

COMMISSION 27 OF THE I. A. U.
INFORMATION BULLETIN ON VARIABLE STARS

Number 3399

Konkoly Observatory
Budapest
4 December 1989
HU ISSN 0374 - 0676

PROGRAM OF PARALLAX MEASUREMENTS FROM SPACE FOR THE NEAREST
ECLIPSING BINARIES

The idea of making stellar parallax measurements from space was born ten years ago, after the preparation of "A Catalogue of Photometric Parallaxes of Eclipsing Binaries" (Dworak 1975). We selected a subset of 102 of the nearest eclipsing variables (all within 100 pc from the Sun) from the catalogue of Brancewicz and Dworak (1980). From our list, 95 stars have been selected by the HIPPARCOS Organizing Committee (Table I). We are in hope that we obtain positions and parallaxes for these stars as well as their brightness in the UBV system.

More precise and homogeneous measurements and trigonometric parallax determinations of eclipsing binaries are needed for the following reasons:

- to obtain the absolute geometrical and physical parameters of eclipsing systems which are necessary for theoretical studies of these systems;
- to more accurately determine the empirical mass-luminosity relationship for the components of close binary stars, especially those of luminosity class IV (Dworak 1975; Griffiths et al., 1988);
- to verify the method for determining photometric parallaxes of distant eclipsing binaries (Dworak 1975; Brancewicz and Dworak 1980) and of spectroscopic binaries (Dworak 1983);
- to obtain the space distribution of binary stars, important information for investigating the structure of Galaxy in the neighbourhood of the Sun (Oblak 1983);
- to verify the validity of the hypothesis of the nonexistence of single subgiants (Dworak 1985);
- to determine the zero-point of the photometric parallax scale (absolute magnitudes) which is necessary for determining extragalactic distances and for verifying the value of Hubble's constant (de Vaucouleurs 1983);
- to resolve some eclipsing systems which allow us to compare the parameters of visual double stars with the same parameters as close binary systems (Oblak and Chareton 1980).

Table I

BD	HD	ALPHA(1950)	DELTA(1950)	NAME	V	Sp. T
		h m s	o ' "		m	
+08 19	1061	00 12 24.12	+08 32 36.3	UU Psc	5.9	F0IV+
+39 154	3765	00 38 04.31	+39 55 19.7		7.6	K2V
+74 27	4161	00 42 18.42	+74 42 54.6	YZ Cas	5.6	A2IV
+23 106	4502	00 44 40.96	+23 59 43.9	Zet And	4.0	K1IIe
-55 267	6882	01 06 17.24	55 30 45.7	Zet Phe	3.8	B6V+
+06 189	7700	01 14 18.53	+06 32 53.0	UV Psc	9.5	G5
CD-50 410	9528	01 30 29.02	-49 47 01.4	AE Phe	7.9	G1/G2IV
SV*HV11634		01 49 12 00	-38 55 30.0	V572 Cen	11.0	?
+22 284	11763	01 53 03.35	+23 19 59.2	RR Ari	6.0	G8III
CD-23 737	12180	01 56 40.39	-23 09 43.5	AA Cet	6.5	F2...
+40 442	13078	02 05 59.31	+40 33 28.3	BX And	8.7	F2Vvar
+45 3813	21033	02 06 39.52	+45 29 45.0	AR Lac	6.4	G2IV+...
		02 33 47 00	-45 17 12.0	CO Eri	8.5	G0
+69 179	17138	02 44 22.77	+69 25 32.9	RZ Cas	6.3	A2V
+40 673	19356	03 04 54.35	+40 45 52.4	bet Per	2.2	B8V
+47 781		03 09 53.31	+47 55 23.2	LX Per	7.9	G4
+12 539	25204	03 57 54.37	+12 21 02.1	lam Tau	3.7	B3V+...
-10 858	26609	04 09 46.52	-10 35 43.6	YY Eri	8.2	G5
AN 4.1913		04 31 52 00	+15 09 48.0	TY Tau	11.9	K0
-08 1050		05 08 50.59	-08 36 59.8	ER Ori	9.4	G1V:
+19 886	34335	05 14 33.49	+20 04 47.8	CD Tau	6.8	F7V
+33 1002	34364	05 15 01.25	+33 42 55.1	AR Aur	6.0	B9V+...
SV*HV2435269320		05 18 42 00	-68 16 36.0	RW Dor	10.0	K5
		05 31 47 00	-81 37 18.0	TY Men	7.6	A3
CPD-76329	37513	05 32 00.30	-15 34 54.8	V1010 Oph	6.5	A5V
+59 920	39220	05 50 28.95	+59 52 47.2	TU Cam	5.2	A2V
+44 1328	40183	05 55 51.57	+44 56 40.6	bet Aur	1.9	A2IV+...
+56 1125	44691	06 22 12.69	+56 18 51.5	RR Lyn	5.6	A3Vm
+32 1324	46052	06 29 11.43	+32 29 32.8	WW Aur	5.7	A3m+...
+82 174	44982	06 30 36.66	+82 18 46.3	SV Cam	9.3	G5V:+...
CSV 847	263139	06 42 49 00	+34 29 00.0	GX Gem	10.6	G5
		06 47 33 00	+47 44 00.0	HS Aur	10.4	G5
-16 1898	57167	07 17 12.31	-16 17 59.9	R CMa	6.2	F1V
CD -69 461		07 37 50 00	-69 25 48.0	W Vol	9.9	K
		08 28 13 00	+02 26 54.0	GK Hya	8.9	G4
CPD-78378	75747	08 44 58.11	-78 53 15.1	RS Cha	6.3	A7V
CD-276141	77137	08 57 34.04	-27 37 10.5	TY Pyx	6.9	G5V
+27 1706		08 58 58 00	+26 52 42.0	WY Cnc	9.3	G8V
+55 1317	237786	09 06 18.43	+54 41 40.0	XY UMa	9.8	G5
-28 7373	82610	09 30 06.99	-28 24 24.3	S Ant	6.9	A9V
-44 5573	82829	09 31 19.97	-44 59 10.8	S Vel	8.0	A5m...
+56 1400	83950	09 40 15.40	+56 10 56.3	W UMa	8.3	F8V:p+...
+20 2437		10 05 34.60	+20 14 56.0	YY Leo	9.6	M2
CPD-63134307739		10 23 21 00	-63 23 00.0	EX Car	9.5	G0
+15 2230	92109	10 35 40.99	+14 31 39.5	UV Leo	8.0	G0V
+10 2234		10 59 34.18	+10 09 53.2	AM Leo	8.6	F8Vn
		11 02 29 00	+05 25 36.0	AP Leo	9.5	G0
+30 216	99946	11 27 25.57	+30 14 35.2	AW UMa	7.1	F0
+12 2437	106400	12 11 47.86	+12 05 55.3	AH Vir	8.8	K0V+...
-18 3437	110139	12 37 37.34	-18 31 32.4	SX Crv	9.1	F8
+36 2344	114519	13 08 17.86	+36 12 01.1	RS CVn	8.2	F4V+...
		13 29 44 00	+28 50 18.0	VZ CVn	9.3	G5
+26 2508	121648	13 53 51.75	+26 09 46.1	ZZ Boo	6.8	F2V
-49 8609	124784	14 13 40.21	-49 42 49.0	V636 Cen	9.0	F8/G0V
AN 29.193		14 15 01 00	+12 47 18.0	vw Boo	10.3	G5
-07 3938	132742	14 58 17.80	-08 19 18.1	del Lib	4.8	B9.5v
+48 2259	133640	15 02 08.28	+47 50 53.3	i Boo	6.4	G0Vnvar
+40 2857		15 06 18 00	+40 09 36.0	TZ Boo	9.7	G2V
+62 1393		15 10 50.38	+62 02 48.6	BW Dra	9.2	B0
+62 1393	135421	15 10 50.66	+62 02 32.9	BV Dra	8.1	F7V
+39 2849		15 11 39 00	+38 45 18.0	SS Boo	9.7	G5V:+...

Table I (cont.)

BD	HD	ALPHA(1950)			DELTA(1950)			NAME	V	Sp. T
o		h	m	s	o ' "			m		
+27 2512	139006	15 32	34.14	+26 52 54.7	alf	CrB	2.2	A0V		
+00 3562	150484	16 38	47.78	+00 36 08.5	V502	Oph	8.2	G2V+...		
+82 498	153751	16 51	00.90	+82 07 21.5	eps	UMi	4.7	G5III		
+16 3130	155937	17 11	43.18	+16 24 27.6	AK	Her	8.4	F8Vvar		
		17 33	51 00	-56 47 30.0	V535	Ara	7.5	A3		
+05 3547	163611	17 54	24.33	+04 59 30.8	V566	Oph	7.5	F4V		
+15 3311	163930	17 55	51.37	+15 08 31.4	z	Her	7.1	F4IV-V		
+13 3495		17 56	20.78	+13 53 12.7	V508	Oph	9.2	A2		
+09 3584	166231	18 06	58.35	+09 08 28.3	V839	Oph	9.0	F8V		
-15 4842	166126	18 06	58.30	-15 33 37.3	w	Ser	9.3	F5Iab:pe		
+41 3021		18 14	14 00	+41 05 36.0	TZ	Lyr	9.8	F5V		
+18 367	348635	18 23	26.70	+18 15 52.0	AW	Her	9.9	G2IV		
-10 4814		18 46	25.72	-10 17 56.2	RS	Sct	10.1	G0		
-3713001	175813	18 55	21.11	-37 10 28.0	eps	CrA	4.8	F2V		
+10 3787	178125	19 04	37.31	+10 59 34.3	Y	Aql	4.9	B8III		
+46 2641	179890	19 10	37.58	+46 14 18.2	FL	Lyr	9.0	G0V		
+5421931	85912	19 37	33.73	+54 51 21.6	V1143	Cyg	6.2	F6Va		
+47 3059	192909	20 13	55.49	+47 33 35.7	V1488	Cyg	4.3	K3IB+...		
SV* SVS 309		20 17	31 00	+36 10 54.0	V346	Cyg	10.9	A5		
+75 752	197433	20 38	03.01	+75 24 58.4	VW	Cep	7.4	K0Vvar		
-4613749	198827	20 51	17.42	-45 55 16.6	SU	Ind	9.7	F5/F6V		
CPD-702812	199005	20 53	51.33	-70 36 58.5	KZ	Pav	7.6	F2+...		
-15 5848	199603	20 55	55.85	-14 40 38.0	DV	Aqr	6.2	F0IV		
+27 3952	200391	21 00	16.43	+27 36 33.3	ER	Vul	7.6	G0V+...		
		21 05	45 00	+51 50 48.0	V1061	Cyg	9.1	F8		
-16 5943	207098	21 44	16.99	-16 21 18.4	del	Cap	3.0	A7IIIm		
-16 6074		22 20	35 00	-15 35 06.0	BW	Aqr	10.0	F7		
		22 31	59 00	-20 07 .0	EE	Aqr	8.1	F0		
+37 4717	216598	22 51	22.54	+37 40 18.9	SW	Lac	10.1	K0Vvar		
+52 3383	218915	23 08	52.33	+52 47 12.1	RT	And	7.2	O9.5Iab		
+01 4695	219113	23 10	50.56	+02 24 10.0	SZ	Psc	7.0	K1IV-V+..		

In order to obtain homogeneous results for the geometrical and physical parameters, new or additional observations of eclipsing binaries from the HIPPARCOS program are necessary, especially for the stars listed in Table I (for which only the spectral type of bright component is given). The solution of light curves from photoelectric observations is also needed for accurately determining the geometrical parameters of each eclipsing system. The determination of the spectral type and the luminosity class of the secondary components of some eclipsing binaries are especially needed.

Acknowledgements: We would like to thank J. Colin and E. Davoust for inviting one of us (T.Z.D.) in the Bordeaux and Toulouse observatories, respectively, and for supporting his visit.

T. ZBIGNIEW DWORAK

Institute for Environmental
Forming and Protection
University of Mining and
Metallurgy, Cracow, Poland
and
Observatoire de Bordeaux I
et Observatoire Midi-Pyrenees,
Toulouse, France

EDOUARD OBLAK

Observatoire Besancon, Besancon
UA 04389 du CNRS
41 bis Avenue de l'Observatoire
25044 Besancon, France

References:

- Brancewicz, H.K., Dworak, T.Z.: 1980, *Acta Astron.*, 30, 501.
de Vaucouleurs, G.: 1983, *Astron. J.*, 268, 468.
Dworak, T.Z.: 1975, *Acta Astron.*, 25, 383.
Dworak, T.Z.: 1983, *Acta Astron.*, 33, 431.
Dworak, T.Z.: 1985, *Acta Astron.*, 35, 109.
Griffiths, S.C., Hicks, R.B., Milone, E.F.: 1988, *J. Roy. Astron. Soc. Can.*, 82, No. 1, 1.
Oblak, E.: 1983, *Astron. Astrophys.*, 123, 238.
Oblak, E., Chareton, M.: 1980, *Astron. Astrophys. Suppl.*, 41, 225.