

OPTICAL POSITIONS OF RADIOSTARS BY THE DANJON ASTROLABE AT CAGLIARI AND FURTHER PROJECTS

A. POMA and T. ZANZU
Cagliari Astronomical Observatory
Via Ospedale 72
09124 Cagliari Italy

ABSTRACT . Precise positions of optical counterparts of radiosources are needed in connecting optical and radio reference frames. The Cagliari Astronomical Observatory has planned systematic observations with the Danjon astrolabe of objects from the high priority Hipparcos radio-stars list. A preliminary result of the position of radiosource HR 5110 is presented.

1. Introduction

Precise positions and proper motions of optical counterparts of radiosources are needed in order to determine a direct link between the radio reference frame and the ground-based optical reference frame and will be of great importance when the Hipparcos catalogue becomes available, making it possible to link together the Hipparcos and radio reference frames (Froeschlé and Kovalevsky, 1982). During the past decade, within the framework of international cooperation, a great number of observations have been carried out to provide high quality astrometric data on radiostars.

An international programme of systematic observations of radiostars included in the list prepared by the IAU Commission 24 working group "On Identification of Radio/Optical Astrometric Sources" with prismatic Danjon astrolabes was proposed at the beginning of this decade (Debarbat 1980,1981) and several observation campaigns have been conducted (Clauzet et al.,1985,1986; Noel, 1986) which have confirmed the opportunity of astrolabe programmes devoted to the connection of the optical and radio reference frames.

2. Preliminary Results

Some radiostars on the list of Commission 24 Working Group have been observed with the Danjon astrolabe in Cagliari these objects being included in the fundamental groups of the astrolabe program for time and latitude observations (Poma and Gusai , 1987). Unfortunately , because of the constraints required for a uniform distribution in azimuth of the stars in each group, the observations of these

radiostars have been made at one of two transits solely. In this case, as is known (Debarbat and Guinot, 1970), it is possible to determine the right ascension only for those stars with a sufficiently small parallactic angle. In our case this was true only for radiostar HR 5110 (FK5 502, HD 118216 in Table 1) which was observed 21 times at west transit. Thus, the only preliminary result we can report here is the value of its right ascension. We obtain, by using standard reduction procedures (Debarbat and Guinot, 1970)

$$\Delta\alpha = 0^{\text{S}}.004 \pm 0^{\text{S}}.0036$$

for the mean epoch 1984.1 and in the sense Astrolabe - FK5.

3. Subsequent Projects

The Danjon astrolabe of the Cagliari Astronomical Observatory has recently been taken out of routine time and latitude observations. It was decided to use the instrument, after suitable improvements, mainly for astrometric purposes (Poma and Zanzu, 1990). In this context we have set up a programme to determine accurate optical positions of radiostars included in the "High priority Hipparcos radiostars" list proposed for the Hipparcos input catalogue. The objects that we have selected are listed in Table 1.

TABLE 1

Radiostars currently observed by the Cagliari astrolabe at the zenith distance of 30°

Radiostar	M_v	α (1950.0)	δ (1950.0)	
		h m s	° ' "	
HD 004502	4.1	00 44 40.968	23 59 43.95	FK5 27
HD 008634	6.1	01 22 51.423	23 15 07.42	
HD 019356	2.1	03 04 54.356	40 45 52.46	FK5 111
HD 026961	4.6	04 14 28.441	50 10 28.87	b Per
HD 039587	4.4	05 51 25.196	20 16 07.39	
HD 062044	4.3	07 40 11.386	29 00 22.58	sig Gem
HD 091480	5.2	10 31 57.350	57 20 27.14	FK5 398
HD 118216	5.0	13 32 33.917	37 26 16.62	FK5 502
HD 127739	5.9	14 30 16.090	22 28 45.49	26 Boo
HD 146361	5.2	16 12 48.251	33 59 02.63	TZ Crb
HD 174638	3.4	18 48 13.936	33 18 12.51	FK5 705
HD 179094	5.8	19 07 15.438	52 20 42.81	
HD 206860	6.0	21 42 06.546	14 32 35.62	HN Peg
HD 208816	5.0	21 55 14.45	63 23 13.5	VV Cep
HD 210334	6.1	22 06 39.425	45 29 45.82	AR Lac
HD 216489	5.6	22 50 34.454	16 34 31.28	IM Peg
HD 217476	5.0	22 57 58.164	56 40 36.60	
HD 222107	3.8	23 35 06.520	46 11 13.83	FK5 890
HD 223460	5.9	23 47 09.719	36 08 52.56	

The list takes into account the latitude ($39^{\circ}.1$) and the capabilities of the instrument at the present time (zenith distance = 30° $M_v < 6.2$, $11^{\circ} < \delta < 67^{\circ}$). The number of objects which could be observed will be increased when in the near future the astrolabe is equipped with a 135° reflecting prism, at present being built by Soptel of Paris, allowing observations at 45° for the zenith distance to cover a larger declination zone. The list of the radiostars that will be added to those reported in Table 1 is given in Table 2.

It is important to note that the possibility of observations at the two different zenith distances of 30° and 45° will also allow us to obtain absolute determinations of declinations (Kreinin,1968) with good accuracy because of the favourable geographic position of the Cagliari astrolabe on the ILS parallel (Kreinin,1986). A study in this direction is in progress.

TABLE 2

Radiostars to be observed by the Cagliari astrolabe at the zenith distance of 45°

Radiostar	M_v	α (1950.0)	δ (1950.0)	
		h m s	$^{\circ}$, ' , "	
HD 001061	5.8	00 12 24.123	08 32 36.10	UU Psc
HD 007672	5.4	01 14 03.829	-02 45 46.66	AY Cet
HD 017138	6.1	02 44 22.747	69 25 32.89	RZ Cas
HD 018884	2.5	02 59 39.744	03 53 41.15	FK5 107
HD 022468	5.7	03 44 12.88	00 25 32.6	
HD 036486	2.2	05 29 27.017	-00 20 04.41	FK5 206
HD 037128	1.7	05 33 40.476	-01 13 56.30	FK5 210
HD 039801	0.5	05 52 27.809	07 23 57.92	FK5 224
HD 109387	3.9	12 31 21.550	70 03 48.96	FK5 472
HD 111456	5.8	12 46 29.276	60 35 32.12	
HD 115383	5.2	13 14 17.524	09 41 05.57	59 Vir
HD 124224	5.0	14 09 43.762	02 38 38.22	CU Vir
HD 169985	5.2	18 24 38.88	00 09 53.8	d Ser

3. References

- Clauzet, L.B.F., Atalla, R., Debarbat S.:1985, *Astron. Astrophys. Suppl. Ser.* **61**,221
- Clauzet, L.B.F., Atalla, R., Debarbat S.:1986, *Astron. Astrophys. Suppl. Ser.* **63**,204
- Debarbat, S. :1980, *Circulaire Astrolabe Radiosource*, CAR 1.
- Debarbat, S.:1981, in *Reference Coordinate Systems for Earth Dynamics*, eds. E.M. Gaposchkin and B. Kolaczek, Reidel, Dordrecht, p. 363

- Debarbat, S., Guinot, B.:1970, *La méthode des hauteurs égales en astronomie*, Gordon and Breach
- Floeschlé, M., Kovalevsky, J. :1982, *Astron. Astrophys.* **116**,89
- Kreinin, E.I.:1968, *Sov. Astron.* **12**,356
- Kreinin, E.I.:1986, *Sov. Astron.* **30**(3),349
- Noel, F. :1986, in *Astrometric Techniques*, eds. H.K. Eichorn and R.J. Leacock, Reidel, Dordrecht, p. 715
- Poma, A., Gusai, V. :1987, *Circ. Stn.Astron.Int.Latitud.*,Cagliari,Serie B(12) n. 36
- Poma, A., Zanzu T.:1990, in *Systemes de Reference spatio-temporels*, eds. N. Capitaine and S. Debarbat, Observatoire de Paris (in press)