

Divinus Lux Observatory Bulletin: Report #24

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Abstract: This report contains theta/rho measurements from 109 different double star systems. The time period spans from 2010.616 to 2011.679. Measurements were obtained using a 20-cm Schmidt-Cassegrain telescope and an illuminated reticle micrometer. This report represents a portion of the work that is currently being conducted in double star astronomy at Divinus Lux Observatory in Flagstaff, Arizona.

This article contains a listing of double star measurements that are part of a series, which have been continuously reported at Divinus Lux Observatory, since the spring of 2001. Beginning with this article, the selected double star systems, which appear in the table below, have been taken exclusively from the 2006.5 version of the Washington Double Star Catalog (WDS), with published measurements that are no more recent than ten years ago. There are also some noteworthy items that are discussed, which pertain to a few of the measured systems.

As in previous articles, this report contains some double stars with noteworthy theta/rho shifts because of the effects of proper motion by one or both of the components. To begin with, proper motion by both component stars, for ES 1015 AB, has caused a 4% rho value increase during the past decade. Likewise, proper motion by both components, for STF 2944 AC, is responsible for a 4% rho value increase, but this occurred in just the last 5 years. Next, proper motion by the companion star, for GRV 440, caused a 2 degrees theta value decrease during the past 10 years. A rho value decrease of 5% is being reported for HJ 1927. Proper motion by both compo-

nents, since 2001, is the cause for this shift.

Two additional variances in the theta values for two more double stars are being noted. First, proper motion by the "A" component, for the BU 483 multiple star system, appears to have caused significant increases in the theta values for AC and AD during the past 10 years. Increases of over three degrees are being reported for both components. Secondly, the theta value for STF 140 AC, which appears in the table, is 2.5 degrees greater than the 1998 WDS value. Proper motion doesn't appear to be the cause in this case, but since this double star has few previous measurements, perhaps additional measurements will help bring more accuracy to this parameter. In a similar context, the rho measurement in this report, for HJ 3437, lines up more closely with the listing for 1836 than it does for the one in 2002. Additional measures of this pair might also be useful.

Some possible corrections are being suggested for the 2006.5 version of the WDS catalog. First of all, the 2005 theta value for STF 3008 (23238-0828) might contain a typo, since the proper motion vectors imply a theta value increase rather than a decrease. Based upon measurements for this report, it appears

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that this value might be 159 degrees instead of 150 to either confirm the 2001 catalog values or the ones degrees. Secondly, the 2000 theta value for HJ 5547 obtained for this report.

(22204+1102) reveals a 2 degrees increase from the 1991 value, when the proper motion vectors suggest WDS catalog seems to suggest a position angle increase, over time, for S 799AB (21434+3817) but the position angle measurement obtained for this article is more closely in line with the value listed for 1824.

Another unexplained discrepancy from catalog values pertains to STF 431 (03424+3358). The WDS catalog lists the parameters for this double star as 249 degrees and 25.6" in 2001, but measurements of this pair on 2010.847 yielded theta/rho values of 243.8 degrees and 19.75 seconds. Proper motion shifts are not significant enough to account for this and no other pairs with similar parameters or magnitudes appear in this part of the sky. Perhaps other researchers might consider measuring this double star

Again, others may want to consider making additional position angle measurements of this pair in order to help verify the actual value. Finally, the rho measurement in the catalog for ARY 9 (00116+5813), for 2002, appears to possibly be in error. The rho measurement in this report, for this double star, is much more closely aligned with the measurements in 1910, rather than the 2002 measurements.

NAME	RA DEC	MAGS	PA	SEP	DATE	NOTES
STF2688	20308+1347	9.2 10.4	174.3	7.67	2010.616	1
GRV 440	21157+2355	10.6 10.6	297.9	43.94	2010.616	2
ES 1012	21467+5523	10.5 10.6	5.5	4.44	2010.616	3
ES 1015AB	21584+5245	10.4 10.7	238.7	7.90	2010.616	4
POP 145AB-CD	22042+4633	9.5 9.8	94.1	30.61	2010.616	5
STT 465 AB	22120+5012	7.3 10.5	317.3	12.84	2010.616	6
BU 477	22159+3125	9.5 10.3	40.8	6.42	2010.616	7
HJ 5547	22204+1102	7.5 10.1	300.9	40.98	2010.616	8
STF2944AC	22478-0414	7.2 8.5	87.1	60.24	2010.616	9
STF3008	23238-0828	7.1 7.6	159.2	5.93	2010.616	10
ARG 47	00027+5958	9.3 10.3	290.4	9.88	2010.638	11
HJ 1927	00032+4508	9.1 10.1	73.4	9.88	2010.638	12
BU 483AC	00091+4051	6.9 7.5	270.4	158.00	2010.734	13
BU 483AD	00091+4051	6.9 10.4	275.3	227.13	2010.734	13
HJ 1953AC	00194-0849	3.5 10.3	190.7	107.14	2010.638	14
HJ 1981A-BC	00310-1005	6.9 8.4	88.1	78.51	2010.638	15
STF 104	01170+3828	7.9 9.8	321.6	13.33	2010.638	16
HDO 45	01172+0201	7.2 9.5	102.6	38.02	2010.638	17
H 23AC	01201+5814	5.0 7.0	231.0	134.30	2010.638	18
H 23AD	01201+5814	5.0 10.2	287.8	178.74	2010.638	18
H 23AE	01201+5814	5.0 10.3	239.0	170.84	2010.638	18
H 23CE	01201+5814	7.0 10.3	265.3	41.97	2010.638	18

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NAME	RA DEC	MAGS	PA	SEP	DATE	NOTES
WEI 3	01201+3639	8.9 9.7	188.4	4.94	2010.638	19
S 398	01284+0758	6.2 8.0	99.5	69.13	2010.658	20
HJ 2052	01316-1901	6.8 7.4	113.9	80.98	2010.658	21
STF 135AB-C	01341+3612	8.0 10.5	260.4	7.90	2010.658	22
STF 135AB-D	01341+3612	8.0 10.6	51.0	50.86	2010.658	22
STT 33AB	01374+5838	7.3 8.8	77.1	26.66	2010.658	23
DOB 2AC	01374+5838	7.3 10.2	109.3	106.65	2010.658	23
STF 140AC	01390+4104	9.2 9.9	322.5	195.53	2010.734	24
STF 150	01434-0705	7.7 8.2	195.8	36.04	2010.658	25
ENG 8	01496-1041	4.7 6.7	250.4	183.68	2010.658	26
STF 4AB	01562+3715	5.7 5.9	297.5	202.44	2010.658	27
BU 1368Bb	01562+3715	5.9 9.6	258.2	204.41	2010.658	27
STF 245Aa-B	02186+4017	7.2 8.0	293.9	11.36	2010.658	28
STT 27AB	02268+1034	6.7 8.3	31.9	73.57	2010.658	29
STF 431	03424+3358	5.0 10.0	243.8	19.75	2010.847	30
WEB 4	05290-0442	9.8 10.0	232.9	47.89	2010.978	31
STF 785AB	05459+2555	7.3 8.3	347.8	14.32	2010.978	32
STT 116AD	05459+2555	7.3 10.2	10.5	201.45	2010.978	32
BU 93AB	05489+2101	9.0 10.2	122.1	60.24	2010.978	33
H 125AB	05506+5655	6.5 10.4	128.0	26.19	2010.978	34
BRT1188	05596+1312	10.0 10.1	354.6	5.43	2010.978	35
GUI 10AC	06117+1723	7.5 9.0	35.9	73.08	2010.978	36
STF 889AB	06199+2501	7.4 9.9	243.2	21.23	2010.978	37
WAL 43AC	06199+2501	7.4 10.1	322.2	38.51	2010.978	37
A 2720AC	06234+1432	9.3 9.6	28.6	67.15	2010.978	38
STF1174AB-C	08047+4717	8.9 9.3	215.0	5.93	2011.118	39
WFC 81	09133+0540	10.2 10.4	76.5	8.39	2011.118	40
A 2367AB	10100+1623	9.9 10.6	85.0	60.74	2011.118	41
STF1435	10280+1950	10.3 10.7	203.2	8.89	2011.173	42
STF1442	10320+2202	8.2 8.5	156.8	13.33	2011.118	43
STF1447	10338+2321	7.5 8.8	124.4	4.44	2011.118	44
BU 111AC	10512-0906	10.0 9.4*	130.7	64.19	2011.173	45
STF3072	11309-0643	7.7 9.9	331.1	9.88	2011.173	46
ES 626	15409+5009	9.2 9.2	275.1	7.90	2011.367	47
STF 29AB	16224+3348	5.2 5.4	164.2	356.49	2011.367	48

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NAME	RA DEC	MAGS	PA	SEP	DATE	NOTES
WEB 6	16354+1703	6.4 7.3	359.2	157.01	2011.411	49
STF 32AC	16579+4722	7.8 7.9	259.9	111.59	2011.367	50
STF 2156	17240-0050	9.0 9.4	35.0	3.95	2011.411	51
AG 210	17378+2257	9.9 10.2	187.5	4.44	2011.367	52
H 50AC	18497-0555	6.0 8.1	171.2	110.60	2011.411	53
STT 178	19153+1505	5.6 7.6	268.2	89.86	2011.501	54
STF 40AB	19188+0020	6.4 6.7	316.6	426.60	2011.501	55
STF 2498AB	19202+0403	8.1 8.8	66.1	11.85	2011.501	56
BOT 2AC	19202+0403	8.1 10.1	101.2	171.83	2011.501	56
STT 182AB	19268+5009	7.4 8.6	297.5	73.08	2011.501	57
HU 342	19371+1723	9.7 10.3	254.3	4.44	2011.501	58
STF 45AB	19431-0818	7.1 7.5	146.9	97.76	2011.501	59
ARY 23AB	20133+3502	8.4 8.8	28.3	80.98	2011.559	60
ARY 23BC	20133+3502	8.4 10.5	339.8	65.18	2011.559	60
ARY 1	20198+3707	6.6 8.5	257.3	77.03	2011.559	61
SHJ 323AD	20289-1749	4.9 6.6	149.8	258.73	2011.559	62
S 752AC	20302+1925	6.8 7.3	288.0	106.65	2011.559	63
ES 667	20386+4438	9.7 10.3	184.9	9.88	2011.556	64
STT 533AC	20391+1005	5.1 8.5	100.2	212.31	2011.556	65
STF 54AD	21103+1008	4.7 6.1	151.7	335.75	2011.559	66
STF 2780Aa-C	21118+5959	6.1 8.9	210.7	120.48	2011.559	67
WAL 137AB-E	21118+5959	6.1 10.3	44.5	61.72	2011.559	67
STF 55AB	21238+3721	6.4 6.6	303.0	362.41	2011.556	68
S 799AB	21434+3817	5.7 7.0	58.9	149.11	2011.556	69
S 799AC	21434+3817	5.7 10.1	318.1	135.29	2011.556	69
STF 2822AD	21441+2845	4.7 6.9	43.8	197.50	2011.559	70
HWE 59AB	22015-1537	7.1 10.2	270.1	8.89	2011.559	71
HJ 5524AD	22015-1537	7.1 9.9	312.8	180.71	2011.559	71
HJ 5355AB	22386-1404	7.5 8.7	289.3	83.44	2011.559	72
HJ 5355AC	22386-1404	7.5 9.2	359.3	106.65	2011.559	72
BU 1144Aa-BC	22430+3013	2.9 9.8	338.0	93.32	2011.559	73
STF 59AB-C	23052-0742	5.4 7.1	149.6	253.79	2011.674	74
S 823AC	23097+5920	5.7 8.2	162.8	166.89	2011.674	75
STF 2991	23134+1104	5.9 10.0	358.8	33.08	2011.674	76
ES 2725AB	23191+4855	7.2 8.5	235.0	54.31	2011.674	77

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NAME	RA DEC	MAGS	PA	SEP	DATE	NOTES
HJ 5413AB	23418-1749	4.8 8.5	4.2	118.50	2011.674	78
STF3054	00031+0816	8.1 9.0	181.3	33.58	2011.677	79
HJ 1929AB-C	00039+2759	8.7 9.5	287.3	5.43	2011.677	80
ARY 7AB	00104+5831	7.7 8.3	2.7	124.43	2011.677	81
ARY 8AB	00108+5846	8.1 8.6	100.4	39.01	2011.677	82
ARY 8AC	00108+5846	8.1 8.3	42.8	104.68	2011.677	82
ES 2577	00112+4933	8.2 8.9	310.9	66.16	2011.677	83
ARY 9	00116+5813	7.1 8.5	82.7	138.30	2011.677	84
STF 8	00116-0305	7.8 9.2	291.1	7.90	2011.677	85
STF 17AB	00165+2918	8.3 9.8	29.6	27.16	2011.677	86
STF 28	00239+2930	8.3 8.5	224.0	33.08	2011.677	87
STT 10AB	00275+1602	6.4 10.1	239.9	113.56	2011.677	88
STT 10AC	00275+1602	6.4 9.3	156.0	274.53	2011.677	88
STF 49	00408-0714	7.0 9.8	321.5	8.72	2011.677	89
ES 224AC	00473+3837	9.4 10.4	108.6	66.66	2011.677	90
STF 70AB	00538+5242	6.3 9.4	247.2	8.39	2011.677	91
STF 72	00546+3910	8.2 9.1	173.3	23.70	2011.677	92
S 390	00582-1541	7.7 7.8	215.5	6.42	2011.677	93
BU 234AB	01005-1705	9.1 9.2	333.3	4.94	2011.679	94
BU 234AC	01005-1705	9.1 9.1	129.0	62.21	2011.679	94
HJ 2010	01027+4742	8.3 9.6	270.7	9.88	2011.679	95
STT 23AB	01101+5145	8.1 8.5	190.9	14.32	2011.679	96
ENG 4AB	01107+4256	7.7 9.9	308.4	152.08	2011.679	97
HJ 2030AC	01170+5345	8.6 9.1	193.1	38.51	2011.679	98
AG 17	01208+1127	8.3 10.3	98.5	54.81	2011.679	99
ES 1712AB	01243+5858	7.7 9.3	2.3	47.40	2011.679	100
ES 2583	01246+5311	8.2 9.1	344.6	26.17	2011.679	101
STT 30AC	01256+3133	8.0 8.0	105.7	56.78	2011.679	102
HJ 3437	01281-1716	7.4 9.3	247.3	12.34	2011.679	103
ARN 32AE	01433+6033	5.8 7.0	267.9	316.99	2011.679	104
HJ 644AC	01487+0741	7.1 9.7	226.2	128.38	2011.679	105
BUP 26Aa-B	01515-1020	3.7 10.0	40.1	188.61	2011.679	106
FRK 2	01564+3026	7.9 9.1	306.6	53.82	2011.679	107
A 819AB-C	01570+3101	7.7 9.9	271.2	66.66	2011.679	108
BU 7AC	01580-0204	6.6 8.8	199.0	152.08	2011.679	109

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1. In Delphinus. Sep. & p.a. increasing. Spect. G0.
2. In Vulpecula. Position angle decreasing.
3. In Cygnus. Relatively fixed.
4. In Cygnus. Separation increasing; position angle decreasing.
5. In Lacerta. Separation slightly increasing.
6. Sep. & p.a. decreasing. Spect. F0II.
7. In Pegasus. Position angle decreasing. Spect. F5, F5.
8. In Pegasus. Sep. increasing; p.a. decreasing. Spect. K0.
9. In Aquarius. Sep. increasing; p.a. decreasing. Spect. G2V, F5.
10. Sep. and p.a. increasing. Spect. K0III, K0.
11. In Cassiopeia. Position angle slightly increasing. Spect. K, A0.
12. In Andromeda. Sep. & p.a. decreasing. Spect. F8, F5.
13. In Andromeda. AC & AD = sep. & p.a. increasing. Spect. A & C = G5, G5.
14. 8 Ceti. Position angle decreasing. Spect. K0.
15. In Cetus. Position angle slightly increasing. Spect. A5IV, G1V.
16. In Andromeda. Relatively fixed. Spect. G5.
17. In Cetus. Sep. & p.a. increasing. Spect. G5.
18. Phi or 34 Cassiopeiae. All components relatively fixed. Spect. AC = F5, B5.
19. In Andromeda. Common proper motion; sep. & p.a. inc. Spect. G0, G0.
20. In Pisces. Relatively fixed. Common proper motion. Spect. K1III, G0.
21. In Cetus. Sep. increasing; p.a. decreasing. Spect. A7III, K0.
22. In Andromeda. AB-C=fix.; c.p.m. AB-D=sep. & p.a. dec. Spect. AB-C= A2.
23. In Cassiopeia. AB = sep. & p.a. inc. AC = relfix. Spect. AB = B3IV, K7.
24. In Andromeda. Separation increasing. Spect. F2V, K0.
25. In Cetus. Relatively fixed. Common proper motion. Spect. A, A.
26. Chi or 53 Ceti. Relatively fixed. Common proper motion. Spect. F3III.
27. 56 Andromedae. AB = sep inc.; p.a. dec. Bb = relfixed. Spect. K0III, M0.
28. In Andromeda. Common proper motion. Sep. & p.a. slightly inc. F3V, F3V.
29. In Aries. Relatively fixed. Common proper motion. Spect. A3, F0.
30. In Perseus. Position angle increasing. Spect. B1.5IV.
31. In Orion. Position angle increasing. Spect. M7, M.
32. In Taurus. AB = sep. slightly increasing. AD = relatively fixed. Spect. B9.
33. In Taurus. Common proper motion; p.a. slightly decreasing. Spect. A0, G5.
34. In Camelopardus. Sep. increasing; p.a. decreasing. Spect. A4IV.
35. In Orion. Common proper motion; p.a. slightly decreasing.
36. In Orion. Sep. decreasing; p.a. increasing. Spect. B9.5III, F8.
37. In Gemini. AB = p.a. increasing. AC = sep. & p.a. increasing. Spect. K2.
38. In Orion. Position angle decreasing. Spect. F7V.
39. In Lynx. Relatively fixed. Common proper motion. Spect. F5, F5.
40. In Hydra. Common proper motion. Sep. & p.a. slightly increasing. Spect. G5.
41. In Leo. Common proper motion. Sep. slightly decreasing. Spect. G0, G5.
42. In Leo. Sep. & p.a. increasing. Spect. G0, G.
43. In Leo. Separation decreasing. Spect. F0, A.
44. In Leo. Common proper motion; p.a. slightly increasing. Spect. A2, A2.
45. In Sextans. Separation decreasing. Spect. of C = F2.
46. In Crater. Relatively fixed. Common proper motion. Spect. F6V, F8.
47. In Bootes. Separation decreasing.
48. Nu Coronae Borealis. Separation decreasing. Spect. M2III, K5.
49. In Hercules. Relatively fixed. Common proper motion. Spect. A2V, A5.
50. In Hercules. Relatively fixed. Common proper motion. Spect. K8, K8.
51. In Ophiuchus. Common proper motion; p.a. increasing. Spect. F2, F2.
52. In Hercules. Common proper motion; p.a. increasing. Spect. M0V, M0.
53. In Scutum. Position angle increasing. Spect.

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- K1II, K0.
54. In Aquila. Relatively fixed. Common proper motion. Spect. G8II, A0.
 55. In Aquila. Separation slightly increasing. Spect. K0III, F0.
 56. In Aquila. AB = reifix; c.p.m. AC = reifix. Spect. AB = G5II, K.
 57. In Cygnus. Sep. increasing; p.a. decreasing. Spect. F6V, A5.
 58. In Sagitta. Sep. & p.a. increasing. Spect. F8.
 59. In Aquila. Relatively fixed. Common proper motion. Spect. F4V, F5V.
 60. In Cygnus. AB = sep. inc. BC = p.a. dec. Spect. AB = B0, F8.
 61. In Cygnus. Separation increasing. Spect. A0, K0.
 62. Rho or 11 Capricorni. Separation increasing. Spect. F3V, K0.
 63. In Delphinus. Relatively fixed. Common proper motion. Spect. B7IV, B9.
 64. In Cygnus. Relatively fixed. Spect. K0.
 65. Kappa or 7 Delphini. Relfixed. Common proper motion. Spect. G1, K0.
 66. Gamma or 5 Equulei. Sep. & p.a. decreasing. Spect. A9V, A2.
 67. In Cepheus. Aa-C & AB-E = p.a. slightly decreasing. Spect. B0II, B3, A0.
 68. In Cygnus. Separation decreasing. Spect. K5, F8.
 69. 79 Cygni. AB = sep. decreasing. AC = sep. increasing. Spect. AB = A0V, A0.
 70. Mu or 1 Cygni. Sep. & p.a. decreasing. Spect. F7V, A5.
 71. In Aquarius. AB = reifix, cpm. AD = sep. inc; p.a. dec. Spect. AB = G8, G8.
 72. In Aquarius. AB = sep. inc.; p.a. dec. AC = p.a. dec. Spect. A5II, F6V, M7.
 73. Eta or 44 Pegasi. Separation increasing. Spect. G0, G5.
 74. 83 Aquarii. Sep. decreasing; p.a. increasing. Spect. A9III, K0.
 75. 2 Cassiopeiae. Relatively fixed. Spect. A5III, B8.
 76. In Pegasus. Sep. & p.a. slightly decreasing. Spect. G8III, G8III.
 77. In Andromeda. Sep. & p.a. increasing. Spect. A2, G5.
 78. 104 Aquarii. Sep. & p.a. decreasing. Spect. G0I, F.
 79. In Pisces. Relatively fixed. Common proper motion. Spect. F0, F0.
 80. In Pegasus. Sep. increasing; p.a. decreasing. Spect. F8.
 81. In Cassiopeia. Sep. & p.a. increasing. Spect. F, A5.
 82. In Cassiopeia. AB = reifix, c.p.m. AC = reifix. Spect. B5, B9, B8.
 83. In Cassiopeia. Relatively fixed. Common proper motion. Spect. A2, F0.
 84. In Cassiopeia. Separation increasing. Spect. B5, G5.
 85. In Pisces. Relatively fixed. Common proper motion. Spect. F8, F8.
 86. In Andromeda. Separation increasing. Spect. K0, A.
 87. In Andromeda. Relatively fixed. Common proper motion. Spect. G0, G0.
 88. In Pisces. AB = sep. inc. AC = p.a. inc. Spect. A5, F8, K2.
 89. In Cetus. Sep. increasing; common proper motion. Spect. G0, G0.
 90. In Andromeda. Separation increasing. Spect. A5.
 91. In Cassiopeia. Common proper motion; p.a. increasing. Spect. A0, A5.
 92. In Andromeda. Position angle decreasing. Spect. M.
 93. In Cetus. Common proper motion; p.a. increasing. Spect. F5, F5.
 94. In Cetus. AB = sep. & p.a. inc. AC = sep. inc., p.a. dec. Spect. F0, F0, F0.
 95. In Andromeda. Relatively fixed. Common proper motion. Spect. A0, A0.
 96. In Cassiopeia. Relatively fixed. Common proper motion. Spect. F8, F8.
 97. In Andromeda. Position angle increasing. Spect. K0.
 98. In Cassiopeia. Relatively fixed. Spect. F2, A.
 99. In Pisces. Relatively fixed. Common proper motion. Spect. F8, K0.
 100. In Cassiopeia. Sep. & p.a. decreasing. Spect. K0.
 101. In Cassiopeia. Sep. decreasing; p.a. increasing. Spect. K2, K2.
 102. In Pisces. Relatively fixed. Common proper

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- motion. Spect. F8, G0.
103. In Cetus. Relatively fixed. Common proper motion. Spect. F0.
104. 44 Cassiopeiae. Relatively fixed. Spect. B9, K2.
105. In Pisces. Separation slightly increasing. Spect. K0.
106. Zeta or 55 Ceti. Position angle decreasing. Spect. K0, K0.
107. In Triangulum. Common proper motion; sep. slightly inc. Spect. F0, F0.
108. In Triangulum. Relatively fixed. Common proper motion. Spect. F5, G0.
109. In Cetus. Sep. & p.a. slightly increasing. Spect. A0, A0.

