CORES IN EXTENDED QUASARS

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The Nuclear Radio cores of several nearby extended radio galaxies (e.g. M87, 3C236) consist not only of optically thick (< 1 pc) components, but also of emission on somewhat larger scale. As extended radio sources associated with quasars have on average stronger and more luminous radio cores (see e.g. Miley, 1980, Ann. Rev. Astron. Astrophys. 18, 165), we have started a project to study the properties of these quasar cores. The most important reasons for this study are:

1. A comparison of the core structure with the overall morphology of the sources can give important information about the evolution of extended radio sources;
2. The statistics of the core sizes and their relation to other source parameters as radio, optical and X-ray luminosities, optical polarizations, emission line widths etc. can provide fundamental clues as to the nature of active galactic nuclei;
3. Observations of the core structures at different epochs may provide tests for the different models explaining superluminal motion.

Four large MkII VLBI experiments at 5 GHz have been carried out so far, and this contribution is meant as a progress report on the project. Pilot surveys in January 1980 and April 1981 were followed by first and second epoch mapping programs in April 1982 and April 1983. The telescopes that we used were the Effelsberg 100-m, the Onsala 25-m, the Green Bank 43-m, the 27 antenna VLA and the Owens Valley 40-m telescopes, giving resolutions of about 1 mas.*

The source sample (1980) consisted of all quasi-stellar radio sources having (i) δ (1950) > 0^{o}, (ii) known extended radio structure, and redshift, and (iii) 5 GHz core flux density greater than 100 mJy. This sample of 18 quasars is shown in Table 1.

*mas = milli arc second

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For the pilot surveys we made typically 3-5 10-20 minute scans per source at different hour angles. Compact cores ($\lesssim$ 1 mas) were detected in 15 quasars, whereas in 8 sources significant variations in correlated flux density occurred, implying mas structure.

As follow-up, full tracks at two epochs have been made on the four (three) largest sources showing mas structure in their cores: 0610+260, 0742+318, 1137+660 (only one epoch) and 1721+343. Although the hybrid maps still have to be made, comparison of the visibility amplitudes on the longest baselines already showed that the core structures in these very large radio sources have not changed much in a year: $\mu < 0.15$ mas/yr, implying $v/c < 3$. Comparison of the hybrid maps will yield better values or limits to the velocities involved.

Full account of this work will be given elsewhere.

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Table 1.

source	other name	redshift	proj. lin. size*
0003+158	4C15.01	0.450	140 kpc
0214+108	4C10.06	0.408	510
0610+260	3C154	0.580	250
0742+318	4C31.30	0.462	530
0836+195	4C19.31	1.691	70
0838+133	3C207	0.684	50
0855+143	3C212	1.048	50
0932+022	4C02.27	0.659	270
1040+123	3C245	1.029	30
1047+096	4C09.37	0.786	380
1055+201	4C20.24	1.110	130
1058+110	4C10.30	0.420	140
1137+660	3C263	0.652	240
1203+109	4C10.34	1.088	50
1222+216	4C21.35	0.435	100
1548+114A	4C11.50	0.436	300
1618+177	3C334	0.555	250
1721+343	4C34.47	0.206	1270

*calculated, assuming $H_o = 75$ km sec^{-1} Mpc^{-1} and $q_o = 0.5$