

SPATIAL STRUCTURES OF A COMPLETE SAMPLE OF EXTRAGALACTIC RADIO SOURCES
NORTH OF DECLINATION 70°

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With the aim of studying the spatial structures of a complete sample of radio sources found at 6 cm wavelength we selected 13 sources from the "S5-survey" (Kühr et al., 1981) which fulfil the following criteria

- 1) $\delta > 70^\circ$, $|b^{II}| > 10^\circ$
- 2) $S_{5 \text{ GHz}} > 1 \text{ Jy}$ (at the epoch of the S5-survey)
- 3) $\alpha_{5 \text{ GHz}}^{2.7 \text{ GHz}} > -0.5$ ($S \propto \nu^\alpha$)

6 of these sources are identified by means of optical spectroscopy with QSOs, 6 are BL Lac-type objects, and the identification of 1 source is presently unknown. Observations at frequencies ranging from radio to X-ray have been reported (Biermann et al., 1981; Biermann et al., 1982; Eckart et al., 1982). Table 1 lists the present status of the survey.

Table 1

Source name	Ident.	Z	VLA	MERLIN	V L B I			
			20 cm	18 cm	18 cm	6 cm	2.8 cm	1.3 cm
0016+73	QSO	X	X	X	map	model	model	
0153+74	QSO	X	X	X	map	model		
0212+73	BL		X	X	map	model	model	proc. struct.
0454+84	BL		X	X	map	model		proc. struct.
0615+82	?		X	X	map	model	model	
0716+71	BL		X	X	map	2 x map		proc. struct.
0836+71	QSO	X	X	X	map	2 x map	map	proc. struct.
1039+81	QSO	X		X	map	map		
1150+81	QSO	X	X	X	map	model map		
1749+70	BL		X	X	map	model		
1803+78	BL		X	X	map	map		
1928+73	QSO	X	X	X	map	2 x map		
2007+77	BL		X	X	map	2 x map		

"proc. struct." means: processed, structure

4 of the 13 sources display extended arcsec structures based on VLA and MERLIN observations.

VLBI-measurements at different frequencies showed source structures ranging from point-like to complex (see table 2). At 18 cm about half of the objects are point-like or just slightly resolved. Although the information is still incomplete at 2.8 cm and 1.3 cm it is obvious that the number of resolved and complex sources increases with rising frequency.

Table 2

Structure	$\lambda 18$ cm	$\lambda 6$ cm	$\lambda 2.8$ cm	$\lambda 1.3$ cm
pointlike	2 (1)	—	—	—
slightly resolved	5 (2)	3 (1)	2	—
core-jet (incl. complex jets)	6 (3)	10 (5)	2 (1)	4 (3)

(The numbers in parentheses refer to BL Lac objects)

Although the investigation of the spectral indices of individual components, the analysis of the total spectra, and the statistical investigations of apparently superluminal motions in the sample sources is not yet finished, we will briefly comment on four sources of the sample for which we have presently analyzed two epochs of 5 GHz VLBI observations.

The experiments at 6 cm were performed in 1979.9/1980.1 and 1982.9/1983.3 and therefore cover an interval of about three years.

0716+71: No significant changes in the source structure at 5 GHz have been observed for this BL Lac object. At both epochs the source is well described by a close (separation 1.3 mas) double source with PA 45° . The 18 cm map displays extended emission in PA -150° and a separation of about 4 mas. Therefore this object is a candidate for VLB structure on both sides of the compact emission. Furthermore the source has a two sided arcsecond structure in PA -60° and 125° . This may represent a bending of the jet of about 70° to 100° .

0836+71: This high redshifted quasar ($z = 2.16$) is well described by three compact sources located along PA -144° . A comparison with the 18 cm VLB map suggests that the northern component has an inverted spectrum and can therefore be identified with the core. Between the two 5 GHz epochs no significant structural changes have been observed.

1928+73: This source is a quasar with a redshift of 0.36 and consists of at least 3 bright components which are part of a large jet. This jet has also been detected on the arcsecond scale. Our data does not reveal any significant changes of separations. The decrease of total flux density between the two epochs of about 0.5 Jy can be attributed to the core. The two dominant secondary components in the 1982.9 map are located at a distance from the core at 3.3 mas (PA 165°) and about 9 mas (PA 175°). A 18 cm MERLIN map shows an extension along PA 180° .

2007+77: This BL Lac source consists of 3 components along PA 95° . The object is a good candidate for superluminal expansion. The separations between the core and the first secondary component at the different epochs is 1 mas and 1.8 mas respectively.

REFERENCES

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