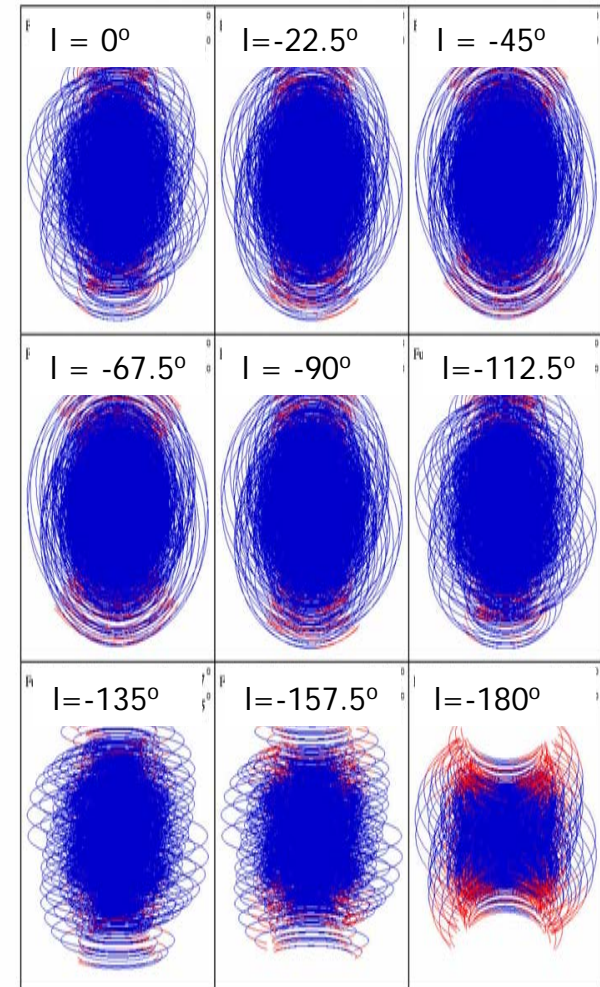
NL (lat = $+52.5^\circ$)



US-SW (lat = $+34.1^\circ$)



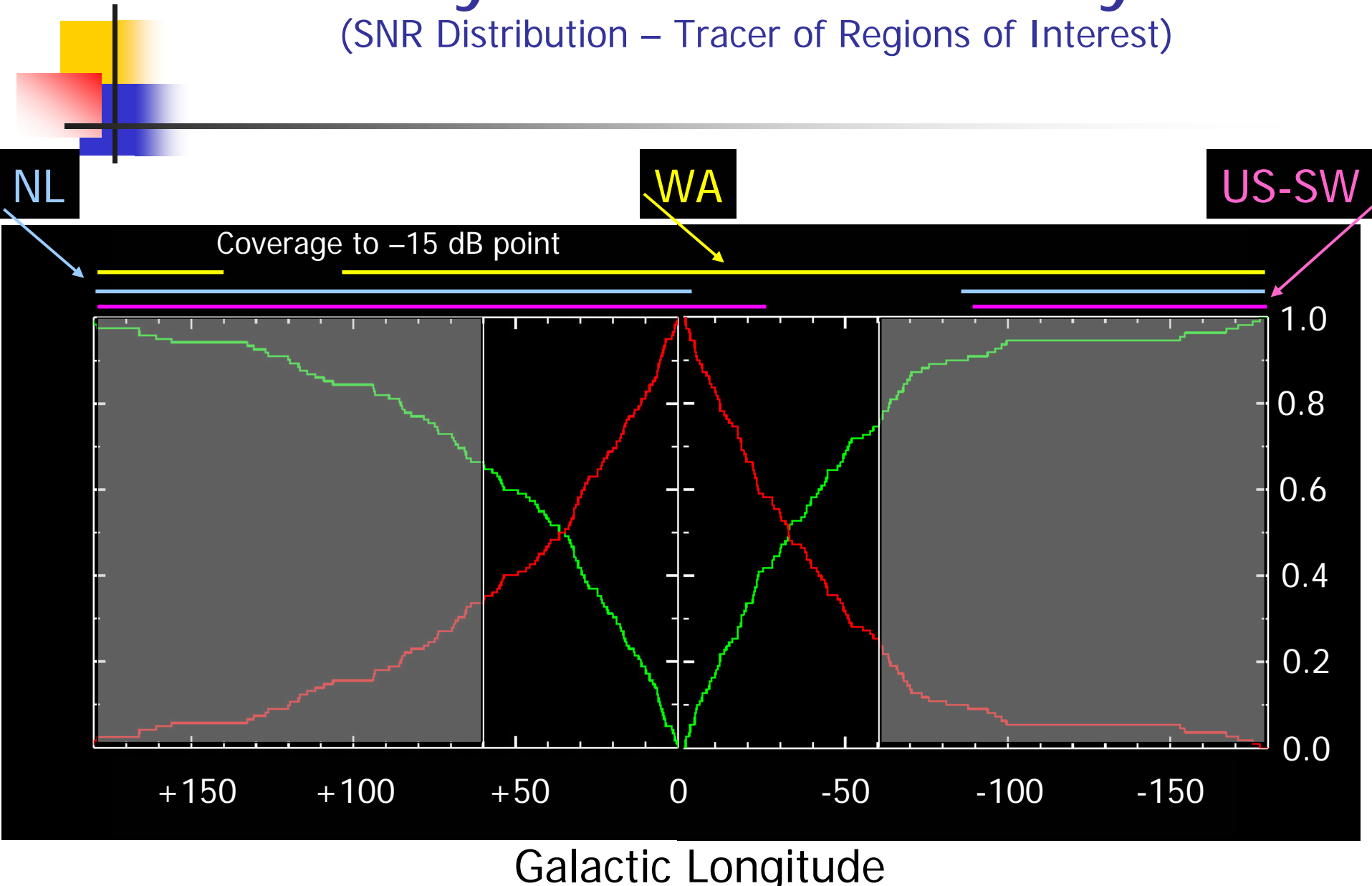
WA (lat = -26.7°)



BLUE = elevation $> 30^\circ$; RED = $7^\circ < \text{elevation} < 30^\circ$

Why the Inner Galaxy?

(SNR Distribution – Tracer of Regions of Interest)





Assumptions/Parameters

(Inner Galaxy u,v Coverage in Long.)

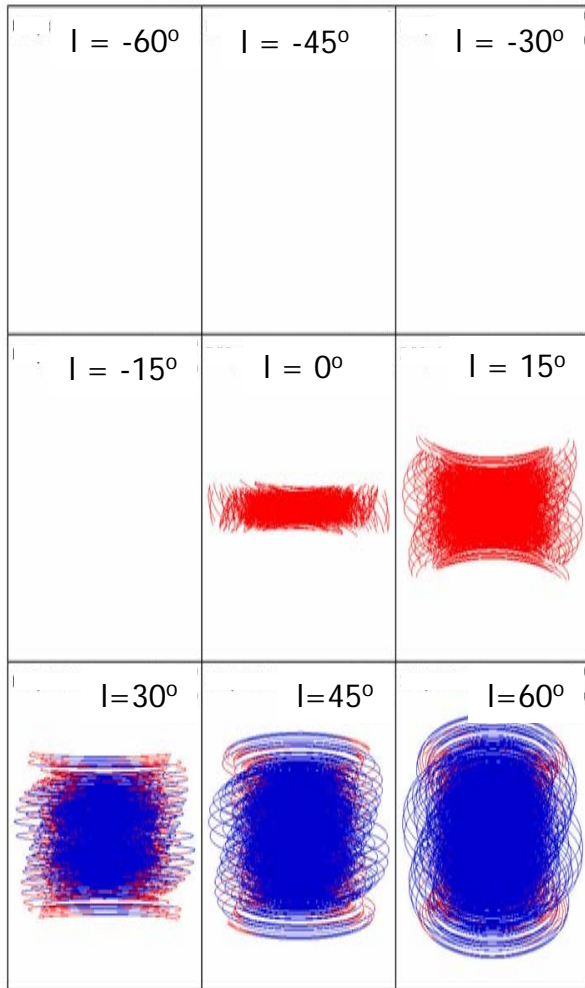
LWA beam (assumed $\pm 60^\circ$ to half power)

- LWA u,v Cover in Inner Galaxy ($l = -60^\circ$ to $l = +60^\circ$)
 - BLUE = elevation $> 30^\circ$
 - RED = $7^\circ < \text{elevation} < 30^\circ$

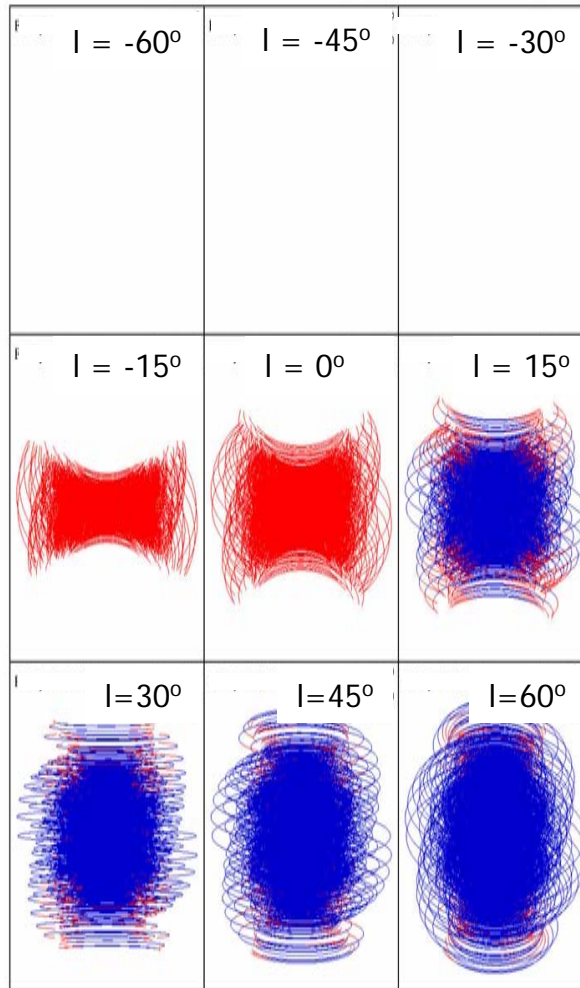
LWA u,v Coverage of Inner Galaxy

($l = -60^\circ$ to $l = +60^\circ$)

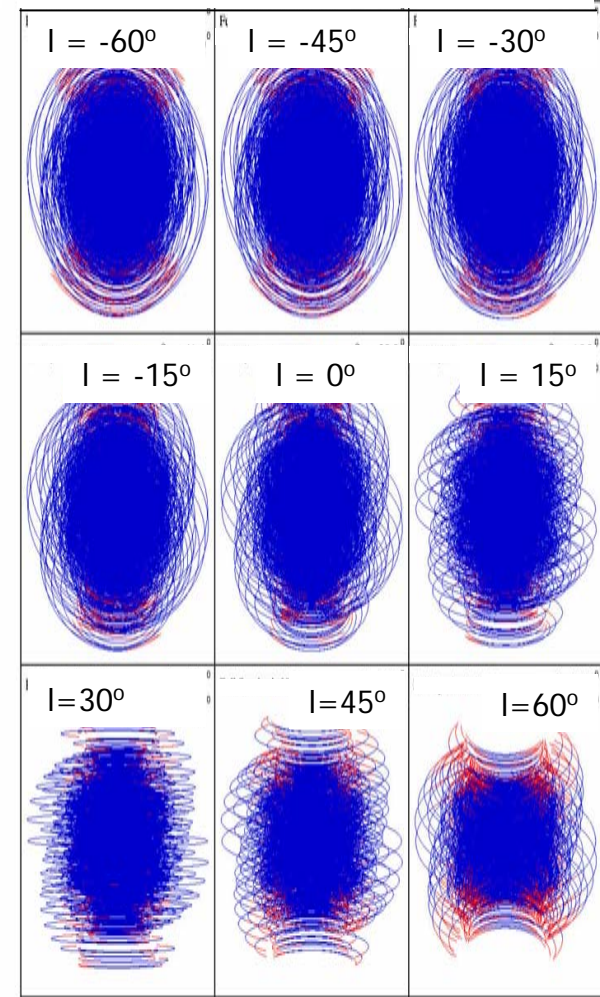
NL (lat = $+52.5^\circ$)



US-SW (lat = $+34.1^\circ$)



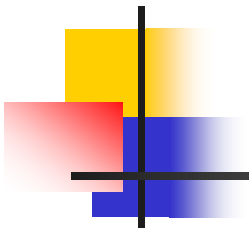
WA (lat = -26.7°)



BLUE = elevation $> 30^\circ$; RED = $7^\circ < \text{elevation} < 30^\circ$

Overlap between Observatories

(out of total possible to -15 dB point)



Site		NL	US-SW	WA
	Latitude	52.5	34.1	-26.7
		<i>Beam Overlap (fract.)</i>		
AAO	-31	0.50	0.61	0.86
Alma	-23	0.55	0.66	0.88
ATCA	-30.3	0.50	0.61	0.86
Keck	19.7	0.73	0.84	0.72
Palomar	32.7	0.73	0.84	0.64
VLA	34.1	0.73	0.84	0.63
VLT	-24.6	0.54	0.65	0.88
WSRT	52.5	0.73	0.84	0.52