

## VLBI CORES IN A SAMPLE OF RADIO GALAXIES

G. Comoretto,<sup>1</sup> L. Feretti,<sup>2,3</sup> G. Giovannini <sup>2,3</sup>

1 - Osservatorio Astrofisico di Arcetri, L.go E. Fermi 5,  
Firenze, Italy

2 - Istituto di Radioastronomia, v. Innerio 46, Bologna

3 - Dipartimento di Astronomia, v. Zamboni 33, Bologna, Italy

We present the first results of a statistical study of the milliarcsec structure in a complete sample of radio galaxies. We have selected from the B2 and 3CR samples of galaxies the sources which present, at the VLA or WSRT angular resolution, an unresolved core with a flux density at 5 GHz  $S_{\nu} \geq 100$  mJy. The total sample consists of 30 radio galaxies, 17 from the B2 and 13 from the 3CR catalog. This complete sample covers a range of total radio power at 408 MHz  $\log P = 23.5 - 26.5$  W/Hz (low-intermediate luminosity). The radio structure of these sources on the arcsec-arcmin scale is well known, thanks to good dynamic range VLA and/or WSRT maps; a large variety of structures is present in the sample, from classical doubles to head-tail sources; flat, inverted and steep spectrum cores are also present.

The 12 radio galaxies with the strongest cores have been already observed by other authors with the VLBI, therefore we observed at 5 GHz the remaining 18 galaxies with the EVN array + Haystack antenna, using the Mark III recording system in mode B. As a first step, each source was observed with 1 to 8 scans of 13 minutes in order to have indications on the size and flux of the nuclear sources. Unambiguous mapping is not possible because of the limited  $u-v$  coverage, but crude indications about the core structure can be derived. Thanks to the transatlantic baselines, we were able to detect structure down to a resolution of 2 mas in E-W direction.

The results are summarized in table 1. We detected 15 out of the 18 sources. In 9 sources all the arcsec flux was detected on the VLBI scale, in 4 sources more than 70%; only in 2 sources less than 65% of the arcsec flux was detected. This result is different from that of Wehrle et al. (1984, Ap. J., 284, 519), who observed on the baseline Goldstone-Madrid a complete sample of radio galaxies, selected according to the total flux at 408 MHz. They found that for most sources the flux in the VLBI component is only a fraction of the flux detected in the arcsec core. This implies that besides the compact feature some resolved structure, which can be missed in observations with only transatlantic baselines, is generally present in these sources.

In our sample, of the 15 sources detected, 8 are unresolved and 7 show indication of an extended structure. The limited u-v coverage available allow us to derive only simple models. All sources show a structure of the type core-jet, with the parsec jet well aligned with the Kpc jet. In one source (0755+37) a jet-counterjet is strongly suggested both in the map and in the model.

The accurate mapping with better u-v coverage of all the detected sources is planned as a second step of this work.

**TABLE 1**

Summary of observations

Source name	Beam mas (deg)	Scans observed	Number of stations	Structure	$S_{mas}/S_{as}$ %
0055+30 NGC315	6×2 (0)	6	6	one sided	100
0104+32 3C31	6×2 (0)	6	6	point	100
0220+43 3C66B	5×2 (60)	2	6	point	100
0222+36	6×2 (20)	2	6	extended?	65
0258+35 NGC1167	5×2 (25)	2	6	—	< 20
0331+39 4C39.12	6×2 (30)	1	6	point	85
0755+37 NGC2484	4×2 (0)	8	6	two sided	100
0836+29	4×2 (−15)	6	6	one sided	100
1037+30	4×2 (−15)	6	6	—	< 7
1142+20 3C264	8×2 (0)	4	6	one sided?	90
1144+35	6×2 (15)	2	6	one sided	variable
1322+36 NGC5141	4×2 (30)	2	6	point	50
1441+52 3C303	6×2 (−45)	3	6	point	100
1511+26 3C315	14×4 (30)	1	3	—	< 5
1626+39 3C338	7×2 (−15)	5	6	extended	100
1641+17 3C346	12×6 (−45)	2	5	point	70
1833+32 3C382	8×3 (0)	1	6	extended?	100
2249+39 3C452	3×2 (0)	3	6	one sided	100