

Measurements of 95 Large Delta Magnitude Double Stars with HCDSF instrument, Part 1 from 2023.000 - 2023.499

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Abstract

This report shows the results of 95 double star measurements made with the High Contrast Double Star Filter instrument (HCDSF).

1. Introduction

In a previous article a special filter for measurements of high contrast double stars was introduced and described in detail (Schlimmer, 2023). After two month of testing and optimization in January and February the HCDSF instrument was transitioned to standard operating mode. In this contribution the results of 95 measurements from 2023.000 to 2023.499 will be reported.

For the observations an extract of the WDS catalog was compiled first. The WDS catalog was downloaded and imported in an Excel file. To select the target stars some filter criteria were used :

- Coordination : Declination > 0
- Separation : $\geq 6''$
- Secondary magnitude : ≤ 12
- Delta magnitude : ≥ 3

With these criteria a list of 2241 doubles stars were compiled for possible observations. Some of them were be picked up and marked in the Redshift Planetary software as target. The Redshift Planetary software will be used for mounting control.

2. Equipment and Methods

For observations a 12-inch Newtonian telescope was used. The focal length is 1500 mm. For the measurements of double stars with large magnitude differences, the HCDSF instrument was mounted on an ocular adapter. In the back focus of the HCDSF instrument a QHY 5-II color CMOS camera was mounted. Image scale is about 0.44 arc seconds per pixel.



Figure 1 : High Contrast Double Star Filter (HCDSF) instrument mounted on ocular adapter on the 12-inch Newtonian telescope

The measurements were made in same way as other double stars observations without the HCDSF instrument. For each double star a video with 50 up to 200 frames was recorded. The number of the frames depended on the needed exposure time. In general, the longer the exposure time the fewer numbers of frames was recorded. Every frame of the video is like a single measurement. For data analyses REDUC software (Losse, 2016) was used. For each frame separation and position angle was automatically analyzed by the ELI interface. The standard deviation for measurements of the separation is usually smaller than ± 0.15 arc seconds. The standard deviation for measurements of position angle depends on the separation of both components. For double stars with separation of about 5 arc seconds the standard deviation for position angle is usually ± 1 degree.

3. Data

Table 1 shows the results of the 95 measurements with the HCDSF instrument from 2023.000 - 2023.499. The brightness was taken from WDS catalogue. Dm is the difference in magnitudes between the primary and secondary component. Average of dm is 6.24 magnitudes. N is the number of observations. Generally, every double star was observed only once. Date is given in Julian date (JD).

Table 1: Results of 95 double star measurements made with the High Contrast Double Star Filter (HCDSF) from 2023.000 - 2023.499

RA+DEC	Code	Magnitudes	m2-m1	PA	SEP	Date	N
03502+3449	ES 277AB	6.80,9.8	3,00	141.6	20.26	2023.049	1
03502+3449	WAL 25AD	6.80,10.30	3,50	11.0	71.53	2023.049	1
04018+1000	STT 70AB	5.81,11.21	5,40	229.6	11.86	2023.049	1
04018+1000	WAL 27AC	5.81,11.70	5,89	241.4	84.36	2023.049	1
04359+1631	BU 550AB	0.85,13.6	12,75	114.7	31.43	2023.049	1
04444+1109	BUP 68AB	5.41,11.23	5,82	96.7	67.96	2023.049	1
04444+1109	BUP 68BC	11.23,12.6	1,37	7.3	8.70	2023.049	1
04497+1554	HJ 3261AB	6.08,11.3	5,22	60.9	26.18	2023.049	1
04497+1554	BU 551BC	11.3,13.1	1,80	204.6	5.86	2023.049	1
05552+0724	H 6 39AB	0.77,14.5	13,73	113.0	37.52	2023.049	1
05552+0724	H 6 39AC	0.77,14.2	13,43	288.7	64.97	2023.049	1
05552+0724	H 6 39AD	0.77,13.5	12,73	345.7	71.79	2.023.049	1
05552+0724	H 6 39AE	0.77,11.0	10,23	154.9	176.48	2.023.049	1
05552+0724	SLE 831AF	0.77,12.1	11,33	266.3	169.05	2023.049	1
05552+0724	SLE 831AG	0.77,12.8	12,03	47.2	149.20	2.023.049	1
05552+0724	SLE 831AH	0.77,11.2	10,43	294.3	240.21	2023.049	1
05552+0724	SMR 29AJ	0.77,13.5	12,73	257.9	190.96	2023.049	1
00084+2905	H 5 32AB	2.22,11.11	8,89	285.6	92.79	2023.063	1
02383+3744	BU 305AC	6.16,11.37	5,21	205.7	20.64	2023.063	1
00365+5831	BU 1096AB,C	8.79,9.74	0,95	241.1	35.66	2023.079	1
00365+5831	SMR 24AB,E	8.79,12.	3,21	145.9	38.69	2023.079	1
00405+5632	H 5 18AD	2.35,8.98	6,63	282.8	70.89	2023.079	1
00447+4817	BU 231AB	4.54,11.2	6,66	303.0	34.36	2023.079	1
00491+5749	STF 60AB	3.52,7.36	3,84	327.6	13.54	2023.079	1
00491+5749	STF 60AE	3.52,10.15	6,63	126.2	65.95	2023.079	1
05552+0724	H 6 39AD	0.77,13.5	12,73	345.4	71.65	2023.095	2

04359+1631	STFB 2AC	0.85,11.3	10,45	31.5	136.34	2023.118	1
04230+1732	BUP 55AB	3.76,13.21	9,45	336.5	112.26	2023.140	1
04255+1756	H 6 101AC	4.26,11.12	6,86	234.8	76.26	2023.140	1
04498+0658	STT 560AB	3.22,11.31	8,09	173.8	72.70	2023.140	1
05133+0252	STF 654AB	4.62,8.50	3,88	63.7	6.90	2023.140	1
05133+0252	STF 654AC	4.62,11.43	6,81	157.6	182.15	2023.140	1
05145-0812	STF 668A,BC	0.3,6.8	6,50	203.7	9.35	2023.140	1
05320-0018	STFA 14AC	2.41,6.83	4,42	0.3	51.83	2023.140	1
05354-0555	STF 752AB	2.77,7.73	4,96	141.1	11.17	2023.140	1
05354-0555	STF 752AC	2.77,9.81	7,04	103.7	49.34	2023.140	1
05362-0112	BUP 81	1.69,11.34	9,65	58.0	179.52	2023.140	1
05407-0157	STF 774AC	1.88,9.55	7,67	9.7	57.59	2023.140	1
08404+1940	STF1254AB	6.44,10.37	3,93	54.7	20.68	2023.285	1
08404+1940	STF1254AC	6.52,7.61	1,09	342.9	63.24	2023.285	1
08404+1940	STF1254AD	6.52,9.20	2,68	44.3	82.74	2023.285	1
10084+1158	STFB 6AB	1.40,8.24	6,84	307.8	175.94	2023.285	1
11141+2031	STT 573AB	2.54,10.87	8,33	341.4	207.81	2023.285	1
11141+2031	BU 1282AC	2.54,12.69	10,15	28.5	98.24	2023.285	1
11475+2002	SHJ 130AB	7.52,9.94	2,42	30.6	71.54	2023.285	1
07346+3153	STF1110AB	1.93,2.97	1,04	51.2	5.37	2023.337	1
07346+3153	STF1110AC	1.93,9.83	7,90	164.4	69.59	2023.337	2
07346+3153	STF1110AD	1.93,10.07	8,14	221.8	178.30	2023.337	1
08404+1940	SMR 30AE	6.52,12.5	5,98	155.9	15.60	2023.337	1
09510+5902	STT 521	3.8,11.3	7,50	297.2	11.88	2023.375	1
10319+3223	HJ 482AB	5.90,11.8	5,90	249.0	58.93	2023.375	1
10332+4026	HJ 2534AB	4.75,11.6	6,85	4.8	16.87	2023.375	1
11416+3145	STT 575AB	5.79,9.75	3,96	313.0	42.80	2023.375	2
11007+4244	ES 2637	6.69,10.7	4,01	211.1	11.69	2023.397	1
11256+1627	HJ 4433AB	5.62,10.84	5,22	6.2	55.03	2023.397	1
11442+2513	STT 239	6.18,10.44	4,26	33.2	36.30	2023.397	1
11480+2013	STFB 7AB	4.59,9.03	4,44	355.9	74.44	2023.397	1
11509+1217	HJ 1201	6.42,11.65	5,23	189.8	14.66	2023.397	1
11512+3322	ARG 101	6.27,9.28	3,01	274.1	46.05	2023.397	1
12269+2816	SMR 58	4.4,12.	7,60	206.8	15.83	2023.417	1
12083+4354	ES 2641	8.17,11.18	3,01	259.1	15.83	2023.424	1
12225+2551	SHJ 143AB	4.86,11.8	6,94	58.6	37.00	2023.424	1
12225+2551	SHJ 143AC	4.86,8.90	4,04	168.3	64.94	2023.424	1
13100+1732	STF1728AB,C	4.43,11.45	7,02	352.5	82.85	2023.427	1
13119+2753	STT 578	4.30,12.1	7,80	178.3	134.97	2023.427	2
13221+4354	KZA 55AB	6.35,11.5	5,15	307.6	45.57	2023.430	1
13221+4354	KZA 55AC	6.37,11.96	5,59	59.4	68.24	2023.430	1
13253+0051	STT 265AB	7.37,11.03	3,66	293.9	25.52	2023.430	1
13253+0051	STT 265AC	7.37,12.19	4,82	75.9	70.79	2023.430	1
13375+3618	STF1768AC	4.98,11.55	6,57	322.0	212.10	2023.430	1
13396+1045	BU 612AB,C	5.62,11.0	5,38	274.5	118.3	2023.430	1
13547+1824	SHJ 169	2.72,9.99	7,27	84.8	114.29	2023.444	1

13567+0259	BU 461AB	7.08,11.9	4,82	235.2	33.11	2023.444	1
13567+0259	BU 461AC	7.08,11.2	4,12	220.3	42.27	2023.444	1
14016+0133	SHJ 171AB	4.25,9.41	5,16	290.8	82.27	2023.444	1
14016+0133	DRS 14AE	4.25,12.0	7,75	178.1	14.68	2023.444	1
14083+4927	H 6 112	5.45,11.05	5,60	270.3	76.05	2023.444	1
14193+1300	ENG 51	5.44,10.84	5,40	220.9	164.60	2023.444	1
14275+7542	HJ 2733AC	4.40,11.9	7,50	129.8	58.88	2023.444	1
14318+3022	HJ 2728	3.58,11.5	7,92	344.6	32.31	2023.444	1
14347+2945	STT 582AB	4.50,10.66	6,16	85.5	212.77	2023.444	1
14135+5147	STF1821AB	4.53,6.62	2,09	236.4	13.69	2023.457	1
14162+5122	STFA 26AB	4.76,7.39	2,63	33.0	38.81	2023.457	1
14252+5151	STT 580	4.10,11.46	7,36	182.2	69.37	2023.457	1
14321+3818	BU 616AB	3.04,12.7	9,66	122.8	53.04	2023.457	1
14407+1625	STF1864AB	4.88,5.79	0,91	114.3	5.44	2023.457	1
14407+1625	STF1864AC	4.88,10.63	5,75	165.1	127.81	2023.457	1
14411+1344	H 6 104AB,C	4.52,10.98	6,46	261.1	104.42	2023.457	1
14463+0939	STF1879AB,D	7.32,10.8	3,48	231.5	118.71	2023.457	1
14497+0759	A 1110AB,C	7.05,12.0	4,95	203.5	19.67	2023.457	1
14497+0759	A 1110AB,D	7.05,12.5	5,45	341.9	23.89	2023.457	1
14514+1906	STF1888AB	4.76,6.95	2,19	292.1	4.96	2023.457	1
15073+2452	ENG 52AB	4.97,11.53	6,56	39.5	103.33	2023.457	1
15155+3319	STFA 27AB	3.56,7.89	4,33	77.9	104.69	2023.457	1
15155+3319	SMR 31AC	3.56,14.30	10,74	3.9	92.70	2023.457	1

Acknowledgements:

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This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France

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