Chapter 8

Appendix

Model fits to the VLBI structure of 3C345.

In this appendix, we list all the models from previous observations of 3C 345 that have been used in the thesis. References to the publications in which the corresponding observations were described are given in the captions. We have reanalysed all models presented in Zensus, Cohen, and Unwin (1995) prior to submission of that article.

In each table, the columns have the following meanings: S – component flux density; r – component relative distance from the core "D"; θ – component position angle (North through West); b_{maj} – component major axis; ϵ – component axial ratio; ϕ – component major axis position angle (North through West); Fit – type of the fit (G – elliptical Gaussian; S – optically thin sphere). The δ–s indicate the estimated errors for the corresponding parameters. Zero errors indicate that no error estimates were made for the corresponding parameters.

Table 8.1: Model for epoch 1979.25 at 5.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.300	0.300	0.000	0.000	0.000	0.000	1.500	0.200	1.000	0.000	0.000	0.000	S
C3	2.300	0.200	1.190	0.040	-80.000	3.000	0.900	0.400	1.000	0.000	0.000	0.000	S
C2	0.900	0.200	3.640	0.150	-72.000	2.000	1.400	0.600	1.000	0.000	0.000	0.000	S

Table 8.2: Model for epoch 1979.92 at 5.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.660	0.140	0.000	0.000	0.000	0.000	1.140	0.160	1.000	0.000	0.000	0.000	S
C3	2.620	0.140	1.240	0.020	-85.700	1.200	0.990	0.140	1.000	0.000	0.000	0.000	S
C2	1.200	0.120	3.980	0.100	-74.300	1.100	1.720	0.170	1.000	0.000	0.000	0.000	S

Table 8.3: Model for epoch 1979.44 at 10.70 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.450	0.450	0.000	0.000	0.000	0.000	0.520	0.070	1.000	0.000	0.000	0.000	S
C3a	1.430	0.650	0.540	0.020	-104.000	3.000	0.640	0.260	1.000	0.000	0.000	0.000	S
C3	1.950	0.130	1.400	0.020	-89.100	0.900	0.850	0.050	1.000	0.000	0.000	0.000	S
C2	0.700	1.000	4.200	0.300	-76.000	6.000	1.400	1.200	1.000	0.000	0.000	0.000	S

Table 8.4: Model for epoch 1980.52 at 10.70 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.400	1.400	0.000	0.000	0.000	0.000	0.240	0.120	1.000	0.000	0.000	0.000	S
C4	3.400	1.300	0.250	0.020	-135.000	4.000	0.320	0.130	1.000	0.000	0.000	0.000	S
C3a	0.860	0.150	1.040	0.060	-97.000	4.000	0.980	0.120	1.000	0.000	0.000	0.000	S
C3	1.020	0.110	1.800	0.040	-87.400	0.800	0.790	0.090	1.000	0.000	0.000	0.000	S
C2	0.800	0.180	4.280	0.100	-74.000	2.000	2.000	1.200	1.000	0.000	0.000	0.000	S

Table 8.5: Model for epoch 1980.73 at 5.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.280	0.080	0.000	0.000	0.000	0.000	1.100	0.050	1.000	0.000	0.000	0.000	S
C3	2.250	0.100	1.590	0.020	-81.600	0.700	1.300	0.080	1.000	0.000	0.000	0.000	S
C2	0.870	0.080	4.370	0.070	-73.000	0.800	1.700	0.200	1.000	0.000	0.000	0.000	S

Table 8.6: Model for epoch 1981.09 at 10.70 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	6.600	0.500	0.000	0.000	0.000	0.000	0.060	0.060	1.000	0.000	0.000	0.000	S
C4	3.600	0.400	0.325	0.014	-131.000	2.000	0.200	0.090	1.000	0.000	0.000	0.000	S
C3a	0.520	0.230	1.150	0.110	-108.000	9.000	0.800	0.400	1.000	0.000	0.000	0.000	S
C3	1.110	0.260	2.000	0.110	-84.000	2.000	1.170	0.360	1.000	0.000	0.000	0.000	S
C2	1.000	1.000	4.600	0.400	-72.000	4.000	2.800	1.900	1.000	0.000	0.000	0.000	S

Table 8.7: Model for epoch 1981.25 at 22.20 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	9.800	0.200	0.000	0.000	0.000	0.000	0.140	0.020	1.000	0.000	0.000	0.000	S
C4	3.220	0.160	0.377	0.004	-126.500	1.200	0.260	0.030	1.000	0.000	0.000	0.000	S
C3a	0.300	0.100	1.110	0.100	-99.000	5.000	0.300	0.200	1.000	0.000	0.000	0.000	S
C3	0.550	0.130	1.950	0.160	-86.000	4.000	0.800	0.200	1.000	0.000	0.000	0.000	S

Table 8.8: Model for epoch 1981.63 at 5.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	6.570	0.080	0.000	0.000	0.000	0.000	1.080	0.050	1.000	0.000	0.000	0.000	S
C3	1.990	0.070	1.760	0.020	-82.900	0.800	1.630	0.080	1.000	0.000	0.000	0.000	S
C2	1.330	0.130	4.610	0.050	-71.300	0.700	2.800	0.200	1.000	0.000	0.000	0.000	S

Table 8.9: Model for epoch 1981.89 at 2.30 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.540	0.250	0.000	0.000	0.000	0.000	1.600	0.600	1.000	0.000	0.000	0.000	S
C3	2.420	0.250	1.700	0.040	-78.900	1.400	1.900	0.500	1.000	0.000	0.000	0.000	S
C2	1.750	0.150	4.710	0.100	-70.400	0.900	2.700	0.200	1.000	0.000	0.000	0.000	S
C1	0.560	0.550	15.500	2.500	-64.000	18.000	13.000	6.000	1.000	0.000	0.000	0.000	S

Table 8.10: Model for epoch 1982.09 at 10.70 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	6.600	0.300	0.000	0.000	0.000	0.000	0.160	0.060	1.000	0.000	0.000	0.000	S
C4	6.400	0.300	0.352	0.002	-115.300	0.600	0.100	0.050	1.000	0.000	0.000	0.000	S
C3a	0.400	0.060	0.920	0.020	-106.000	4.000	0.700	0.300	1.000	0.000	0.000	0.000	S
C3	1.000	0.170	2.180	0.060	-88.300	1.800	1.120	0.130	1.000	0.000	0.000	0.000	S
C2	0.790	0.270	5.120	0.310	-74.000	3.000	3.300	0.900	1.000	0.000	0.000	0.000	S

Table 8.11: Model for epoch 1982.38 at 89.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	6.000	5.000	0.000	0.000	0.000	0.000	0.280	0.140	1.000	0.000	0.000	0.000	S
C4	6.000	4.000	0.480	0.470	-110.000	5.000	0.460	0.400	1.000	0.000	0.000	0.000	S

Table 8.12: Model for epoch 1982.42 at 22.20 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	6.800	0.400	0.000	0.000	0.000	0.000	0.520	0.020	1.000	0.000	0.000	0.000	S
C4	7.500	0.400	0.410	0.008	-107.000	0.800	0.350	0.020	1.000	0.000	0.000	0.000	S

Table 8.13: Model for epoch 1982.56 at 5.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	8.000	0.150	0.000	0.000	0.000	0.000	0.900	0.050	1.000	0.000	0.000	0.000	S
C3	1.590	0.160	2.000	0.080	-81.000	2.000	1.600	0.200	1.000	0.000	0.000	0.000	S
C2	1.080	0.200	5.090	0.160	-73.000	2.000	2.200	0.400	1.000	0.000	0.000	0.000	S

Table 8.14: Model for epoch 1982.86 at 10.70 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.600	0.700	0.000	0.000	0.000	0.000	0.200	0.140	1.000	0.000	0.000	0.000	S
C4	8.100	1.000	0.470	0.010	-100.000	2.000	0.300	0.120	1.000	0.000	0.000	0.000	S

Table 8.15: Model for epoch 1983.09 at 22.20 GHz (Biretta *et al.* 1986)

Name	S	δ_S	r	δ_r	θ	δ_θ	b_{maj}	$\delta_{b_{maj}}$	ϵ	δ_ϵ	ϕ	δ_ϕ	Fit
	[Jy]	[Jy]	[mas]	[mas]	[°]	[°]	[mas]	[mas]			[°]	[°]	
D	5.600	0.600	0.000	0.000	0.000	0.000	0.350	0.040	1.000	0.000	0.000	0.000	S
C5	1.700	0.600	0.250	0.020	-79.000	4.000	0.280	0.100	1.000	0.000	0.000	0.000	S
C4	5.900	0.300	0.618	0.006	-93.800	0.700	0.310	0.020	1.000	0.000	0.000	0.000	S

Table 8.16: Model for epoch 1983.10 at 10.70 GHz (Biretta *et al.* 1986)

Name	S	δ_S	r	δ_r	θ	δ_θ	b_{maj}	$\delta_{b_{maj}}$	ϵ	δ_ϵ	ϕ	δ_ϕ	Fit
	[Jy]	[Jy]	[mas]	[mas]	[°]	[°]	[mas]	[mas]			[°]	[°]	
D	5.460	0.410	0.000	0.000	0.000	0.000	0.420	0.170	1.000	0.000	0.000	0.000	S
C4	6.950	0.280	0.528	0.004	-94.500	0.700	0.410	0.160	1.000	0.000	0.000	0.000	S
C3a	0.380	0.180	1.300	0.300	-84.000	8.000	1.000	0.400	1.000	0.000	0.000	0.000	S
C3	0.670	0.170	2.530	0.090	-87.000	2.000	0.850	0.340	1.000	0.000	0.000	0.000	S
C2	1.200	0.900	5.300	0.500	-75.000	5.000	2.900	1.500	1.000	0.000	0.000	0.000	S

Table 8.17: Model for epoch 1983.57 at 5.00 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.550	0.710	0.000	0.000	0.000	0.000	0.710	0.120	1.000	0.000	0.000	0.000	S
C4	3.600	0.500	0.544	0.008	-85.500	1.600	0.500	0.200	1.000	0.000	0.000	0.000	S
C3	1.370	0.070	2.430	0.060	-81.600	0.700	1.630	0.140	1.000	0.000	0.000	0.000	S

Table 8.18: Model for epoch 1983.76 at 22.20 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	5.400	0.600	0.000	0.000	0.000	0.000	0.360	0.030	1.000	0.000	0.000	0.000	S
C5	2.800	0.400	0.239	0.012	-91.000	3.000	0.360	0.050	1.000	0.000	0.000	0.000	S
C4	5.000	0.200	0.858	0.008	-87.600	0.600	0.330	0.010	1.000	0.000	0.000	0.000	S

Table 8.19: Model for epoch 1984.09 at 22.20 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	6.700	0.400	0.000	0.000	0.000	0.000	0.410	0.020	1.000	0.000	0.000	0.000	S
C5	1.300	0.400	0.270	0.030	-94.000	6.000	0.360	0.140	1.000	0.000	0.000	0.000	S
C4	5.200	0.300	0.864	0.016	-86.700	0.800	0.480	0.020	1.000	0.000	0.000	0.000	S

Table 8.20: Model for epoch 1984.11 at 10.70 GHz (Biretta *et al.* 1986)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	5.400	0.200	0.000	0.000	0.000	0.000	0.530	0.060	1.000	0.000	0.000	0.000	S
C5	1.400	0.280	0.440	0.040	-96.000	4.000	0.300	0.150	1.000	0.000	0.000	0.000	S
C4	5.750	0.520	0.810	0.008	-86.600	0.400	0.510	0.070	1.000	0.000	0.000	0.000	S
C3	0.540	0.080	2.860	0.080	-84.000	2.000	1.100	0.200	1.000	0.000	0.000	0.000	S
C2	0.650	0.560	5.900	0.400	-72.000	4.000	2.800	0.400	1.000	0.000	0.000	0.000	S

Table 8.21: Model for epoch 1984.25 at 4.99 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.611	0.265	0.000	0.000	0.000	0.000	0.573	0.124	1.000	0.000	0.000	0.000	S
C5	3.379	0.268	0.649	0.014	-85.886	0.478	0.389	0.139	1.000	0.000	0.000	0.000	S
C3	0.863	0.022	2.668	0.044	-81.394	0.556	1.686	0.079	1.000	0.000	0.000	0.000	S
C2	0.776	0.021	6.032	0.053	-70.248	0.452	2.513	0.082	1.000	0.000	0.000	0.000	S

Table 8.22: Model for epoch 1984.76 at 22.22 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	5.842	0.121	0.000	0.000	0.000	0.000	0.399	0.006	1.000	0.000	0.000	0.000	S
C4	1.300	0.232	1.023	0.012	-85.039	0.746	0.245	0.062	1.000	0.000	0.000	0.000	S
C3a	0.317	0.131	1.793	0.053	-70.400	2.128	0.327	0.133	1.000	0.000	0.000	0.000	S

Table 8.23: Model for epoch 1984.94 at 10.67 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	3.968	0.171	0.000	0.000	0.000	0.000	0.457	0.052	1.000	0.000	0.000	0.000	S
C5	1.217	0.181	0.493	0.026	-97.200	3.637	0.334	0.157	1.000	0.000	0.000	0.000	S
C4	2.973	0.144	0.956	0.011	-87.389	0.469	0.510	0.040	1.000	0.000	0.000	0.000	S
C3	0.083	0.079	3.618	0.156	-80.097	5.186	1.413	0.090	1.000	0.000	0.000	0.000	S
C2	0.095	0.083	7.514	0.160	-74.054	2.855	2.605	0.237	1.000	0.000	0.000	0.000	S

Table 8.24: Model for epoch 1985.75 at 22.22 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.963	0.088	0.000	0.000	0.000	0.000	0.388	0.013	1.000	0.000	0.000	0.000	S
C5	1.794	0.087	0.475	0.007	-115.553	1.271	0.430	0.026	1.000	0.000	0.000	0.000	S
C4	1.605	0.133	1.050	0.013	-93.729	0.949	0.644	0.033	1.000	0.000	0.000	0.000	S

Table 8.25: Model for epoch 1985.76 at 4.99 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.619	0.123	0.000	0.000	0.000	0.000	0.000	0.000	1.000	0.000	0.000	0.000	S
C5	3.118	0.184	0.639	0.022	-93.650	1.584	0.400	0.100	1.000	0.000	0.000	0.000	S
C4	1.745	0.175	1.236	0.025	-80.140	1.240	0.600	0.100	1.000	0.000	0.000	0.000	S
C3	1.033	0.061	3.138	0.051	-79.030	1.177	2.107	0.070	1.000	0.000	0.000	0.000	S
C2	0.730	0.052	6.634	0.105	-68.822	1.120	2.924	0.214	1.000	0.000	0.000	0.000	S

Table 8.26: Model for epoch 1985.93 at 10.65 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	4.677	0.378	0.000	0.000	0.000	0.000	0.803	0.098	1.000	0.000	0.000	0.000	S
C5	3.027	0.248	0.652	0.013	-102.566	2.821	0.283	0.091	1.000	0.000	0.000	0.000	S
C4	1.741	0.150	1.272	0.078	-81.824	0.812	0.500	0.050	1.000	0.000	0.000	0.000	S
C3	0.414	0.048	3.249	0.078	-77.123	1.320	1.878	0.142	1.000	0.000	0.000	0.000	S

Table 8.27: Model for epoch 1986.39 at 22.22 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.682	0.126	0.000	0.000	0.000	0.000	0.396	0.014	1.000	0.000	0.000	0.000	S
C5	1.642	0.135	0.727	0.012	-116.299	1.530	0.421	0.000	1.000	0.000	0.000	0.000	S
C4	0.506	0.274	1.212	0.045	-93.906	3.458	0.430	0.110	1.000	0.000	1.295	0.000	S
C3a	0.211	0.123	1.754	0.115	-86.532	23.192	0.375	0.000	1.000	0.000	0.000	0.000	S

Table 8.28: Model for epoch 1986.87 at 22.22 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.690	0.065	0.000	0.000	0.000	0.000	0.391	0.008	1.000	0.000	0.000	0.000	S
C5	2.532	0.057	0.860	0.002	-114.554	0.237	0.325	0.008	1.000	0.000	0.000	0.000	S
C4	0.360	0.071	1.299	0.027	-91.503	1.717	0.491	0.083	1.000	0.000	0.000	0.000	S

Table 8.29: Model for epoch 1986.90 at 4.99 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.540	0.402	0.000	0.000	0.000	0.000	0.269	0.158	1.000	0.000	0.000	0.000	S
C5	4.256	0.342	0.736	0.061	-111.967	3.372	0.706	0.247	1.000	0.000	0.000	0.000	S
C4	2.141	0.480	1.448	0.138	-87.328	1.866	1.028	0.233	1.000	0.000	0.000	0.000	S
C3	1.111	0.081	3.183	0.107	-78.808	1.840	2.465	0.191	1.000	0.000	0.000	0.000	S
C2	0.664	0.056	7.144	0.129	-69.878	1.131	4.021	0.238	1.000	0.000	0.000	0.000	S

Table 8.30: Model for epoch 1987.15 at 10.64 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	3.570	0.112	0.000	0.000	0.000	0.000	0.592	0.044	1.000	0.000	0.000	0.000	S
C5	4.726	0.100	0.830	0.003	-109.962	0.405	0.630	0.032	1.000	0.000	0.000	0.000	S
C4	1.179	0.046	1.535	0.011	-88.291	0.919	0.831	0.047	1.000	0.000	0.000	0.000	S

Table 8.31: Model for epoch 1987.42 at 22.22 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.523	0.081	0.000	0.000	0.000	0.000	0.411	0.017	1.000	0.000	0.000	0.000	S
C5	2.591	0.065	0.957	0.007	-111.602	0.712	0.323	0.009	1.000	0.000	0.000	0.000	S

Table 8.32: Model for epoch 1987.47 at 43.21 GHz (Krichbaum *et al.* 1993)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.700	0.200	0.000	0.000	0.000	0.000	0.140	0.060	0.610	0.270	-21.000	180.000	G
C5	1.630	0.320	1.100	0.100	247.000	5.000	0.700	0.200	0.440	0.300	107.000	20.000	G

Table 8.33: Model for epoch 1988.15 at 22.22 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.591	0.051	0.000	0.000	0.000	0.000	0.313	0.011	1.000	0.000	0.000	0.000	S
C5	2.994	0.047	1.155	0.002	-109.021	0.211	0.555	0.004	1.000	0.000	0.000	0.000	S
C4	0.484	0.054	2.193	0.025	-89.871	1.098	0.700	0.053	1.000	0.000	0.000	0.000	S

Table 8.34: Model for epoch 1988.16 at 10.64 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.282	0.566	0.000	0.000	0.000	0.000	0.781	0.188	1.000	0.000	0.000	0.000	S
C5	5.954	0.490	1.171	0.181	-113.722	4.445	0.768	0.057	1.000	0.000	0.000	0.000	S
C3	0.463	0.223	4.337	0.330	-79.961	3.519	1.660	0.105	1.000	0.000	0.000	0.000	S

Table 8.35: Model for epoch 1988.17 at 4.98 GHz (Zensus *et al.* 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.291	0.150	0.000	0.000	0.000	0.000	0.682	0.108	1.000	0.000	0.000	0.000	S
C5	4.337	0.053	0.945	0.019	-102.966	2.656	0.969	0.078	1.000	0.000	0.000	0.000	S
C4	0.757	0.163	2.034	0.026	-84.120	5.372	0.854	0.216	1.000	0.000	0.000	0.000	S
C3a	0.430	0.126	3.154	0.092	-81.969	6.833	1.385	0.370	1.000	0.000	0.000	0.000	S
C3	0.626	0.164	5.007	0.475	-76.997	7.478	2.519	0.370	1.000	0.000	0.000	0.000	S
C2	0.427	0.143	7.946	0.684	-69.123	5.837	3.555	0.437	1.000	0.000	0.000	0.000	S

Table 8.36: Model for epoch 1988.21 at 100.00 GHz (Bååth *et al.* 1992)

Name	S	δ_S	r	δ_r	θ	δ_θ	b_{maj}	$\delta_{b_{maj}}$	ϵ	δ_ϵ	ϕ	δ_ϕ	Fit
	[Jy]	[Jy]	[mas]	[mas]	[°]	[°]	[mas]	[mas]			[°]	[°]	
D	2.600	0.800	0.000	0.000	0.000	0.000	0.015	0.005	0.500	0.300	132.000	30.000	S
C6	0.600	0.300	0.120	0.100	306.000	20.000	0.044	0.020	1.000	0.000	0.000	0.000	S

Table 8.37: Model for epoch 1988.49 at 43.20 GHz (Krichbaum *et al.* 1993)

Name	S	δ_S	r	δ_r	θ	δ_θ	b_{maj}	$\delta_{b_{maj}}$	ϵ	δ_ϵ	ϕ	δ_ϕ	Fit
	[Jy]	[Jy]	[mas]	[mas]	[°]	[°]	[mas]	[mas]			[°]	[°]	
D	1.540	0.150	0.000	0.000	0.000	0.000	0.140	0.020	0.730	0.100	27.000	12.000	G
C6	0.410	0.100	0.140	0.020	245.000	7.000	0.130	0.020	0.410	0.200	51.000	20.000	G
C5	2.100	0.140	1.340	0.020	254.000	2.000	0.680	0.090	0.400	0.220	107.000	8.000	G
C4	0.230	0.170	1.960	0.120	264.000	10.000	0.170	0.120	1.000	0.000	0.000	0.000	G

Table 8.38: Model for epoch 1989.22 at 100.00 GHz Bååth *et al.* 1992)

Name	S	δ_S	r	δ_r	θ	δ_θ	b_{maj}	$\delta_{b_{maj}}$	ϵ	δ_ϵ	ϕ	δ_ϕ	Fit
	[Jy]	[Jy]	[mas]	[mas]	[°]	[°]	[mas]	[mas]			[°]	[°]	
D	2.800	0.500	0.000	0.000	0.000	0.000	0.009	0.005	0.500	0.300	25.000	20.000	S
C7	0.200	0.120	0.090	0.080	300.000	4.000	0.016	0.010	0.500	0.300	45.000	20.000	S
C6	0.200	0.080	0.230	0.150	250.000	5.000	0.020	0.010	1.000	0.000	0.000	0.000	S

Table 8.39: Model for epoch 1989.28 at 4.99 GHz (Unwin and Wehrle 1992)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.415	0.140	0.000	0.000	0.000	0.000	0.625	0.060	0.754	0.070	91.713	5.000	G
C5	3.656	0.400	1.255	0.120	-102.144	5.000	0.746	0.070	0.744	0.070	102.695	5.000	G
C3a	1.049	0.100	2.619	0.260	-82.948	5.000	2.426	0.240	0.283	0.030	102.765	5.000	G
C3	0.774	0.080	4.553	0.450	-71.929	5.000	5.261	0.500	0.193	0.020	115.004	5.000	G
C2	0.619	0.060	6.718	0.700	-73.008	5.000	4.892	0.500	0.318	0.030	115.213	5.000	G
C1	0.333	0.030	19.227	1.000	-58.368	5.000	9.706	0.900	0.747	0.070	-7.059	5.000	G

Table 8.40: Model for epoch 1990.16 at 10.65 GHz (Unwin *et al.* 1994)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.162	0.046	0.000	0.000	0.000	0.000	0.323	0.015	1.000	0.000	0.000	0.000	G
C6	0.355	0.022	0.757	0.033	-110.066	5.004	0.243	0.020	1.000	0.000	0.000	0.000	G
C5	1.403	0.050	1.891	0.109	-103.493	2.490	0.601	0.016	1.000	0.000	0.000	0.000	G
C4	0.221	0.140	3.364	0.308	-79.138	4.904	1.465	0.372	1.000	0.000	0.000	0.000	G

Table 8.41: Model for epoch 1990.18 at 4.99 GHz (Unwin and Wehrle 1992)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.369	0.130	0.000	0.000	0.000	0.000	0.720	0.070	0.533	0.050	80.075	5.000	G
C5	2.556	0.300	1.515	0.150	-101.705	5.000	0.862	0.080	0.751	0.080	107.292	5.000	G
C4	0.957	0.090	3.216	0.320	-80.419	5.000	2.601	0.260	0.396	0.040	101.085	5.000	G
C3a	0.574	0.060	4.361	0.470	-75.386	5.000	5.369	0.530	0.172	0.020	114.647	5.000	G
C3	0.629	0.060	6.541	0.700	-76.022	5.000	5.231	0.520	0.258	0.030	107.326	5.000	G
C2	0.104	0.010	17.696	1.200	-55.526	5.000	16.508	1.200	0.087	0.030	23.124	5.000	G
C1	0.305	0.030	21.463	1.500	-57.501	5.000	10.603	1.000	0.632	0.060	12.184	5.000	G

Table 8.42: Model for epoch 1990.42 at 22.20 GHz (Unwin *et al.* 1994)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.068	0.210	0.000	0.000	0.000	0.000	0.179	0.020	1.000	0.000	0.000	0.000	S
C76	0.290	0.030	0.358	0.040	-111.695	5.000	1.162	0.120	1.000	0.000	0.000	0.000	S
C5	0.654	0.070	2.034	0.200	-103.092	5.000	0.799	0.080	1.000	0.000	0.000	0.000	S

Table 8.43: Model for epoch 1990.49 at 43.22 GHz (Krichbaum *et al.* 1993)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	2.026	0.510	0.000	0.000	0.000	0.000	0.152	0.030	0.677	0.140	15.442	5.000	G
C7	0.661	0.310	0.220	0.020	302.288	4.000	0.111	0.060	0.580	0.120	45.770	5.000	G
C6	1.245	0.550	0.638	0.020	283.773	5.000	0.337	0.080	0.467	0.100	12.644	5.000	G
C5	2.597	0.520	1.599	0.100	255.678	4.000	1.350	0.160	0.219	0.040	-7.533	5.000	G
C4	1.346	0.600	2.732	0.170	263.635	3.000	1.262	0.290	0.182	0.100	16.395	16.000	G

Table 8.44: Model for epoch 1990.84 at 8.40 GHz (Unwin *et al.* 1994)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.236	0.120	0.000	0.000	0.000	0.000	0.598	0.060	1.000	0.000	0.000	0.000	S
C6	0.337	0.030	1.132	0.120	-89.449	5.000	0.255	0.080	1.000	0.000	0.000	0.000	S
C5	1.312	0.130	2.006	0.200	-101.720	5.000	0.996	0.100	1.000	0.000	0.000	0.000	S
C4	0.710	0.080	3.501	0.400	-81.089	5.000	2.011	0.300	1.000	0.000	0.000	0.000	S
C3	0.464	0.040	6.418	0.700	-70.207	5.000	3.868	0.400	1.000	0.000	0.000	0.000	S

Table 8.45: Model for epoch 1991.68 at 43.20 GHz (Krichbaum *et al.* 1993)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	7.600	0.800	0.000	0.000	0.000	0.000	0.310	0.030	0.520	0.500	45.000	20.000	G
C6	4.400	1.800	1.060	0.200	249.000	10.000	0.410	0.220	0.860	0.200	137.000	20.000	G
C5	4.100	2.700	1.900	0.300	262.000	15.000	1.480	0.340	0.340	0.100	-62.000	20.000	G
C4	4.400	3.000	3.300	0.300	260.000	10.000	1.320	0.500	0.200	0.100	-21.000	20.000	G

Table 8.46: Model for epoch 1991.71 at 4.99 GHz (Unwin and Wehrle 1992)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	1.140	0.140	0.000	0.000	0.000	0.000	0.308	0.030	1.000	0.000	0.000	0.000	G
C76	0.566	0.060	0.795	0.080	-91.638	5.000	0.613	0.060	1.000	0.000	0.000	0.000	G
C5	0.984	0.100	2.109	0.200	-96.850	5.000	0.803	0.080	1.000	0.000	0.000	0.000	G
C4	0.650	0.060	4.043	0.400	-68.278	5.000	3.072	0.300	0.429	0.040	-48.404	5.000	G
C3a	0.811	0.800	4.601	0.500	-74.739	5.000	4.972	0.500	0.193	0.020	-57.808	5.000	G
C3	0.484	0.050	7.120	0.700	-76.023	5.000	7.660	0.800	0.188	0.020	-61.677	5.000	G
C2	0.335	0.030	19.512	1.200	-56.783	5.000	9.712	0.970	0.885	0.090	124.105	5.000	G

Table 8.47: Model for epoch 1994.45 at 22.23 GHz (Leppänen 1995)

Name	S [Jy]	δ_S [Jy]	r [mas]	δ_r [mas]	θ [°]	δ_θ [°]	b_{maj} [mas]	$\delta_{b_{maj}}$ [mas]	ϵ	δ_ϵ	ϕ [°]	δ_ϕ [°]	Fit
D	3.052	0.300	0.000	0.000	0.000	0.000	0.262	0.030	1.000	0.000	69.588	7.000	G
C8	0.709	0.070	0.374	0.050	-84.688	5.000	0.527	0.060	0.313	0.030	62.334	6.000	G
C7	1.037	0.100	0.911	0.090	-97.584	5.000	0.284	0.030	0.696	0.070	82.475	8.000	G

Bibliography

Abramovicz, M. A. 1992. *Page 206 of:* Roland, J., Sol, H., Pelletier, G. (eds), *Extragalactic Radio Sources: From Beams to Jets*. Cambridge: Cambridge University Press.

Alfvén, H., Herlofson, N. 1950. *Phys. Rev.*, **78**, 616.

Aller, H. D., Aller, M. F., Latimer, G. E., Hodge, P. E. 1985. *Astrophys. J. Suppl.*, **59**, 513.

Baade, W., Minkowski, R. 1954. *Astrophys. J.*, **119**, 215.

Babadzhanyants, M. K., Belokon', E. T. 1984. *Astrophysics*, **20-21**, 461.

Beasley, A. J., Conway, J. E. 1995. *Page 291 of:* Zensus, J. A., Diamond, P. D., J., Napier P. (eds), *Very Long Baseline Interferometry and the VLBA*. Cambridge: Cambridge University Press.

Begelman, M. C. 1995. *Pages 11442–11446 of:* Kellermann, M.H. Cohen & K.I. (ed), *Quasars and Active Galactic Nuclei: High Resolution Radio Imaging*. Proceedings of a National Academy of Sciences Colloquium, vol. 92.

Begelman, M. C., Blandford, R. D., Rees, M. J. 1984. *Rev. Mod. Phys.*, **56**, 255.

Bevington, P. R., Robinnson, D. K. 1992. *Data Reduction and Error Analysis for the Physical Sciences*. (2nd ed.) edn. McGraw-Hill.

Bicknell, G. V., Begelman, M. C. 1996. (in preparation).

Biretta, J. A., Moore, R. L., Cohen, M. H. 1986. *Astrophys. J.*, **308**, 93.

Blandford, R. D., Königl, A. 1979. *Astrophys. J.*, **232**, 34.

Blandford, R. D., Levinson, A. 1995. *Astrophys. J.*, **441**, 79–95.

Blandford, R. D., Pringle, J. E. 1976. *Monthly Notices Roy. Astron. Soc.*, **176**, 443.

Blandford, R. D., Rees, M. J. 1974. *Monthly Notices Roy. Astron. Soc.*, **169**, 395.

Blandford, R. D., Rees, M. J. 1978. *Page 328 of:* Wolfe, A. M. (ed), *Pittsburgh Conference on BL Lac Objects.* Pittsburgh: University of Pittsburgh.

Bolton, J., Stanley, G. J. 1949. *Australian Journal of Scientific Research*, **2A**, 139.

Born, M., E., Wolf. 1980. *Principles of Optics.* Pergamon Press.

Bregman, J. N., Glassgold, A. E., Huggins, P. J., Neugebauer, G., Soifer, B. T., Matthews, K., Elias, J., Webb, J., Pollock, J. T., Pica, A. J., Leacock, R. J., Smith, A. G., Aller, H. D., Aller, M. F., Hodge, P. E., Dent, W. A., Balonek, T. J., Barvains, R. E., Roellig, T. P. L., Wisniewski, W. Z., Rieke, G. H., Lebofsky, M. J., Wills, B. J., Wills, D., Ku, W. H.-M., Bregman, J. D., Witteborn, F. C., Lester, D. F., Impey, C. D., Hackwell, J. A. 1986. *Astrophys. J.*, **301**, 708.

Burbidge, G. C. 1967. *Nature*, **216**, 1287.

Camenzind, M. 1993. *Page 109 of:* Roser, H.-J., Meisenheimer, K. (eds), *Jets in Extragalactic Radio Sources.* Tegernsee, FRG: Springer-Verlag.

Cawthorne, T. V. 1991. *Page 187 of:* Hughes, P.A. (ed), *Beams and Jets in Astrophysics.* Cambridge: Cambridge University Press.

Cawthorne, T. V., Wardle, J. F. C. 1988. *Astrophys. J.*, **332**, 696.

Cawthorne, T. V., Wardle, J. F. C., Roberts, D. H., Gabuzda, D. C., Brown, L. F. 1993. *Astrophys. J.*, **416**, 519.

Clark, B. G. 1973. *Proc. Inst. Elec. Electron. Engrs.*, **61**, 1242.

Clark, B. G. 1980. *Astron. Astrophys.*, **89**, 377.

Clark, B. G., Kellermann, K. I., Bare, C. C., Cohen, M. H., Jauncey, D. L. 1968a. *Astrophys. J. (Letters)*, **153**, L67.

Clark, B. G., Kellermann, K. I., Bare, C. C., Cohen, M. H., Jauncey, D. L. 1968b. *Astrophys. J.*, **153**, 705.

Cohen, M. H. 1985. *Page 1 of:* Kapahi, V.K. (ed), *Extragalactic Energetic Sources.* Bangalore: Indian Academy of Sciences.

Cohen, M. H., Cannon, W., Purcell, G. H., Shaffer, D. B., Broderick, J. J., Kellermann, K. I., Jauncey, D. L. 1971. *Astrophys. J.*, **170**, 207.

Conçalves, D. R., Jatenco-Pereira, V., Opher, R. 1993. *Astron. Astrophys.*, **279**(351).

Cornwell, T. J. 1995. *Page 217 of:* Zensus, J. A., Diamond, P. D., J., Napier P. (eds), *Very Long Baseline Interferometry and the VLBA.* Cambridge: Cambridge University Press.

Cornwell, T. J., Braun, R. 1989. *Page 167 of:* Perley, R. A., Schwab, F. R., Bridle, A. H. (eds), *Synthesis Imaging in Radio Astronomy.* Conference Series, vol. 6. San Francisco: Astronomical Society of the Pacific.

Cornwell, T. J., Fomalont, E. B. 1989. *Page 185 of:* Perley, R. A., Schwab, F. R., Bridle, A. H. (eds), *Synthesis Imagin in Radio Astronomy.* San Francisco: Astronomical Society of the Pacific.

Cotton, W. D. 1995. *Page 179 of:* Zensus, J. A., Diamond, P. D., J., Napier P. (eds), *Very Long Baseline Interferometry and the VLBA.* Cambridge: Cambridge University Press.

Dent, W. A. 1965. *Science*, **148**, 1458.

Eichler, D., Wiita, P. J. 1978. *Nature*, 38–39.

Ferrari, A., Trussoni, E., Zaninetti, L. 1978. *Astron. Astrophys.*, **64**, 43–52.

Fichtel, C.E., Bertsch, D. L., Chaing, J., Dingus, B. L., Esposito, J. A., Fierro, J. M., Hartman, R. C., Hunter, S. D., Kanbach, G., Kniffen, D. A., Kwok, P. W., Lin, Y. C., R., Mattox J., Mayer-Hasselwander, H. A., McDonald, L., Michelson, P. F., von Montigny, C., Nolan, P. L., Pinkau, K., Radecke, H.-D., Rothermel, H., Sreekumar, P., Sommer, M, Schneid, E. J., Thompson, D. J., Willis, T. 1994. *Astrophys. J. Suppl.*, **94**, 551.

Field, G. B., Rogers, R. D. 1993. *Astrophys. J.*, **403**, 94–109.

Fomalont, E. 1995. *Page 347 of:* Zensus, J. A., Diamond, P. D., J., Napier P. (eds), *Very Long Baseline Interferometry and the VLBA.* Cambridge: Cambridge University Press.

Gabuzda, D. C., Mullan, C. M., Cawthorne, T. V., Wardle, J. F. C., Roberts, D. H. 1994. *Astrophys. J.*, **435**, 140.

Ghisellini, G., Maraschi, L., Treves, A. 1985. *Astron. Astrophys.*, **146**, 204–212.

Ghisellini, G., Celotti, A., George, I. M., C., Fabian. A. 1992. *Monthly Notices Roy. Astron. Soc.*, **258**, 776–786.

Ginzburg, V. L., Syrovatskii, S. I. 1969. *Ann. Rev. Astron. Astrophys.*, **7**, 375.

Giovanoni, P. M., Kazanas, D. 1990. *Nature*, **345**, 319–322.

Gómez, J. L., Alberdi, A., Marcaide, J. M. 1994. *Astron. Astrophys.*, **284**, 51.

Hardee, P. E. 1982. *Astrophys. J.*, **257**, 509–526.

Hardee, P. E. 1984. *Astrophys. J.*, 523–533.

Hardee, P. E. 1986. *Astrophys. J.*, **303**, 111–118.

Hardee, P. E. 1996. *In:* P.E. Hardee, A.H. Bridle, J.A. Zensus (ed), *Energy Transport in Radio Galaxies and Quasars.* Proceedings of the Workshop held at University of Alabama. San Francisco: PASP.

Hardee, P. E., Cooper, M. A., Clarke, D. A. 1994. *Astrophys. J.*, **424**, 126–137.

Hardee, P. E., Clarke, D. A., Howell, P. A. 1995. *Astrophys. J.*, **441**, 644–664.

Henri, G., Pelletier, G. 1991. *Astrophys. J. (Letters)*, **383**, L7–L10.

Henri, G., Pelletier, G. 1992. *Page 221 of:* Roland, J., Sol, H., Pelletier, G. (eds), *Extragalactic Radio Sources: From Beams to Jets.* Cambridge: Cambridge University Press.

Hewitt, A., Burbidge, G. 1993. *Astrophys. J. Suppl.*, **87**, 451.

Hey, J. S., Parsons, S. J., Phillips, J. W. 1946. *Nature*, **158**, 234.

Högbom, J. 1974. *Astrophys. J. Suppl.*, **15**, 417.

Hughes, P. A., Aller, H. D., Aller, M. F. 1985. *Astrophys. J.*, **298**, 301.

Hughes, P. A., Aller, H. D., Aller, M. F. 1989. *Astrophys. J.*, **341**, 68.

Hughes, P. A., Aller, H. D., Aller, M. F. 1990. *Page 250 of:* Zensus, J. A., Pearson, T. J. (eds), *Parsec–scale Radio Jets.* Cambridge: Cambridge University Press.

Hughes, P. A., Aller, H. D., Aller, M. F. 1991a. *Page 142 of:* Valtaoja, E., Valtonen, M. (eds), *Variability of Blazars.* Cambridge: Cambridge University Press.

Hughes, P. A., Aller, H. D., Aller, M. F. 1991b. *Astrophys. J.*, **341**, 54.

Hughes, P. A., Aller, H. D., Aller, M. F. 1992. *Astrophys. J.*, **396**, 469.

Jansky, K. G. 1932. *Proceedings of the Institute of Radio Engineers*, **20**, 1920.

Jennison, R. C. 1958. *Monthly Notices Roy. Astron. Soc.*, **118**, 276.

Kardashev, N. S. 1962. *Soviet Astronomy - AJ*, **6**(3), 317.

Kardashev, N. S. 1995. *Monthly Notices Roy. Astron. Soc.*, **276**, 515–520.

Kellermann, K. I. 1994. *Page 245 of:* Zensus, J. A., Kellermann, K. I. (eds), *Compact Extragalactic Radio Sources.* Green Bank, USA: National Radio Astronomy Observatory.

Kidger, M. R. 1990. *Astron. Astrophys.*, **226**, 9.

Kirk, J. G., Schneider, P. 1987. *Astrophys. J.*, **315**, 425.

Kollgaard, R. I., Wardle, J. F. C., Roberts, D. H. 1989. *Astrophys. J.*, **97**, 1550.

Kollgaard, R. I., Wardle, J. F. C., Roberts, D. H. 1990. *Astron. J.*, **100**, 1057.

Königl, A. 1981. *Astrophys. J.*, **243**, 700.

Krichbaum, T. P. 1990. *In:* Zensus, J. A., Pearson, T. J. (eds), *Parsec–scale Radio Jets*. Cambridge: Cambridge University Press.

Krichbaum, T. P., Witzel, A., Graham, D. A., Standke, K. J., Schwartz, R., Lochner, O., Schalinski, C. J., Greve, A., Steppe, H., Brunswig, W., Butin, G., Hein, H., Navarro, S., Peñalver, J., Grewing, M., Booth, R. S., Colomer, F., Rönnäng, B. O. 1991. *Astrophys. J.*, **303**, 21.

Krichbaum, T. P., Witzel, A., Graham, D. A., Standke, K. J., Schwartz, R., Lochner, O., Schalinski, C. J., Greve, A., Steppe, H., Brunswig, W., Butin, G., Hein, H., Navarro, S., Peñalver, J., Grewing, M., Booth, R. S., Colomer, F., Rönnäng, B. O. 1993. *Astron. Astrophys.*, **275**, 375.

Lainela, M., Valtaoja, E., Tornikoski, M. 1991. *Page 102 of:* Valtaoja, E., Valtonen, M. (eds), *Variability of blazars*. Cambridge: Cambridge University Press.

Laing, R. A. 1993. *Pages 346–348 of:* Davies, R.S., Booth, R.S. (eds), *Subarcsecond Radio Astronomy*. Cambridge: Cambridge University Press.

Leppänen, K. J. 1993. VLBA Scientific Memo 1. AOC NRAO, Socorro.

Leppänen, K. J. 1995. Ph.D. thesis, Helsinki University of Technology, Helsinki, Finland.

Lobanov, A. P., Zensus, J. A. 1994. *Page 157 of:* Zensus, J. A., Kellermann, K. I. (eds), *Compact Extragalactic Radio Sources*. Green Bank: National Radio Astronomy Observatory.

Longair, M. S., Ryle, M., Scheuer, P. A. G. 1973. *Monthly Notices Roy. Astron. Soc.*, **164**, 243.

Lynden-Bell, D. 1964. *Nature*, **223**, 690.

Mannheim, K. 1993. *Astron. Astrophys.*, **269**, 67–76.

Marr, J. M., Backer, D. C., Wright, M. C. H., Readhead, A C. S., Moore, R. 1989. *Astrophys. J.*, **337**, 382.

Marscher, A. P. 1987. *In:* Zensus, J. A., Pearson, T. J. (eds), *Superluminal Radio Sources*. Cambridge: Cambridge University Press.

Marscher, A. P. 1990. *Page 236 of:* Zensus, J. A., Pearson, T. J. (eds), *Parsec–scale Radio Jets*. Cambridge: Cambridge University Press.

Marscher, A. P. 1995. *Pages 11439–11441 of:* Cohen, M.H., Kellermann, K.I. (eds), *Quasars and Active Galactic Nuclei: High Resolution Imaging*. Publications of the National Academy of Sciences., vol. 92, no. 5. Natl. Acad. Sci, USA.

Marscher, A. P., Daly, R. A. 1988. *Astrophys. J.*, **334**, 539–551.

Marscher, A. P., Gear, W. K. 1985. *Astrophys. J.*, **298**, 114.

Marscher, A. P., Marshall, F. E., Mushotzky, R. F., Dent, W. A., Balonek, T. J., Hartman, M. F. 1979. *Astrophys. J.*, **233**, 498.

Marscher, A. P., Gear, W. K., Travis, J. P. 1991. *Page 85 of:* Valtaoja, E., Valtonen, M. (eds), *Variability of Blazars*. Cambridge: Cambridge University Press.

Matveenko, L. I., Kardashev, N. S., Sholomitskii, G. B. 1965. *Soviet Radiophysics*, **8**, 461.

Matveenko, L. I., Graham, D. A., Paulini-Toth, I. I. K., Sherwood, W. A., Bååth, L. B., Kus, A. 1992. *Soviet Astron. Lett.*, **18**, 379.

Moffet, A. T., Gubbay, J., Robertson, D. S., Legg, J. A. 1971. *Page 228 of:* Evans, D.S. (ed), *External Galaxies and Quasi–Stellar Objects*. IAU Symposium, no. 44. Dodrecht, The Netherlands: Reidel.

Moran, J. M., Dhawan, V. 1995. *Page 151 of:* Zensus, J. A., Diamond, P. D., J., Napier P. (eds), *Very Long Baseline Interferometry and the VLBA*. Cambridge: Cambridge University Press.

Narayan, R., Nityananda, R. 1986. *Ann. Rev. Astron. Astrophys.*, **24**, 127.

Pacholczyk, A. G. 1970. *Radio Astrophysics*. San Francisco: W.H. Freeman and Co.

Pearson, T. J. 1991. *Bull. Am. Astron. Soc.*, **23**, 991.

Pearson, T. J. 1995. *Page 309 of:* Zensus, J. A., Diamond, P. D., J., Napier P. (eds), *Very Long Baseline Interferometry and the VLBA*. Cambridge: Cambridge University Press.

Pearson, T. J., Zensus, J. A. 1987. *Page 1 of:* Zensus, J.A., Pearson, T.J. (eds), *Superluminal Radio Sources*. Cambridge: Cambridge University Press.

Pelletier, G., Roland, J. 1989. *Astron. Astrophys.*, **224**, 24.

Pelletier, G., Roland, J. 1990. *Page 323 of:* Zensus, J. A., Pearson, T. J. (eds), *Parsec-Scale Radio Jets*. Cambridge: Cambridge University Press.

Pelletier, G., Sol, H. 1992. *MNRAS*, **254**, 635.

Perley, R.A., Schwab, F.R., Bridle, A.H. (eds). 1991. *Synthesis Imaging in Radio Astronomy*. Astronomical Society of the Pacific Conference Series, vol. 6. Bookcrafters. Second printing.

Piran, T. 1982. *Astrophys. J. (Letters)*, **257**, L23.

Press, W. H., Teukolsky, S. A, Vetterling, W. T., Flannery, B. P. 1992. *Numerical Recipes*. (2nd ed.) edn. Cambridge: Cambridge University Press.

Rabaça, C. R., Zensus, J. A. 1994. *Page 163 of:* Zensus, J. A., Kellermann, K. I. (eds), *Compact Extragalactic Radio Sources*. Green Bank: National Radio Astronomy Observatory.

Readhead, A. C. S. 1994. *Astrophys. J.*, **426**, 51–59.

Readhead, A. C. S., Walker, R. C., Pearson, T. J., Cohen, M. H. 1980. *Nature*, **285**, 137.

Rees, M. J. 1966. *Nature*, **211**, 468.

Rees, M. J. 1967. *Monthly Notices Roy. Astron. Soc.*, **135**, 345.

Rees, M. J. 1971. *Nature*, **229**, 312–315.

Rees, M. J. 1985. *Page 69 of:* M., Centrella J., LeBlanc, J. M., Bowers, R. L. (eds), *Numerical Astrophysics*. Boston: Jones and Bartlet Publishers Inc.

Reid, M. J., Biretta, J. A., Junor, W., Muxlow, T. W., Spencer, R. E. 1989. *Astrophys. J.*, **336**, 112.

Reynolds, S. P. 1982. *Astrophys. J.*, **256**, 13.

Rogers, A. E. E., Hinteregger, A. R., R., Whitney A., C., Counselman C., Shapiro, I. I., Wittels, J. J., Klemperer, W. K., Warnock, W. W., Clark, T. A., Hutton, L. K., Marandino, G. E., Rönnäng, B. O., Rydbeck, O. E. H., Niell, A. E. 1974. *Astrophys. J.*, **193**, 293.

Rogers, A. E. E., Cappallo, R. J., Hintegger, H. F., Levine, J. I., Nesman, E. F., Weber, J. C., Whitney, A. R., Clark, T. A., Ma, C., Ryan, C., Herring, T. A., Shapiro, I. I., Knight, C. A., Shaffer, D. B., Vandenberg, N. R., Lacasse, R., Mauzy, R., Rayhrer, B., Schulper, B. R., Pigg, J. C. 1983. *Science*, **219**, 51.

Roland, J., Teyssier, R., Roos, N. 1994. *Astron. Astrophys.*, **290**, 357.

Rose, W. K., Guillory, J., Beall, J. H., Kainer, S. 1984. *Astrophys. J.*, **280**, 550.

Rose, W. K., Beall, J. H., Guillory, J., Kainer, S. 1987. *Astrophys. J.*, **315**, 95.

Ryle, M., Hewish, A. 1960. *Monthly Notices Roy. Astron. Soc.*, **120**, 220.

Salpeter, E. E. 1964. *Astrophys. J.*, **140**, 796.

Schmidt, M. 1963. *Nature*, **197**, 1040.

Schwab, F. R. 1980. *Proc. S.P.I.E.*, **231**, 18.

Schwab, F. R., Cotton, W. D. 1983. *Astron. J.*, **88**, 688.

Shepherd, M. C., Pearson, T. J., Taylor, G. B. 1994. *Bull. Am. Astron. Soc.* in press.

Shklovsky, I. S. 1953. *Doklady Akademii Nauk SSSR*, **90**, 983.

Shklovsky, I. S. 1960. *Soviet Astronomy - AJ*, **4**, 243.

Shklovsky, I. S. 1963. *Soviet Astronomy - AJ*, **7**, 748.

Simon, R. S., Readhead, A. C. S., Moffet, A. T., Wilkinson, P. N., Allen, B., Burke, B. F. 1983. *Nature*, **302**, 487.

Smith, F. G. 1951. *Nature*, **168**, 555.

Sol, H., Pelletier, G., Asséo, E. 1989. *Monthly Notices Roy. Astron. Soc.*, **237**, 411.

Steffen, W., Zensus, J. A., Krichbaum, T. P., Witzel, A., Qian, S. J. 1995. *Astron. Astrophys.*, **302**, 335–342.

Teräsranta, H., Tornikoski, M., Karlamaa, K., Valtaoja, E., Urpo, S., Lainela, M., Kotilainen, J., Wiren, S., Laine, S., Nillson, K., Lähteenmäki, A., Korpi, R., Valtonen, M. 1991. *Page 159 of:* Valtaoja, E., Valtonen, M. (eds), *Variability of Blazars*. Cambridge: Cambridge University Press.

Teräsranta, H., Tornikoski, M., Valtaoja, E., Urpo, S., Nesterov, N., Lainela, M., Kotilainen, J., Wiren, S., Laine, S., Nillson, K., Valtonen, M. 1992. *Astron. Astrophys. Suppl.*, **94**, 121.

Ternov, I. M., V., Mikhailin V. 1986. *Sinchrotron emission: Theory and Experiment*. Moscow: Energoizdat. (in Russian).

Thompson, A. R., Moran, J. M., J., Swenson G. W. 1991. *Interferometry and Aperture Synthesis in Radio Astronomy*. Wiley-Interscience. Reptinted by Krieger Pub. Co., Malabar (Florida).

Trussoni, E., Ghisellini, G., Bodo, G. 1992. *Page 502 of:* Duschl, W. J., Wagner, S. J. (eds), *Physics of Active Galactic Nuclei*. Berlin Heidelberg: Springer-Verlag.

Twiss, R. W., Carter, A. W., Little, A. G. 1960. *Observatory*, **80**, 153.

Unwin, S. C., Wehrle, A. E. 1992. *Astrophys. J.*, **398**, 74.

Unwin, S. C., Wehrle, A. E., Urry, C. M., Gilmore, D. M., Barton, E. J., Kjerulf, B. C., Zensus, J. A., Rabaça, C. R. 1994.

Valtaoja, E., Teräsranta, H., Urpo, S., Nesterov, N.S., Lainela, M., Valtonen, M. 1992. *Astron. Astrophys.*, **254**, 71.

van der Laan, H. 1963. *Monthly Notices Roy. Astron. Soc.*, **126**, 535.

Vermeulen, R. C., Cohen, M. H. 1994. *Astrophys. J.*, **430**, 467–494.

Vio, R., Cristiani, S., Lessi, O., Salvadori, L. 1991. *Astrophys. J.*, **380**, 351.

Waak, J. A., S., Simon. R., Spencer, J. H., Johnson, K. J. 1988. *Astron. J.*, **95**, 1023.

Walker, R. C. 1989a. *Page 141 of:* Feli, M., Spencer, R. (eds), *Very Long Baseline Interferometry.* NATO ASI Series C, vol. 283. Dordrecht: Kluwer.

Walker, R. C. 1989b. *Page 355 of:* Perley, R. A., Schwab, F. R., Bridle, A. H. (eds), *Synthesis Imagin in Radio Astronomy.* San Francisco: Astronomical Society of the Pacific.

Waltman, E. B., Fiedler, R. L., Johnston, K. J., Spencer, J. H., Florkowski, D. R., Josties, F. J., McCarthy, D. D., Matsakis, D. N. 1991. *Astrophys. J. Suppl.*, **77**, 379.

Wardle, J. F. C., Cawthorne, T. V., Roberts, D. H., Brown, L. F. 1994. *Astrophys. J.*, **437**, 122.

Weinberg, S. 1972. *Gravitation and Cosmology.* New York: John Wiley & Sons.

Whitney, A. R., Shapiro, I. I., Rogers, A. E. E., Robertson, D. S., Knight, C. A., Clark, T. A., Goldstein, R. M., Marandino, G. E., Vandenburg, N. R. 1971. *Science*, **173**, 225.

Wilkinson, P. N. 1989. *Page 183 of:* Felli, M., Spencer, R. (eds), *Very Long Baseline Interferometry.* NATO ASI Series. Dordrecht: Kluwer.

Zeldovich, Ya. B. 1964. *Doklady Akademii Nauk SSSR*, **155**, 67.

Zensus, J. A., Cohen, M. H., Unwin, S. C. 1995a. *Astrophys. J.*, **443**, 35.

Zensus, J.A., Pearson, T.J. (eds). 1987. *Superluminal Radio Sources.* Cambridge: Cambridge University Press.

Zensus, J.A., Pearson, T.J. (eds). 1990. *Parsec–scale Radio Jets.* Cambridge: Cambridge University Press.

Zensus, J.A., Diamond, P.D., Napier, P.J. (eds). 1995b. *Very Long Baseline Interferometry and the VLBA.* Cambridge University Press.