

Divinus Lux Observatory Bulletin: Report #21

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Abstract: This report contains theta/rho measurements from 94 different double star systems. The time period spans from 2009.701 to 2009.989. 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. As has been done in previous articles, the selected double star systems, which appear in this report, have been taken from the 2001.0 version of the Washington Double Star (WDS) catalog, with published measurements that are no more recent than ten years ago. Several systems are included from the 2006.5 version of the WDS catalog as well. There are also some noteworthy items that are discussed pertaining to the following table.

First of all, three double stars, which appear in this report, have displayed significant theta/rho shifts because of proper motion by one or both of the components. In this regard, HJ 1093 has displayed a 2 degrees theta value decrease and an 11% rho value increase, since 1990, because of proper motion by both component stars. Proper motion by the reference point star, for BAL 1629, has caused a 3% rho value increase during the past 10 years. Likewise, proper motion by the "A" component, for HJ 3495 AB, is responsible for a rho value increase of almost 3% since 2000.

An observation might be made regarding visual binary star STF 982 AB. While the theta measurement that appears in this report agrees fairly closely with the 2000 listing in the WDS catalog, a theta calculation utilizing the orbital elements diverges by approximately 3.5 degrees. The orbital elements calculation suggests a theta value decrease that does not appear to be supported by current measurements. How-

ever, since the orbital elements have a grade 5 listed reliability rating in *Sky Catalogue* 2000.0, Volume 2, this discrepancy shouldn't be totally unexpected. The values of these orbital elements probably need some "fine tuning."

Orbital motion may be responsible for a possible increase in the rho value for STF 1297. During the past decade, a shift of 6% appears to have occurred for this common proper motion pair.

One possible correction to the WDS catalog is also being noted in this report. CHE 29 (01205+0350) appears to be a duplicate entry for BAL 2084. This is suspected because the coordinates, magnitudes of the components, and the theta/rho parameters for both listings are quite similar. Only one such system telescopically appears in this part of the sky. It might also be mentioned that the theta listing for BAL 2084, in the 2006.5 version of the WDS catalog, diverges by 6 degrees from the listing in the 2001.0 catalog version, from the Hipparcos/Tycho catalog, and from the measurement reported in this article. Since BAL 2084 is a common proper motion pair, one would expect the parameter listings to be in fairly close agreement among these sources.

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NAME	RA+DEC	MAGS	PA	SEP	DATE	NOTES
GRV 58	01002+3818	8.9 9.2	188.1	33.08	2009.701	1
STF 84AB	01038+0122	6.1 9.5	255.2	15.8	2009.756	2
HJ 10AC	01052+1250	9.6 9.7	58.1	8.89	2009.756	3
STF 107	01175+2105	8.8 10.6	68.4	21.23	2009.701	4
BAL2084	01199+0350	10.5 10.7	209	4.44	2009.701	5
AG 18	01283+1429	8.7 10.6	41	73.08	2009.701	6
HJ 1093	01519+5838	9.7 10.0	22.2	5.43	2009.701	7
ES 949AB	01586+5545	10.1 10.4	264.3	5.93	2009.701	8
HJ 2101AB	01596+5623	9.4 10.4	277.1	5.93	2009.756	9
A 2324AC	02007+0456	10.2 10.3	130.1	72.09	2009.701	10
A 2324AD	02007+0456	10.2 10.2	169.4	131.34	2009.701	10
GAL 317	02021-1321	10.0 10.6	58.5	41.48	2009.701	11
BLL 4	02032+5514	7.8 9.8	175.6	223.18	2009.701	12
J 1450	02054-0947	10.1 10.4	0.5	5.93	2009.701	13
GAL 319	02070-1017	10.0 10.5	85.2	28.14	2009.715	14
ARG 7	02108+5624	8.8 10.1	252.9	16.79	2009.756	15
BLL 5	02182+4513	8.1 10.5	35.8	100.23	2009.715	16
STF 245Aa-B	02186+4017	7.2 8.0	293.9	11.36	2009.715	17
GRV 123	02206+2816	10.4 10.7	47.1	12.34	2009.715	18
HJ 3495AB	02213-1057	9.8 10.5	312.7	40.98	2009.830	19
STT 27AB	02268+1034	7.0 8.3	31.9	73.57	2009.715	20
HJ 2136	02292+5352	8.9 9.5	36	4.94	2009.756	21
FAB 4AC	02333+5619	9.6 10.7	260.5	18.76	2009.715	22
ES 231	02428+3826	9.5 10.6	82	4.44	2009.756	23
A 2222AB-CD	02473+1717	8.6 9.7	135.3	103.69	2009.715	24
HJ 3545AC	02596-0925	8.5 10.3	67	43.45	2009.715	25
BAL1629	03017+0233	10.7 10.6*	296.2	11.85	2009.773	26
STF 357	03083-1236	9.5 10.7	295.7	8.89	2009.773	27
BAL2995	03212+0523	10.6 10.7	187.1	11.36	2009.830	28
GRV 175	03253+3601	9.1 10.7	191.2	63.69	2009.773	29
CTT 6AC	03261+2015	9.0 10.2	127.6	50.86	2009.888	30
STF 406	03308+0509	7.5 9.3	125.6	9.38	2009.773	31
AG 69	03332+0409	10.0 10.3	353.6	6.42	2009.773	32
RSS 66	03336-1904	9.2 10.7	87.9	37.03	2009.773	33

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NAME	RA+DEC	MAGS	PA	SEP	DATE	NOTES
GRV 183	03385+3859	10.5 10.6	295.5	26.66	2009.773	34
STT 40AB	03494+2423	7.0 7.5	309	86.9	2009.773	35
AG 307	04027+5428	9.9 10.6	328.3	13.33	2009.775	36
STI2036	04105+5717	10.4 10.7	55.7	8.89	2009.775	37
BAL2119	04171+0409	10.1 10.4	248	3.95	2009.775	38
STF 556AB	04302+0518	10.6 10.7	289.5	4.44	2009.775	39
STF 583AC	04409+0058	7.9 10.5	265.5	99.74	2009.775	40
A 3006AC	04441+0205	9.9 10.0	250.2	52.34	2009.888	41
STT 55	04491+0513	8.1 9.2	16.5	37.53	2009.775	42
STF 627	05006+0337	6.6 7.0	260.4	21.23	2009.849	43
AG 85	05024+0419	9.6 10.5	176.4	9.38	2009.849	44
WEI 5	05028+1321	9.9 10.1	81	4.94	2009.849	45
A 483AB	05099-0906	9.7 10.0	58	3.95	2009.888	46
OL 202AC	05099-0906	9.7 10.1	155.3	62.21	2009.888	46
HJ 3270	05127+1629	10.4 10.6	331.5	13.83	2009.849	47
STF 674	05175+2008	6.8 9.6	149.2	9.88	2009.888	48
AG 315	05382+1251	9.7 10.6	159.4	30.12	2009.849	49
ARY 6AD	05460+2119	7.9 8.1	159.9	124.43	2009.849	50
ARY 6AE	05460+2119	7.9 9.1	233	73.08	2009.849	50
ARY 6DF	05460+2119	8.1 10.3	267.6	60.24	2009.849	50
SEI 394	05514+3506	10.0 10.7	325.5	14.32	2009.849	51
SEI 404	05521+3235	10.5 10.7	167.3	16.79	2009.849	52
SEI 410	05522+3235	10.6 10.7	121.9	17.28	2009.849	53
STF 802AC	05525+4009	8.9 9.9	54.6	192.56	2009.849	54
SEI 428	05528+3233	10.0 9.9*	334.2	23.7	2009.849	55
SEI 434AE	05545+3109	10.1 10.0*	82.4	25.68	2009.849	56
AG 103	06010+2014	9.1 10.7	103.5	15.31	2009.907	57
H 48AB	06011+2320	8.2 10.6	259.8	31.6	2009.907	58
GRV 710	06063+0836	9.2 9.5	58.7	61.72	2009.907	59
STF 852AC	06086+1722	9.9 10.5	30	44.93	2009.907	60
AG 106AC	06110+3302	9.9 10.1	218.5	27.65	2009.907	61
GRV 714	06185+2552	9.5 9.7	343.1	56.78	2009.907	62
S 513AB	06212+2108	7.3 8.9	258.5	59.25	2009.907	63
S 513AD	06212+2108	7.3 7.6	23.9	264.65	2009.907	63

Table concludes on next page.

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NAME	RA+DEC	MAGS	PA	SEP	DATE	NOTES
ES 3098AB	06435+3929	10.6 10.5*	203.2	30.61	2009.907	64
GRV 722AC	06487+1913	9.3 10.7	238.1	54.81	2009.907	65
STF 982AB	06546+1311	4.7 7.8	146.2	7.41	2009.907	66
J 273AB	06553+1235	9.8 10.3	337.4	4.44	2009.907	67
GRV 725	06577+2415	9.8 10.0	53.5	47.4	2009.907	68
GRV 737	07328+1757	9.6 10.6	56.2	23.7	2009.926	69
AG 145	07531+0906	10.0 10.7	247.1	4.94	2009.926	70
GRV 743	07563+2855	9.0 10.3	329.6	60.73	2009.926	71
GRV 750	08041+2818	9.8 10.0	337.4	21.73	2009.926	72
STF1181	08054+0812	8.2 9.2	141.1	5.43	2009.970	73
GRV 756	08175+3623	10.3 10.7	146.8	41.97	2009.970	74
STT 92AB	08238+5725	7.6 9.3	180.9	57.77	2009.970	75
H 109	08259+0734	5.1 10.1	344.8	29.63	2009.970	76
ARU 24AC	08301+0824	9.2 10.0	342.9	42.96	2009.970	77
GRV 762	08319+1750	9.0 10.7	352.6	45.92	2009.970	78
STF1277	08471+0845	9.8 10.6	272.2	16.29	2009.970	79
STF1286	08507+0401	8.9 10.7	81.5	29.13	2009.970	80
STF1297	09005+2244	8.8 9.9	159.6	5.43	2009.984	81
GRV 775	09042+0301	8.9 9.2	326.8	32.09	2009.984	82
HJ 808AB	09168+0814	10.3 10.5	205.5	24.19	2009.984	83
A 297AB	09207+0810	9.4 10.5	237	28.64	2009.984	84
HJ 137	09297+0433	10.0 10.3	354.3	18.76	2009.984	85
HJ 139	09329+0415	9.9 10.6	233.4	31.11	2009.984	86
STF1359AB	09330+5615	9.7 10.6	54.4	7.41	2009.984	87
STF1359AC	09330+5615	9.7 10.4	240.4	118.01	2009.984	87
STF1369Aa-B	09354+3958	6.8 7.9	149.2	25.18	2009.989	88
STF1369Aa-C	09354+3958	6.8 8.4	322.5	116.53	2009.989	88
GRV 799	09459+2851	9.8 10.4	179.7	37.53	2009.984	89
STF1395	09554+1007	8.1 10.4	229.2	18.76	2009.989	90
STF1399	09570+1946	7.6 8.3	175.3	30.61	2009.989	91
KR 34	09578+5815	10.0 10.6	65.6	33.08	2009.989	92
GRV 805	09586+2933	10.4 10.7	285.1	37.53	2009.989	93
FOX 66AB	09599+5939	10.0 10.4	318.8	50.36	2009.989	94

* - Companion star is the brighter component.

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1. In Andromeda. Relatively fixed. Spect. G0.
2. 26 Ceti. Separation decreasing. Spect. F1V.
3. In Pisces. Position angle increasing. Spect. F6V.
4. In Pisces. Relatively fixed. Common proper motion. Spect. G5, F8.
5. In Pisces. Sep. slightly increasing. Common proper motion. Spect. F8, F8.
6. In Pisces. Separation slightly decreasing. Spect. G5, K2.
7. In Cassiopeia. Sep. increasing; p.a. decreasing. Spect. A0.
8. In Perseus. Relatively fixed. Common proper motion.
9. In Perseus. Position angle increasing. Spect. F0.
10. In Pisces. AC = sep. inc. AD = p.a. dec. Spect. F8, K2, K5.
11. In Cetus. Sep. & p.a. slightly decreasing.
12. In Perseus. Sep. increasing; p.a. slightly decreasing. Spect. M2.
13. In Cetus. Common proper motion; p.a. decreasing. Spect. K3V, K3V.
14. In Cetus. Relatively fixed.
15. In Perseus. Sep. & p.a. decreasing. Spect. F2V.
16. In Andromeda. Separation increasing. Spect. K2.
17. In Andromeda. Relatively fixed. Common proper motion. Spect. F3V, F3V.
18. In Aries. Common proper motion; p.a. slightly increasing.
19. In Cetus. Sep. & p.a. increasing.
20. In Aries. Relatively fixed. Common proper motion. Spect. A3, F0.
21. In Perseus. Relatively fixed. Spect. G0.
22. In Perseus. Position angle increasing. Spect. A2IV.
23. In Perseus. Separation increasing. Spect. G5.
24. In Aries. Relatively fixed. Spect. A3.
25. In Eridanus. Separation slightly increasing. Spect. F5.
26. In Cetus. Separation increasing. Spect. G0.
27. In Eridanus. Relatively fixed. Common proper motion. Spect. G5, K1.
28. In Cetus. Sep. & p.a. decreasing. Spect. G0, G0.
29. In Perseus. Relatively fixed. Common proper motion. Spect. A2.
30. In Aries. Relatively fixed. Spect. A5, K.
31. In Taurus. Relatively fixed. Common proper motion. Spect. F0, F0.
32. In Taurus. Relatively fixed. Common proper motion. Spect. F8.
33. In Eridanus. Relatively fixed. Common proper motion. Spect. G1.
34. In Perseus. Position angle slightly increasing. Spect. G0, G0.
35. In Taurus. Relatively fixed. Common proper motion. Spect. B9.5V, A0.
36. In Camelopardus. Sep. decreasing; p.a. increasing. Spect. K0, K0.
37. In Camelopardus. Separation decreasing.
38. In Taurus. Relatively fixed. Common proper motion. Spect. F8.
39. In Taurus. Common proper motion; sep. & p.a. slightly inc. Spect. F8, F8.
40. In Taurus. Position angle slightly increasing. Spect. A0IV.
41. In Orion. Relatively fixed. Spect. F8, F0.
42. In Orion. Relatively fixed. Common proper motion. Spect. K, F.
43. In Orion. Relatively fixed. Common proper motion. Spect. B9V, B9V.
44. In Orion. Relatively fixed. Common proper motion. Spect. F0.
45. In Orion. Sep. increasing; p.a. decreasing. Spect. G5.
46. In Eridanus. AB = sep. increasing. AC = relatively fixed. Spect. B8.
47. In Taurus. Position angle increasing. Spect. A0.
48. In Taurus. Common proper motion; p.a. slightly increasing. Spect. F7V, F7V.
49. In Orion. Relatively fixed. Common proper motion. Spect. G0.
50. In Taurus. AD = relfix; cpm. AE & DF = p.a. inc. Spect. F2, A2, A5.
51. In Auriga. Relatively fixed.
52. In Auriga. In M37 open cluster. Relatively fixed. Common proper motion.
53. In Auriga. In M37 open cluster. Sep. & p.a. decreasing.
54. In Auriga. Sep. increasing; p.a. decreasing. Spect. G0, K2.
55. In Auriga. Sep. & p.a. increasing. Spect. F5.

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56. In Auriga. Relatively fixed. Spect. B3.
 57. In Orion. Relatively fixed. Spect. B3V.
 58. In Gemini. Relatively fixed. Spect. B2III.
 59. In Orion. Relatively fixed.
 60. In Orion. Sep. & p.a. increasing. Spect. F5.
 61. In Auriga. Position angle increasing. Spect. G0.
 62. In Gemini. Relatively fixed. Common proper motion. Spect. F2, G0.
 63. In Gemini. AB = relfix; cpm. AD = p.a. slightly inc. Spect. B9II, A0, A0.
 64. In Auriga. Separation increasing.
 65. In Gemini. Relatively fixed. Common proper motion. Spect. F0.
 66. 38 Geminorum. Sep. inc; p.a. dec; common proper motion. Spect. F0V, F0V.
 67. In Gemini. Common proper motion; p.a. slightly decreasing. Spect. G1V.
 68. In Gemini. Position angle slightly increasing.
 69. In Gemini. Relatively fixed. Common proper motion. Spect. G5.
 70. In Canis Minor. Relatively fixed. Common proper motion. Spect. F0, F0.
 71. In Gemini. Relatively fixed. Common proper motion. Spect. F5, G0.
 72. In Gemini. Common proper motion; p.a. increasing. Spect. F8, F8.
 73. In Cancer. Relatively fixed. Common proper motion. Spect. G5, G5.
 74. In Lynx. Common proper motion; p.a. slightly increasing. Spect. G0, F8.
 75. In Lynx. Relatively fixed. Common proper motion. Spect. F2.
 76. In Cancer. Sep. decreasing; p.a. increasing. Spect. K0.
 77. In Cancer. Separation slightly increasing. Spect. B9.
 78. In Cancer. Relatively fixed. Common proper motion. Spect. G5.
 79. In Cancer. Relatively fixed.
 80. In Hydra. Relatively fixed. Common proper motion. Spect. G5, G0.
 81. In Cancer. Sep. inc.; p.a. dec. Common proper motion. Spect. G5, G5.
 82. In Hydra. Relatively fixed. Common proper motion. Spect. G5, G5.
 83. In Cancer. Sep. increasing; p.a. decreasing. Spect. F5, K.
 84. In Cancer. Relatively fixed. Spect. A5, F5.
 85. In Hydra. Position angle decreasing. Spect. G0.
 86. In Hydra. Sep. increasing; p.a. decreasing. Spect. G0.
 87. In Ursa Major. AB = sep. inc., p.a. dec. AC = sep. & p.a. inc. Spect. G5.
 88. In Lynx. Aa-B = p.a. inc; cpm. Aa-C = p.a. & sep. dec. Spect. F2V, G, G0.
 89. In Leo. Relatively fixed. Common proper motion.
 90. In Leo. Relatively fixed. Common proper motion. Spect. G5, G.
 91. In Leo. Relatively fixed. Common proper motion. Spect. G0, G5.
 92. In Ursa Major. Sep. decreasing; p.a. increasing. Spect. M4.
 93. In Leo. Relatively fixed. Common proper motion.
 94. In Ursa Major. Separation decreasing. Spect. G5, F5.

