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VLA Test Memo 113

ANTENNA POLARIZATION PROPERTIES

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Measurement of the polarization properties of the VLA antennas were made at C-Band for antennas 1, 3, 4, L-Band No. 2, and U-Band for No. 1. The presentation and analysis is identical to VLA Test Memo No. 111.

C-BAND POLARIZATION RESPONSE

Direction of Offset [4.5 Radius]	Antenna No. 1			Antenna No. 3			Antenna No. 4		
	I/2	V	L	I/2	V	L	I/2	V	L
0° +E1	0.42	- 9.5%	0.3%	-	-	-	0.56	-4.0	0.7
45°	0.42	-11.1	1.4	0.39	-5.6	13.9	0.42	-7.2	1.3
90° +Az	0.47	- 8.8	1.5	0.42	-6.7	16.3	0.33	-6.0	0.7
135°	0.57	- 7.2	1.5	0.57	-4.1	22.8	0.31	3.5	4.1?
180° -E1	0.63	- 0.1	1.3	0.90	-1.3	5.0	0.55	2.5	1.5
-135°	0.72	2.9	0.5	0.88	1.9	4.7	0.60	5.7	0.5
-90° -Az	0.65	5.1	1.0	0.77	4.1	9.8	0.75	5.2	0.9
-45°	0.58	0.3	1.6	0.57	1.8	0.3	0.74	-0.2	1.4

The linearly polarized response around the "3 dB" points in the beam are markedly improved with the new feeds (Nos. 1 and 4). Typical spurious polarized sidelobes are ~ 1%.

Direction of Offset	Antenna No. 2 L-Band 1335 MHz [15' Radius]			Antenna No. 1 U-Band [1.5 Radius]		
	I/2	V*	L*	I/2	V	L
0° +E1	0.43	0.4%	10.6%	0.29	2.5	3.9
45°	0.58	7.3	9.2	0.39	-3.0	0.4
90° +Az	0.68	9.6	6.0	0.38	-7.6	2.9
135°	0.76	-11.9	3.4	0.45	-4.6	2.6
180° -E1	0.65	- 6.8	6.8	0.54	-1.7	1.0
-135°	0.52	- 5.7	8.1	0.49	3.8	0.6
-90° -Az	0.40	- 5.5	7.8	0.45	5.8	2.7
45°	0.39	- 2.1	7.2	0.36	5.6	4.8

*Affected by relative gain changes in the RR channel. V and L are mixed since the feeds are sensitive to linear polarization.

L-Band polarization properties of Antenna No. 2 are poor over the beam with 10% residuals (sum of L # and V, sort of). The U-Band response on No. 1 is pretty good with ~ 2% residuals.

One curiosity. The beam size for antenna No. 1 U-Band is ~ 2.9 arcmin; for antenna No. 3 it is ~ 2.5 arcmin. With this narrower beam the sensitivity at the offset circle [1.5 arcmin from the center] was too low to give a reliable polarization measurement.

The circular polarization sidelobes at U-Band are similar to that at C-Band. L-Band data is curious. It was taken at 1335 MHz to avoid interference at 1370 and 1395 MHz. Perhaps at this low frequency the feeds are far from optimum.

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