

LINEAR POLARIZATION MEASUREMENTS OF THE 10.6-CM WAVELENGTH RADIATION FROM SMALL-DIAMETER RADIO SOURCES

The two 90-foot antennas at Caltech's Owens Valley Radio Observatory have been used as an interference polarimeter in an extensive investigation of the linear polarization properties of a number of discrete radio sources. Observations have been completed at three frequencies and several antenna separations. It was recognized early that, for sources where the effects of resolution by the interferometer were appreciable, the distribution of polarization over the source became significant and necessitated a completely different type of analysis. Such an analysis is being carried out on the resolved sources and will be reported elsewhere. This paper reports only the measurements made at 10.6-cm wavelength on sources for which the effects of resolution were judged negligible at one or both of the antenna separations used. They are hence comparable with single

TABLE 1
RADIO SOURCES FOUND TO BE LINEARLY POLARIZED AT 10.6-CM WAVELENGTH

SOURCE	290 λ		575 λ		IDENTIFICATION
	Polarization (Per Cent)	Position Angle	Polarization (Per Cent)	Position Angle	
3C 33... ..	8.0 ± 1.3	$88^\circ \pm 7^\circ$	4.9 ± 1.8	$96^\circ \pm 10^\circ$	17 ^m galaxy
3C 48.....	.....	.....	3.4 ± 1.0	75 ± 10	*
3C 98... ..	7.0 ± 2.8	111 ± 11	.....	.....	16 ^m galaxy
3C 111... ..	3.3 ± 1.8	116 ± 14	.....	.....	.....
3C 161... ..	6.1 ± 0.6	161 ± 5	9.5 ± 1.2	168 ± 5	.....
3C 227.....	3.9 ± 2.0	153 ± 16	.....	.....	.....
M 82... ..	3.5 ± 1.3	35 ± 11	.....	.....	Galaxy
3C 273... ..	3.4 ± 0.3	147 ± 4	.....	.....	*
3C 286... ..	9.5 ± 1.2	30 ± 5	8.5 ± 1.1	28 ± 4	*
3C 433.....	5.4 ± 1.2	121 ± 7	6.3 ± 2.3	123 ± 10	17 ^m +17 ^m galaxy

* Optically, these objects present a stellar appearance.

antenna measurements made elsewhere in the same wavelength range. Preliminary results for some of the sources have been presented previously (Radhakrishnan, Seielstad, and Berge 1962).

The receiving system and the measurement technique were identical with those used in the other Caltech polarization measurements (Morris and Radhakrishnan 1963; Seielstad and Wilson 1963). The local oscillator frequency was 2840 Mc/s, the intermediate frequency was 10 Mc/s, and, as before, both upper and lower side bands of width 5 Mc/s were accepted. The output was read from a mechanical integrator developed by J. F. Bartlett (Morris, Clark, and Wilson 1963).

Two independent sets of measurements are reported, one at an east-west antenna spacing of 100 feet ($\sim 290 \lambda$) and the other at an east-west spacing of 200 feet ($\sim 575 \lambda$). The latter measurements were made during July and August, 1962, the former during November, 1962. The sources Cassiopeia A, Virgo A, Orion A, and Hydra A were assumed unpolarized and used as calibrators for both sets of observations. This assumption was made on the basis of an earlier set of measurements made in March, 1962, which showed these sources to be essentially unpolarized (<0.5 per cent) at this frequency. For the observations at 290 λ , CTB 31 and Cygnus A were also used as calibrators. Since the N.R.L. group (Mayer, McCullough, and Sloanaker 1963) have now measured a linear polarization amounting to 0.5 per cent in the radiation from Cygnus A, our