Ludwig Schupmann Observatory Measures for the Period 2009.685 to 2010.257

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Abstract: Forty CCD measures, including twenty large Δm pairs, are reported. Among the large Δm binary pairs, ζ Aquilae AB and Sirius AB presented the greatest observational challenge. Included in the "normal" pairs is a measure of the fascinating M4 and white-dwarf system STI2051AB. Earlier astrometric studies by K. Aa. Strand (1977) demonstrate that the A component has a very close companion.

The Measures

The listed measures are presented in the conventional way. From left to right: the discoverer's designation, WDS identifier, Epoch 2000 RADec, WDS mags, LSO position angle in degrees, LSO separation in seconds of arc, decimal date of observation, number of nights observed and a brief notes column.

Astrometry of the large Delta m pairs were performed with a tailpiece stellar coronograph (Daley 2007) attached to the writer's 9 inch Schupmann medial and operates at an effective focal length (EFL) of 164 inches. Measurements of the "normal" doubles employed the same telescope (coronograph removed), Barlow amplified to an EFL of 286 inches. An SBIG ST-7 CCD camera was used for all measures.

Δm photometry was performed on a few pairs using a standard Bessel photometric V-band filter. The Δm measures are listed in the "brief notes" column, for example: V=0.15 indicates the difference in magnitude in V-band. Shown in brackets after the Δm measure is the number of plates averaged for the Δm value. An idea of the neglected status of many pairs is also shown in the "brief notes" column; for example: 1m100 indicates there has been only one past measure made 100 years ago, (discovery measure) thus the newly reported value is a confirming measure. Other notes in the column are self explanatory. Detailed numbered notes follow the measures.

References

Daley, J.A. 2007, JDSO **3**, 159.

Strand, K.A. 1977, AJ **82**, 745.

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Table 1: LSO Measurements of Double Stars

Discoverer	RA+Dec	Mag-A, Mag-B	PA	Sep	Date	n	Brief Note
H 5 17 AC	00369+3343	4.36, 13.01	356.4	55.37	2009.926	1	π And
BUP 11	00486+0735	4.43, 13.2	11.9	132.29	2009.893	1	δ Pis
STF 60 AD	00491+5749	3.6, 11.6	354.6	186.57	2009.931	1	η Cas
BUP 23 AB	01368+4124	4.09. (12.2)	148.7	55.38	2009.983	1	strong binary candidate, mag LSO
GUI 2 AC	01433+5732	6.29, ~15.	57.9	16.81	2010.085	1	1m94, difficult pair
BUP 27 AB	01531+2935	3.41, 12.9	318.5	100.15	2010.016	1	α Tri, see note 1
BUP 27 AC	01531+2935	3.41, 12.2	182.8	197.11	2010.019	1	
DAL 51 AD	01531+2935	3.41, 11.2	340.4	146.74	2010.119	1	
DAL 51 AF	01531+2935	3.41, 13.7	147.7	229.52	2010.119	1	
DAL 51 FG	01531+2935	13.7, 15.8	311.8	12.49	2010.119	1	
STF 180 AB	01535+1918	3.8, 3.9	0.8	7.47	2010.027	1	γ Ari
BUP 38	03091+4937	4.05, 12.4	189.6	91.67	2010.090	1	1m99, ι Per
HL 15 AB	03463+2357	4.09, 14.	179.8	110.66	2010.096	1	Merope
HL 15 AC	03463+2357	4.09, 13.	336.2	145.80	2010.096	1	
STF 541 BF	04254+2218	5.4, 12.2	215.1	108.54	2010.118	1	κ2 Tau
STF 541 CD	04254+2218	9.5, 9.8	329.5	5.34	2010.118	1	centered between κ1 & κ2 Tau
BUP 58	04263+2249	4.28, 12.5	289.1	115.49	2010.118	1	υ Tau
STI2051 AB	04312+5858	11.38, 12.1	60.8	10.07	2010.214	1	"$B" is a White Dwarf
STT 560 AB	04498+0658	3.22, 11.31	168.3	73.86	2010.205	1	π3 Ori
DAL 50 AC	04498+0658	3.22, 13.2	5.2	22.16	2010.205	1	
STF 612 AB	04543+0722	8.33, 8.41	200.0	16.13	2010.208	1	V=0.15 (10 plate average)
ST 3 HL	05167+4600	10.5, 13.7	169.3	3.55	2010.145	1	Capella H
AGC 1 AB	06451-1643	-1.46, 8.5	91.7	8.94	2010.188	2	Sirius
STF1009 AB	07057+5245	6.87, 7.01	147.5	4.32	2010.216	1	very slow moving binary
DAL 12	07275+7302	10.8, 11.5	94.6	27.24	2010.250	1	cpm pair
STF1110 AB	07346+3153	1.58, 2.62	57.6	4.68	2010.249	1	Castor
STF1110 AC	07346+3153	1.58, 8.8	163.5	70.22	2010.249	1	yy Gem
STT 179	07444+2454	4.37, 8.2	242.1	7.48	2010.250	1	κ Gem visually delicate binary
STF1196 AB	08122+1739	5.30, 6.25	36.5	0.97	2010.257	1	ζ Cnc
STF1196 AB-C	08122+1739	4.92, 5.85	68.5	6.31	2010.257	1	
STF1196 AC	08122+1739	5.30, 5.85	65.9	6.65	2010.257	1	
STF1196 BC	08122+1739	6.25, 5.85	71.3	5.73	2010.257	1	
STF2382 AB	18443+3940	4.67, 5.81	347.6	2.35	2009.803	1	ε1 Lyr V=0.85 (single plate)
STF2383 CD	18443+3940	5.27, 5.48	78.2	2.33	2009.803	1	ε2 Lyr V=0.14 (single plate)
BU 287 AB	19054+1352	2.99, 12.0	46.0	7.16	2009.759	1	ζ Aql see note 2
STFB 10 AB	19508+0852	0.95, 9.82	285.6	193.35	2009.764	1	Altair
DAL 27 AD	19508+0852	0.95, 11.7	98.7	30.60	2009.685	1	LSO determined optical
STI2623 AB	22087+5427	10.3, 10.8	178.3	5.42	2006.860	1	1m89 see note 3
STI2623 AC	22087+5427	10.3, 10.7	26.2	5.66	2006.860	1	

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Detailed Notes

1. **BUP 27AB** - This pair posed a few mysteries in reconciling past measures. First, the original measure of $``$B" appears to be fiction in that no star was found near the listed value in the LSO CCD images. Interestingly though, the PA agrees reasonably well with the "C" components position in that year (1834) with the true "C" lying about twice the distance! Secondly, the 1879 measure of "B" is clearly listed in the wrong quadrant and a 180 deg flip places it in good agreement with a rectilinear fit with the 1909 measure and the LSO measure reported here.

   The AC measures of 1879, 1909, and LSOs' 2010 value form a near perfect rectilinear fit. Both "B" & "C" components are clearly optical components as they parallel the primary's proper motion vector to a high degree.

2. **BU 287AB** - This difficult binary, last measured in 1934, requires the best seeing for detection, let alone a good measure! After a number of tries a great night came along and there stood "B" nice and sharp. Plotting the 1874, 1934 and LSO measures clearly shows the path of "B" strongly concave to the primary. It would be well to plot the last 20 measures to confirm this, but it seems this binary is approaching, or perhaps even past, its greatest apparent separation. The primary ζ Aquilae, is an A0 star with a measured rotational velocity of ~345 km/sec (lower limit). Knowledge of the orbit inclination could, in principle, provide an upper limit to the primary's spin velocity, assuming close orbital and spin alignment.

3. **STI2623AB** - Please note that this measure was made in 2006 when, finding the object triple, the measure was shelved under the "possible misidentification" category. Recently the LSO CCD images were re-examined alongside Digital Sky Survey plates which showed the triple very close to Stein's original position. After discussion with Brian Mason it was agreed that the triple is in all probability Stein's original discovery. It was decided to give the pair most closely agreeing with the original the AB designation. The LSO 2006 measure included Δm V-band values as follows: AB, V=0.50 (5 plate average) and AC, V=0.45 (5 plate average).

   How could Stein have missed "C"? A good look at the original Vatican-Zone plate might be interesting.

On June 2, 2010 the author was diagnosed with non-Hodgkin's Lymphoma and has been undergoing chemotherapy. The possibility of complete cure is ~40% and long-term remission is very high.

This manuscript was mailed to the USNO and transcribed by Brian Mason who added this "about the author" portion and who along with our many readers, wish Jim a speedy and complete recovery.