

Double Star Measurements Using a Webcam and DSLR, Annual Report of 2015

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Abstract: This paper reports 149 double star measurements from 2015; minimum separation is 0.58 as (η CrB), maximum separation is 447 as (BUP 153AC). The mean value of all measurements is 37.5 as.

Report

This is a report of 149 double star measurements from 2015 made with a 12-inch Newtonian telescope, a standard webcam, and in some cases also with a DSLR camera. The closest binary which could be measured was η Coronae Borealis with a separation of 0.58 as, the maximum separation measured was on BUP 153AC at 447 as. The mean value of all the measurements is 37.5 as. Figure 1 gives a more details about the statistics.

Measurements were done with a 12-inch Newtonian telescope. This telescope has been used since 2012. A detailed description of the optical setup is given in annual report of 2012 (Schlimmer, 2013). Reproduction scales are about 0.77 as/pixel in primary focus,

0.34 as/pixel with a 2X barlow lens, 0.14 as/pixel with a 5X barlow lens for webcam measurements, and 0.70 as/pixel for DSLR images. In the case of DSLR imaging, an additional coma corrector was used. In all cases the data analyses were done with REDUC software (Florent Losse).

The focus of observations in the first half of 2015 was stars in Max Wolf's "Catalog About 1053 High Proper Motion Fix Stars" (Wolf, 1919), which are already listed in Simbad Database as well as in WDS catalog. This observational project was started in 2014 (Schlimmer, 2014).

In the second half of 2015, observations of close double stars gained more priority. The intention was to find out the limit of the observation site and instrumental conditions. Because the observation site is located

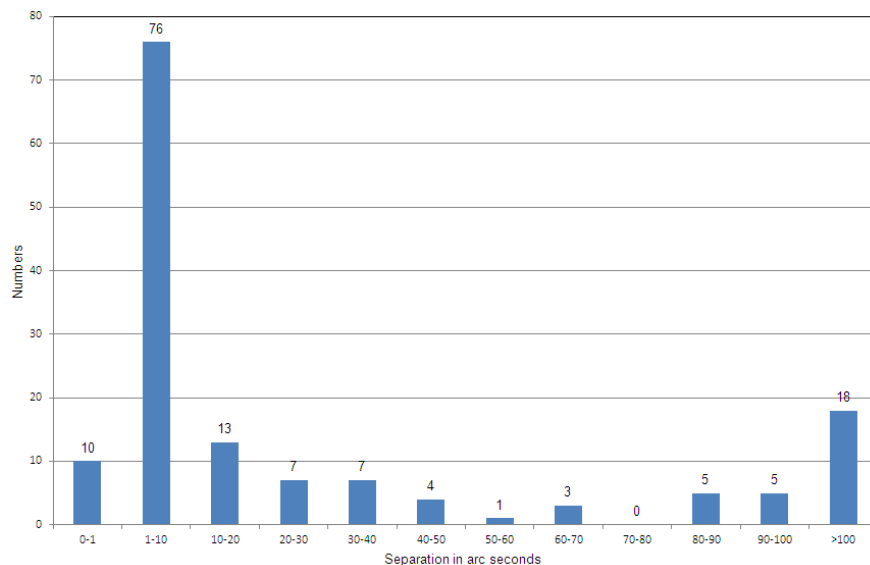


Figure 1. Number of measured double stars in dependence of separation interval

Double Star Measurements Using a Webcam and DSLR, Annual Report of 2015



Figure 2. optical pair HIP56079 and N6IN008392, Canon 1100D, 120s 400ASA



Figure 3. STF2141AB with TYC 404-2150-1, webcam 15 of 50 best frames

in a suburban location in the Rhine River valley, seeing conditions are poor in comparison with seeing conditions in a rural site. Sometimes observations of double stars with separation smaller than 1 as could be made.

During the observations, a nice optical pair was noted; HIP56079 and N6IN008392 (11297+0736) which has a separation of about 17.9 as and a position angle of 283° . See Figure 2. The difference in brightness is more than 6 magnitudes. The proper motion of HIP56079 is -4.72 mas/y in R.A. and -26.61 mas/y in declination. N6IN008392 is only a background star with unknown proper motion.

STF2141AB is also an optical pair with separation of about 39.8 as. In a distance of 49.8 as a further optical component (TYC 404-2150-1) with brightness of 11.03 can be found [SIMBAD Catalog]. Only the A component has a significant proper motion in the direction away from B component. So, in the future distance between AB will increase while distance between A and TYC 404-2150-1 will decrease.

The following table shows my measurements of separation and position angle of 149 components from 2015. Brightness and coordinates are from Washington Double Star catalog (Mason, B.D., Wycoff, G.L. and Hartkopf) except brightness of HIP56079, N6IN008392 and TYC 404-2150-1 (SIMBAD Catalog).

Acknowledgements

This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

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

References

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- Wolf, Max, 1919, (Catalog About 1053 High Proper Motion Fix Stars) Katalog von 1053 stärker bewegten Fixsternen, Veröffentlichung der Badischen Sternwarte zu Heidelberg

Double Star Measurements Using a Webcam and DSLR, Annual Report of 2015

Double Star Measurements from 2015

NAME	RA+DEC	MAGS	PA	SEP	DATE	N	NOTES
BU 860	00000+3852	6.6; 11.4	107.6	6.56	2015.933	1	W
A 800	00029+4715	8.94; 9.10	119.4	1.51	2015.985	1	W
STT 514AB	00046+4206	6.16; 9.65	170.1	5.14	2015.933	1	W
A 910	00302+4557	8.7; 10.2	35.7	2.42	2015.985	1	W
HZG 1	00523+3930	8.3; 10.28	27.8	7.99	2015.126	1	W, Wolf 35
BU 235Aa;Ab	01106+5101	7.54; 7.82	137.3	0.81	2015.985	1	W
STF 162AB	01493+4754	6.47; 7.22	198.5	1.84	2015.985	1	W
STF 162AC	01493+4754	6.47; 9.24	179.2	20.81	2015.985	1	W
STF 314AB;C	02529+5300	6.95; 7.26	317.2	1.60	2015.985	1	W
ES 2598	03289+4039	9.04; 11.3	311.7	11.59	2015.126	1	W, Wolf 170
STFA 7AB	03311+2744	7.41; 7.81	234.0	44.02	2015.101	1	W
SMR 60BC	03311+2744	7.81; 13.	359.8	12.22	2015.101	1	W
LDS9155AC	03321+4340	8.56; 13.09	137.7	14.77	2015.126	1	W, Wolf 182
ES 560	03332+4615	8.33; 11.29	144.2	9.47	2015.189	2	W, Wolf 186
BUP 45AC	03356+4253	7.45; 7.98	90.4	177.56	2015.191	1	W, Wolf 193
LDS9156AD	03356+4253	7.45; 13.76	283.9	81.47	2015.191	1	W, Wolf 191
BUP 45AC	03356+4253	7.45; 7.98	90.4	177.46	2015.191	1	W, Wolf 191
LDS9156AD	03356+4253	7.45; 13.76	283.9	81.47	2015.191	1	W, Wolf 193
STF 425AB	03401+3407	7.52; 7.60	59.1	1.91	2015.985	1	W
ENG 14AB	03438+4236	7.54; 11.03	293.5	93.25	2015.191	1	W
S 455AB	04422+2257	4.24; 7.02	214.0	62.52	2015.101	1	W
STF 644AB	05103+3718	6.96; 6.78	219.3	1.59	2015.985	1	W
STFA 14AC	05320-0018	2.41; 6.83	0.4	52.15	2015.101	1	W, Mintaka
STF 746AB	05353-0441	10.4; 10.7	218.7	13.9	2015.126	1	W
STF 788AB	05447+0350	7.61; 10.05	91.1	7.29	2015.126	1	W
STF 788AC	05447+0350	7.61; 10.37	148.9	35.99	2015.126	1	W
STF 789AB	05450+0400	6.13; 10.17	149.8	13.78	2015.126	1	W
LDS6195AB	06032+1922	9.3; 13.5	229.4	7.31	2015.191	1	W, Wolf 262
STF1110AB	07346+3153	1.93; 2.97	54.4	5.01	2015.186	1	W, Castor
STF1135AB	07475+3325	5.14; 11.4	214.9	18.95	2015.186	1	W, π Gem
STF1135AC	07475+3325	5.32; 11.18	343.7	91.81	2015.186	1	W
STF1196AB	08122+1739	5.30; 6.25	26.7	1.11	2015.298	1	W, ζ Cnc
STF1196AC	08122+1739	5.30; 5.85	63.7	6.28	2015.298	1	W, ζ Cnc
ENG 38AB	08433+2128	4.65; 10.20	66.6	115.86	2015.284	1	W, γ Cnc
HJ 457AB	08447+1809	3.94; 12.2	71.9	40.61	2015.284	1	W, δ Cnc
HJ 110	08585+1151	4.25; 11.8	322.7	9.90	2015.284	1	W, α Cnc
STF1300AB	09013+1516	9.47; 9.73	178.3	5.07	2015.284	1	W
HJ 466AC	09320+2003	8.59; 12.48	75.5	37.45	2015.284	1	W, 6 Leo
H 6 76AB	09412+0954	3.56; 10.83	48.2	96.15	2015.284	1	W, \circ Leo
STFB 6AB	10084+1158	1.40; 8.24	307.9	175.68	2015.253	2	D, W Regulus
HDO 127AD	10084+1158	1.40; 12.10	274.3	195.30	2015.253	2	D, W
WLF 1AB	11285+0750	10.34; 10.51	334.4	112.08	2015.309	1	D, Wolf 397
New	11297+0736	6.73; 12.84	283.0	17.87	2015.309	1	D, HIP56079
LDS4152	11523+0957	7.71; 15.70	348.9	229.95	2015.309	1	D, Wolf 1422

Table continues on next page.

Double Star Measurements Using a Webcam and DSLR, Annual Report of 2015

Double Star Measurements from 2015 (continued)

NAME	RA+DEC	MAGS	PA	SEP	DATE	N	NOTES
LDS 930AB	12089+2147	9.45; 14.63	39.3	15.48	2015.309	1	D, Wolf 1432
STF1782	13451+1822	7.98; 9.81	185.8	29.69	2015.457	1	W
BUP 153AC	13451+1747	10.01; 9.49	106.7	446.89	2015.479	1	W, Wolf 497
STF1863	14380+5135	7.71; 7.80	56.8	0.66	2015.520	1	W
STF1864AB	14407+1625	4.88; 5.79	111.7	5.47	2015.457	1	W, 29 Boo
STF1909	15038+4739	5.20; 6.10	68.2	0.90	2015.510	4	W, 44 Boo
SMR 32AB	15151+3318	12.76; 11.21	333.7	25.92	2015.449	1	W
SMR 32AC	15151+3318	12.76; 12.90	72.8	35.83	2015.449	1	W
SMR 32BC	15151+3318	11.21; 12.90	105.4	47.44	2015.449	1	W
STFA 27AB	15155+3319	3.56; 7.89	78.1	104.73	2015.449	1	W, del Boo
STF1932AB	15183+2650	7.32; 7.41	265.0	1.55	2015.487	1	W
STF1937AB	15232+3017	5.64; 5.95	208.3	0.58	2015.544	3	W, η CrB
STT 296AB	15264+4400	7.83; 9.09	275.6	2.16	2015.487	1	W
STF1950	15300+2530	8.07; 9.23	91.4	3.29	2015.487	1	W
STF1955AB	15339+2643	9.84; 10.32	237.0	7.69	2015.449	1	W
STF1954AB	15348+1032	4.17; 5.16	171.8	3.91	2015.487	2	W, δ Ser
STT 298AB	15360+3948	7.16; 8.44	185.7	1.12	2015.512	1	W
STF1992AB;C	16003+1140	9.46; 9.72	325.8	5.91	2015.522	1	W
STF2006AB	16003+5856	8.48; 9.96	181.3	1.42	2015.498	1	W
STT 303AB	16009+1316	7.69; 8.06	174.4	1.36	2015.498	2	W
FOX 193	16016+1024	10.84; 11.50	17.8	10.89	2015.522	1	W
STF2000	16030+1359	8.42; 9.22	226.7	2.50	2015.498	1	W
BU 811AB	16052+2211	8.71; 11.84	217.8	3.61	2015.522	1	W
STF2014AB	16086+4003	8.62; 10.41	91.4	8.31	2015.522	1	W
STF2015AB	16089+4521	8.24; 9.52	160.0	2.89	2015.405	2	W
STT 307	16105+4748	7.67; 10.71	201.4	17.50	2015.498	1	W
STT 305AB	16117+3321	6.44; 10.17	264.9	5.78	2015.512	1	W
STF2016	16121+1155	8.49; 9.60	148.2	7.36	2015.512	1	W
ES 1793	16126+5748	8.74; 11.52	55.8	5.65	2015.522	1	W
STF2030	16128+4122	7.91; 10.16	240.4	5.72	2015.539	1	W
STF2021AB	16133+1332	7.43; 7.48	359.1	3.86	2015.539	1	W
STF2029	16138+2844	7.95; 9.62	187.4	6.12	2015.539	1	W
ES 1088AB	16139+4736	8.32; 11.87	316.1	33.04	2015.498	1	W
STF2045	16203+6130	8.80; 10.18	184.1	1.85	2015.512	1	W
STF2047	16231+4738	8.54; 8.65	326.3	1.78	2015.512	1	W
STF2054AB	16238+6142	6.15; 7.09	350.5	0.92	2015.512	1	W
STF2052AB	16289+1825	7.69; 7.91	119.3	2.39	2015.512	1	W
STT 312AB	16240+6131	2.8; 8.2	142.8	4.38	2015.520	1	W
A 25	16240+2024	8.28; 10.8	114.6	5.40	2015.539	1	W
A 1860	16299+1424	8.9; 10.8	83.4	3.24	2015.512	1	W
STT 313	16326+4007	7.97; 8.31	128.9	0.90	2015.553	1	W
STF2072	16355+4741	9.80; 10.59	179.0	4.94	2015.553	1	W
STF2078AB	16362+5255	5.38; 6.42	104.9	3.07	2015.498	2	W
STFA 30AC	16362+5255	5.38; 5.50	193.3	89.93	2015.498	2	W

Table continues on next page.

Double Star Measurements Using a Webcam and DSLR, Annual Report of 2015

Double Star Measurements from 2015 (continued)

NAME	RA+DEC	MAGS	PA	SEP	DATE	N	NOTES
STF2089	16433+2508	8.66; 9.96	61.7	2.51	2015.520	1	W
STF2094AB	16442+2331	7.48; 7.87	74.2	1.09	2015.553	1	W
STF2107AB	16518+2840	6.90; 8.50	104.9	1.40	2015.553	1	W
STF2130AB	17053+5428	5.66; 5.69	3.2	2.52	2015.520	1	W
LDS 989	17165+0413	12.61; 13.08	318.1	20.15	2015.596	1	W
STF2141AB	17166+0325	8.32; 10.72	122.9	39.75	2015.596	1	W
New AC		8.32; 11.5	325.3	49.80	2015.596	1	W
STF2185AB	17348+0601	7.46; 10.32	4.7	27.19	2015.596	1	W
STF2185AC	17348+0601	7.46; 8.43	253.6	92.80	2015.596	1	W, Wolf 760
STF2203	17412+4139	7.72; 7.81	291.5	0.73	2015.553	1	W
STT 339	17561+2130	8.37; 10.76	170.7	4.05	2015.660	1	W
HO 423	17575+2759	8.95; 11.47	292.1	4.73	2015.660	1	W
ALL 2	17578+2751	8.86; 9.93	206.2	18.92	2015.660	1	W
STF2254AB	17590+1226	9.11; 9.31	267.0	3.58	2015.660	1	W
A 1886	18000+5316	9.4; 10.5	340.1	4.73	2015.665	1	W
STF2271AB	18003+5251	8.17; 9.24	269.7	3.65	2015.665	1	W
STF2277AB	18031+4828	6.25; 8.93	127.5	26.68	2015.596	1	W
STF2277AC	18031+4828	6.25; 10.19	297.2	99.72	2015.596	1	W, Wolf 1405
H 5 39AB	18369+3846	0.09; 9.5	184.4	82.26	2015.596	1	W, Vega
STFB 9AE	18369+3846	0.09; 9.5	39.3	86.36	2015.596	1	W
STF2382AB	18443+3940	5.15; 6.10	346.0	2.23	2015.665	1	W, ε Lyr
STF2383CD	18443+3940	5.25; 5.38	76.4	2.37	2015.665	1	W, ε Lyr
BU 137AB	18540+3723	8.69; 9.02	168.6	1.52	2015.665	1	W
AG 366	18581+4711	8.54; 8.67	190.3	1.39	2015.665	1	W
STF2448	19037+3545	8.75; 8.80	191.3	2.41	2015.665	1	W
STF2466AB	19079+2948	8.57; 9.02	104.0	2.37	2015.665	1	W
STFB 10AB	19508+0852	0.95; 9.82	285.8	195.83	2015.596	1	W, Altair
STFB 10AC	19508+0852	0.95; 10.3	109.5	186.35	2015.596	1	W, Altair
DAL 27AD	19508+0852	0.95; 11.9	104.9	26.83	2015.596	1	W, Altair
SMR 5AE	19508+0852	0.95; 11.0	354.2	151.34	2015.596	1	W, Altair
SMR 5AF	19508+0852	0.95; 10.3	47.8	292.41	2015.596	1	W, Altair
SMR 7	20000+1736	10.1; 11.4	264.0	4.08	2015.747	1	W
STF2619AB	20011+4816	8.91; 8.92	237.3	4.15	2015.777	1	W
HJ 1495AB	20136+4644	3.93; 13.4	327.6	36.46	2015.777	1	W, 30 Cyg
STFA 50AC	20136+4644	3.93; 6.97	173.3	106.79	2015.777	1	W
BU 1483CI	20136+4644	6.97; 12.26	136.2	60.24	2015.777	1	W
SMR 68HK	20136+4644	12.6;	261.7	8.90	2015.777	1	W
SMR 69	20139+4642	12.9; 13.	62.4	7.01	2015.777	1	W
STF2655AB	20141+2213	7.89; 7.95	3.2	6.14	2015.777	1	W
STF2655AC	20141+2213	7.89; 10.09	154.9	60.85	2015.777	1	W
ES 27	20143+4648	10.58; 10.61	338.8	3.76	2015.777	1	W
STT 403AB	20144+4206	7.31; 7.64	171.6	0.92	2015.695	1	W
STF2657AC	20144+4206	7.28; 9.80	31.5	11.60	2015.695	1	W
STT 410AB	20396+4035	6.73; 6.83	2.5	0.82	2015.695	1	W

Table concludes on next page.

Double Star Measurements Using a Webcam and DSLR, Annual Report of 2015

Double Star Measurements from 2015 (conclusion)

NAME	RA+DEC	MAGS	PA	SEP	DATE	N	NOTES
STF2758AB	21069+3845	5.35; 6.10	152.3	31.55	2015.777	2	W, 61 Cyg
STF2758AG	21069+3845	5.35; 10.84	235.6	256.12	2015.777	1	W
STF2758AH	21069+3845	5.35; 10.89	270.7	108.08	2015.777	1	W
SMR 1AI	21069+3845	5.35; 10.74	240.7	17.54	2015.777	1	W
SMR 40AO	21069+3845	5.35; 12.65	282.6	154.94	2015.777	1	W
SMR 40AP	21069+3845	5.35; 12.84	292.3	148.65	2015.777	1	W
A 1479	23007+5513	8.46; 11.53	124.3	5.20	2015.925	1	W
STF2973	23028+4404	6.41; 10.14	38.8	7.45	2015.925	1	W
STF3000	23188+2513	9.63; 9.83	50.4	3.39	2015.933	1	W
STF3007AB	23228+2034	6.74; 9.78	94.3	5.70	2015.933	1	W
STF3026	23363+2854	9.42; 9.94	276.2	3.42	2015.933	1	W
STT 502	23399+6344	6.89; 10.64	226.2	3.63	2015.933	1	W
STT 503AB	23420+2018	8.26; 8.63	138.6	0.95	2015.933	1	W
STF3042	23519+3753	7.62; 7.75	87.4	5.76	2015.933	1	W
BU 728AB	23522+4331	8.69; 8.94	8.1	1.12	2015.933	1	W
AG 429	23527+2920	9.44; 10.36	270.3	6.33	2015.933	1	W
STF3050AB	23595+3343	6.46; 6.72	340.3	2.37	2015.933	1	W, Mayer 80

Table Notes

D: A DSLR was used for imaging.

W: A webcam was used for imaging.

