

# Neglected Double Star Measurements at the Astronomical Observatory of the Natural Science Museum Galati

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**Abstract:** This article presents a set of neglected double star measurements and also a few non-neglected WDS doubles measured in a Romanian astronomical observatory in collaboration with amateur astronomers.

## Introduction

This set of measurements presented here were realized by a collaboration of two teams of astronomers. One team, Ovidiu Tercu and Alexandru Dumitriu, performed the observing and imaging tasks at the observatory. The other team performed both object selection and validation (Valentin Gavrila, Catalin Vladu) and also data reduction (Lucian Curelaru, Felician Ursache). The instruments and methods employed will be described below.

## Measuring Instruments

In this project we used a 16 inch Ritchey-Chretien telescope from an astronomical observatory situated in Galati, Romania. The observatory (Long. 28 01 57 E, Lat. 45 25 08 N, Alt. 55m) is part of a larger museum, the Natural Science Museum from Galati, Romania and is the biggest and most modern public and educational astronomical observatory in Romania. The 16-inch f/8 Ritchey-Chretien telescope is the main instrument of the observatory and is mounted on a German-type equatorial mount with direct drive technology. The main imaging camera is a SBIG STL-6303e NABG CCD. The CCD has a sensor array of 3072 by 2048 pixels, and each pixel is 9 microns square; for practical reasons, on this project

we used a pixel binning 2x2, which gave us a 1.16"/pixel and a FOV of 29.8' x 19.9'. For a short period of time we also used a second imaging camera, a Canon EOS 500D modified for astrophotography, with a sensor array of 4752 x 3168 pixels, each pixel 4.7 microns square; here we also used a pixel binning 2x2, resulting a 0.61"/pixel and a FOV of 24.0' x 16.0'.

## Methods

The procedure we used in the project is the following.

In the first phase we selected a set of objects which are most appropriate to be observed by the used instruments and in the expected time frame. For the main selection criteria we used a magnitude limit of 17 and a separation bigger than 6 arcseconds. We also selected (with some exceptions) objects that are at least 35 degrees high in the sky in the observing time frame. On this selection we performed a pre-check of each object of the list. This means we took a look on survey images on each candidate object to see if the object was in the expected location. This step was necessary to avoid using telescope time on objects that are missing or different than the catalog description. Also in some cases in this validation task we tried to clarify the situation of some not matching objects. Those cases are presented in a separate section or in the attached notes (where the differences

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are small). The validation was done using Aladin software and a web tool developed by Lucian Curelaru (<http://brasov.astroclubul.org/wdsfilter/>)

After the selection and validation, we sent the final list to the observatory team and the objects were imaged in several observing sessions in a time frame spanning from August to November 2011.

The resulted images were sent back to us and we extracted each object's equatorial coordinates using Astrometrica software [1]. Using a spreadsheet developed by us, we calculated the PA and the separation for each object. Also, we checked for other WDS doubles [2] appearing in each imaged field and accessible for our resolution and we measured them even when they were not neglected doubles. The measurements include also some magnitude estimation made by Astrometrica. However, there are some cases, especially with bright stars, where the magnitude seems to be incorrectly evaluated.

### Resulting Neglected Measurements

Using the described instruments and methods, we measured 124 neglected double stars. The results for the 122 objects are presented in Tables 1 and 2. The other two objects will be explained in a separate section.

### Other Measurements

Also we've measured 57 other objects which are not neglected but they were in the close neighborhood or in the same field with target objects. That objects are presented in Tables 3 and 4.

### Special Cases

There were also some special cases of strange doubles where we discovered more than one close match for the WDS object and we were not able to decide which one is the correct one. We measured both of them and present the results in Table 5.

### Missing objects

During the checking process we've done when selecting target objects we discovered some WDS objects that we were not able to find neither at precise location nor in the close neighborhood. The objects are the following: STT 32, POU4103, CHE 152, J 3012 AC, SEI 690, POU5124, SLE 531, ALI 450, CHE 380, GYL 94, HJ 956, J 289 AC, LDS1492, LDS5964, POU5698, HJ 1967, LDS1630

### Conclusions

This was a very interesting project which united two small teams of astronomers from two different cities in Romania. We intend to repeat this project in the future by measuring a new set of neglected doubles using basically same equipment and methods.

### References

1. Astrometrica software, <http://www.astrometrica.at/>
2. WDS Catalog, The Washington Double Star Catalog, Mason, Wycoff, Hartkopf, Astrometry Department, U.S. Naval Observatory

### Neglected Double Star Measurements at the Astronomical Observatory of ...

Table 1. Neglected double stars measured with the described telescope and Canon camera

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
ARA 134	23001-1616	12.0, 12.1	163.6	8.65	2011.666	1	
J 1430	23549-0438	11.5, 13.6	16.1	9.68	2011.666	1	
WOR 29	23501+0253	9.1, 13.5	254.6	48.17	2011.666	1	1
ES 856	23033+4904	9.5, 14	359.2	7.50	2011.666	1	
J 1793	22109+1545	13.8, 14.4	90.0	4.48	2011.666	1	
POU5688	22194+2504	12.9, 13.9	333.0	10.77	2011.666	1	
STF3046AC	23564-0930	9.4, 14.2	206.0	82.34	2011.666	1	
STI1237	23560+6312	12.2, 11.9	253.5	14.81	2011.666	1	2
STI2933AB	23048+5542	11.2, 12.3	254.3	9.22	2011.666	1	
STI2960	23152+5548	11.8, 11.8	31.1	12.26	2011.666	1	3
STI2985	23289+5645	12.2, 12.3	5.2	19.18	2011.666	1	
STI3002	23347+5609	11.7, 10.9	118.2	14.79	2011.666	1	4
VBS 38AC	23309+6954	10.7, 12.6	144.3	43.86	2011.666	1	
WFC 245	23510+5238	10.6, 11.7	49.8	19.07	2011.666	1	
BAL 638	23366-0118	11.7, 12.8	249.7	27.98	2011.675	1	
ES 2001	23210+3709	10.7, 13.1	299.3	8.37	2011.675	1	
HJ 1871	23214+5152	9.6, 12.6	209.1	10.08	2011.675	1	
HJ 1868	23198+5543	9.6, 12	245.0	25.35	2011.674	1	
HJ 3191	23207+8127	9.7, 12.3	46.8	23.21	2011.675	1	
POU5801	23200+2438	10.3, 13.9	302.0	5.47	2011.674	1	
SHJ 227BC	16219+1909	9.4, 13.4	298.3	82.07	2011.674	1	
SMA 187	23190+4428	12.1, 13.2	263.4	13.04	2011.675	1	5
STI2970	23188+5551	12.0, 12.6	329.5	9.63	2011.675	1	

## Notes:

1. Separation is much bigger than expected. On the other hand the PA and magnitudes are quite close.
2. Compared to the newly measured magnitudes the last measurement appears swapped (A for B and B for A). Also the coordinates of the star indicates correctly A. So the PA is different by 180 degrees.
3. The stars seem equal in magnitudes, even in the catalog there is a 1 magnitude difference between them. Considering them equal in magnitude, maybe the northeast component should be considered the main component (so the PA will be reversed).
4. The secondary is brighter than expected. From our determination the secondary is 10.9 instead on 11.7 and the main star 11.7 instead of 11.3.
5. Object is at 1.8 arcmin southeast. Correct position seems to be RA: 23 19 02.12, declination: 44 27 21.7

## Neglected Double Star Measurements at the Astronomical Observatory of ...

Table 2. Neglected double stars measured with the described telescope and SBIG camera

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
ARA1510	18070-2121	11.8, 12.4	267.2	14.27	2011.709	1	
ARA1847	18091-2222	13.1, 12.9	350.2	11.47	2011.709	1	1
J 1593	18050-2806	10.1, 11.3	145.4	8.62	2011.709	1	2
J 1618	18062-2012	11.5, 11.2	358.0	8.20	2011.709	1	3
LYS 34	18068-2228	13.2, 14.1	120.8	4.68	2011.709	1	
SLE 138	18079+3042	12.1, 12.8	328.6	10.02	2011.709	2	4
ALI1115	19399+3924	12.5, 12.6	192.4	13.00	2011.780	1	
ALI 896	19423+3830	11.8, 12.8	162.0	17.13	2011.780	1	
ALI 899AC	19444+3859	11.3, 12.7	73.0	10.97	2011.780	1	
BU 1130AC	19346+1946	6.6, 13.0	317.5	112.91	2011.780	1	
BUP 192AC	19331+0725	9.8, 11.5	216.9	64.73	2011.780	1	
BUP 193	19357-0014	9.4, 12.1	270.0	103.80	2011.780	1	
ES 1899	08225+6318	9.1, 12.7	225.4	13.53	2011.780	1	
ES 2369	19304+3200	10.1, 14.6	87.3	19.23	2011.780	1	
GAN 4AB	08233+6826	8.8, 12.9	145.2	11.20	2011.780	1	
GCB 43	19343+1840	10.3, 10.6	264.5	7.28	2011.780	1	
GUI 26CD	19371+0819	10.1, 11.5	216.3	119.11	2011.780	1	
HJ 3183AB	23179-0144	10.7, 13.0	93.8	88.21	2011.780	1	
HJ 2444AC	08306+5936	10.5, 13.2	36.6	56.54	2011.780	1	
J 1680	19378-0512	10.2, 12.6	323.5	12.56	2011.780	1	
J 1860	19441+1431	12.2, 12.3	8.9	7.49	2011.780	1	
J 2271BC	19348+0245	11.2, 12.2	4.1	6.32	2011.780	1	
LDS1670	08109+7739	8.7, 13.4	273.4	15.28	2011.780	1	
LDS1674	08160+6907	11.3, 12.6	289.7	98.66	2011.780	1	
LDS3000	23498-1136	11.9, 13.1	55.4	34.65	2011.780	1	5
MLB 873	19339+3914	13.3, 15.0	48.1	7.49	2011.780	1	6
MLB 874AC	19376+3923	14.1, 15.2	203.7	12.67	2011.780	1	
POU4045	19451+2329	12.2, 14.5	167.4	18.86	2011.780	1	
SEI 620	19322+3522	12.2, 12.1	25.6	22.63	2011.780	1	
SLE 667	19409+2828	11.9, 12.6	46.2	6.94	2011.780	1	7
SLE 637	19351+2834	12.5, 13.0	317.0	8.89	2011.780	1	
SLE 644	19358+2909	11.2, 12.5	333.1	6.95	2011.780	1	
STF1193BC	08207+7224	9.9, 12.9	6.2	58.64	2011.780	1	
STF2540AC	19333+2025	8.5, 13.7	221.1	153.20	2011.780	1	
STF2931AC	22413+1311	9.1, 1 4.1	346.6	38.35	2011.780	1	

*Table 2 continues on next page.*

## Neglected Double Star Measurements at the Astronomical Observatory of ...

Table 2 (continued). Neglected double stars measured with the described telescope and SBIG camera

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
ALI1125	19502+3923	12.4, 12.4	2.8	4.81	2011.879	1	
BU 1363AB	01426+6033	8.0, 12.8	94.8	14.21	2011.879	1	
BU 1176AC	03203+7744	6.8, 11.6	273.8	13.45	2011.879	1	
BU 785AC	02055+7607	6.7, 14.3	129.8	30.48	2011.879	1	
LDS1505	00188+7653	14.8, 16.5	0.2	383.60	2011.879	1	8
ES 115AC	00229+6214	8.7, 13.3	57.2	23.44	2011.879	1	
HJ 2077AC	01497+7802	11.0, 13.7	145.3	18.13	2011.879	1	9
HJ 2077BC	01497+7802	11.7, 13.7	204.2	11.52	2011.879	1	
LDS1526	01217+7540	12.1, 12.2	348.2	3.27	2011.879	1	10
LDS1559	02495+7500	9.8, 15.3	57.5	28.49	2011.879	1	
LDS1568	03260+7749	13.2, 14.7	143.0	5.63	2011.879	1	
POU4116	19502+2424	11.6, 14.4	118.2	9.30	2011.879	1	
PTT 19	00039+6041	9.8, 15.4	13.0	14.37	2011.879	1	
STI 282	01451+6029	12.6, 12.6	69.0	20.97	2011.879	1	11
STI1315	00180+5517	12.5, 12.5	285.9	12.07	2011.879	1	
BU 1388	04488+7556	7.1, 13.4	46.2	97.85	2011.882	1	
BU 1499AC	21050-1105	9.2, 13.4	310.7	117.47	2011.882	1	12
HJ 2227	04321+7517	8.7, 13.7	272.3	19.83	2011.882	1	
LDS1611	05292+7620	14.6, 14.8	70.2	84.26	2011.882	1	
LDS1634AC	06438+7648	10.4, 13.7	280.3	56.62	2011.882	1	
LDS1644	07158+7936	13.2, 14.6	342.2	24.37	2011.882	1	
LDS1648	07247+8154	15.7, 17.6	261.2	7.18	2011.882	1	13
LDS1651	07572+8759	12.9, 14.6	74.9	31.53	2011.882	1	14
LDS1652	07365+8238	14.3, 18.7	264.1	12.70	2011.882	1	
LDS1656	07495+7544	16.2, 17.0	355.9	7.32	2011.882	1	
LDS2486	21053+4328	11.8, 15.4	329.5	78.23	2011.882	1	15
SEI1382	21036+3701	13.3, 13.3	156.1	5.91	2011.882	1	
SEI1386	21041+3609	10.5, 14.3	151.3	25.99	2011.882	1	16
STF2744AC	21031+0132	7.3, 14.1	299.7	73.88	2011.882	1	17
J 2369AC	22236+2652	12.5, 15.5	146.0	15.80	2011.761	1	
STF2914AB	22324-1056	8.6, 13.0	241.0	19.37	2011.761	1	
STF2914BC	22324-1056	13.0, 12.9	249.5	9.12	2011.761	1	
ABH 166AD	22324-1056	8.6, 14.2	91.0	58.18	2011.761	1	
ALI 163	19479+3526	9.7, 12.3	173.9	9.15	2011.865	1	
BPM1507	19462+1332	10.8, 13.8	13.6	14.92	2011.865	1	

*Table 2 continues on next page.*

## Neglected Double Star Measurements at the Astronomical Observatory of ...

Table 2 (conclusion). Neglected double stars measured with the described telescope and SBIG camera

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
ES 84AB	19495+3843	6.9, 10.0	164.4	9.14	2011.865	1	
ES 84AC	19495+3843	6.9, 12.8	92.7	21.21	2011.865	1	
ES 84BC	19495+3843	10.0, 12.8	67.4	20.29	2011.865	1	
ES 354	19484+3144	8.6, 12.9	337.4	10.62	2011.865	1	
J 1686	19463-0258	11.6, 11.3	176.7	7.91	2011.865	1	
J 1864AB	19470+0705	12.8, 12.9	18.4	8.96	2011.865	1	
J 1864AC	19470+0705	12.8, 12.8	307.6	19.35	2011.865	1	
J 3009	19485+1843	11.1, 11.4	123.7	6.31	2011.865	1	
LDS1670	08109+7739	8.8, 12.6	271.7	16.89	2011.865	1	
POU4065	19463+2448	8.7, 11.5	305.9	12.11	2011.865	1	
POU4090	19484+2518	14.2, 15.6	213.7	14.18	2011.865	1	
POU4109AC	19496+2445	13.3, 14.8	285.6	10.75	2011.865	1	
ARA2285	22187-2236	11.8, 12.9	206.9	11.33	2011.761	1	
ARA2322	22124-2332	11.6, 12.7	79.1	12.18	2011.761	1	
B 2900	22059-1946	9.6, 13.2	195.7	14.64	2011.761	1	
BRT1360	22290+1200	11.3, 12.1	194.8	8.07	2011.761	1	
ES 386	22068+3435	7.4, 12.8	77.3	10.01	2011.761	1	
HJ 1764	22273-0715	10.5, 13.3	154.3	46.62	2011.761	1	
HO 474CD	22225+3021	12.6, 14.3	245.4	13.23	2011.761	1	
HO 641	22101+3221	8.7, 13.0	170.6	10.04	2011.761	1	
J 1793	22109+1545	13.9, 15.0	91.3	4.33	2011.761	1	
LDS2945	22310-2004	12.6, 16.8	253.1	9.28	2011.761	1	18
LDS4935	22003-0724	21.5, 17.0	156.8	5.66	2011.761	1	19
LDS4939	22038-2450	9.1, 9.3	346.1	97.65	2011.761	1	20
LDS5966	22396-2619	12.6, 14.8	325.7	105.36	2011.761	1	
SEI1549AB-C	22011+3915	10.4, 11.0	19.7	37.82	2011.761	1	21
STA228AC	22019+0446	9.7, 12.0	178.8	14.80	2011.761	1	
TOB 227	22134+3335	11.5, 12.3	264.4	26.74	2011.761	1	
ARA1134	18070-2005	12.6, 12.1	100.9	11.62	2011.709	1	

**Table 2 Notes:**

1. Magnitude of secondary is a little higher than the main star.
2. The object seems to be 1 arc minute in east-northeast. On the precise position there is another double star which does not seem to match the description so well. Correct position seems to be RA : 18 04 59.83 , declination -28 05 42.5.
3. The magnitudes are reversed. Still from other points of view the object is very close to expected.
4. Object a few arcseconds to the northwest. Correct position seems to be RA: 18 07 52.31, declination: 30 41 56.7
5. A few tens of arcseconds to southeast. Correct position seems to be RA: 23 49 47.13, declination: -11 35 36.4
6. Big difference on magnitudes
7. The object is a few arcseconds in south-southwest. Correct position seems to be RA: 19 40 54.83, declination: 28 28 27.3

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8. Strange object ( huge separation , low magnitudes ) but it matches quite well otherwise.
9. It seems old WDS measurement refers to BC and not AC ( possibly a typo error) . At least this is more plausible. We measure both AC and BC
10. The measurement might be not very precise because of the small separation. Still the double can be confirmed as valid.
11. At the specified position there is an object with quite high difference on PA. Separation is plausible ( considering the object was not measured for more than a century ) magnitudes are same as described but 12.6 instead on 14
12. Quite big difference but the only star from area of that magnitude is this one
13. Magnitude of primary higher than catalog values. Also high difference on PA but the main star is exactly on the specified position. So this seems to be closest match
14. High difference on magnitudes, but same difference on both components.
15. There are some other stars in the close neighborhood ( arcseconds ). This is the one which is closest to the last position.
16. Quite big difference on PA but no other candidate in the neighborhood
17. There are also some stars close to the oldest position in WDS. Still this is the closest match near last coordinate position. Considering the high speed of change in PA the identification is not 100% sure ( the field is quite rich in stars)
18. At the coordinates there is a star that matches the description from separation and magnitude points of view but the secondary is on the opposite side (like the old PA measurement was done somehow in the mirror on North-South axis )
19. Magnitude for main star might be incorrectly determined
20. The object from WDS seems to be measured reversed even B magnitude is higher than A
21. Quite different but still this is the better match. Main star is at specified coordinates.

Table 3. Double stars measured with the described telescope and Canon camera

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
J 1794	22110+1543	11.1, 11.6	229.1	5.35	2011.666	1	
POU5687	22194+2508	13.1, 13.8	226.9	13.76	2011.666	1	
POU5697	22238+2351	12.3, 13.9	208.2	17.70	2011.666	1	
STI1186	23331+6215	10.6, 12.5	252.7	13.82	2011.666	1	
STI2933AC	23048+5542	11.2, 12.3	164.6	9.85	2011.666	1	
HJ 1890AB	23309+6954	10.7, 13.0	237.1	8.47	2011.666	1	
POU3186	15236+2317	12.4, 14.5	338.6	13.21	2011.674	1	
POU3231	16316+2307	12.5, 14.6	209.7	21.99	2011.674	1	
POU3235	16382+2244	11.8, 12.1	234.1	5.80	2011.674	1	
POU3246	16489+2259	12.6, 13.8	165.6	16.62	2011.674	1	
SHJ 227AB	16219+1909	7.0, 9.4	227.9	42.79	2011.674	1	1
BU 1202AB-C	18015+0331	8.3, 10.0	27.5	105.23	2011.674	1	
BU 1202AB-E	18015+0331	8.3, 7.9	137.7	90.39	2011.674	1	
BU 1202CF	18015+0331	10.0, 13.7	163.0	17.36	2011.674	1	
STI1180	23259+6119	12.2, 11.7	62.2	13.10	2011.675	1	
STI2311	14357+5437	13.6, 13.6	110.0	7.30	2011.674	1	
STI2314	14415+5641	11.4, 13.2	169.7	15.15	2011.674	1	
STI 767	14343+6111	11.2, 13.1	148.0	6.01	2011.674	1	

Table 3 Note:

1. Magnitude for main star may be incorrectly determined

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Table 4. Double stars measured with the telescope and SBIG camera described in the text.

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
BUP 192AB	19331+0725	9.8, 14.5	355.8	14.34	2011.780	1	
STF1208AC	08233+6826	8.8, 11.0	326.1	20.85	2011.780	1	
STF2544AC	19371+0819	9.2, 10.1	238.1	13.63	2011.780	1	
HJ 2444AB	08306+5936	10.5, 13.2	34.2	12.57	2011.780	1	
J 2271AB	19348+0245	11.2, 11.2	267.1	39.16	2011.780	1	
J 133AC	19369+1116	7.2, 13.1	309.8	22.20	2011.780	1	
WAL 115AD	19369+1116	7.2, 11.4	50.1	63.04	2011.780	1	
STF1193AB	08207+7224	6.6, 9.9	90.7	40.40	2011.780	1	
BU 1363AC	01426+6033	8.0, 13.9	11.1	27.11	2011.879	1	
BU 1103AC	01433+6033	8.0, 10.7	309.6	68.54	2011.879	1	
BU 1103AD	01433+6033	8.0, 10.9	229.8	141.16	2011.879	1	
ARN 32AE	01433+6033	8.0, 8.0	267.7	316.99	2011.879	1	1
STI 265	01433+6023	12.1, 13.6	231.3	8.64	2011.879	1	
ES 115AD	00229+6214	8.7, 12.2	82.2	45.13	2011.879	1	
ABH 3AE	00229+6214	8.7, 12.9	191.9	57.64	2011.879	1	
HJ 2077AB	01497+7802	11.0, 11.7	106.3	15.69	2011.879	1	
LDS1523	01074+7708	13.0, 16.7	167.6	9.83	2011.879	1	
LDS1531	01332+8530	9.7, 14.6	137.4	11.95	2011.879	1	
STI1261	00035+6041	12.5, 13.0	161.7	14.01	2011.879	1	
STI 280	01449+6029	10.7, 11.7	123.8	9.16	2011.879	1	
STI 284	01458+6021	14.1, 13.6	154.8	11.16	2011.879	1	
STI1318	00185+5514	11.1, 13.1	253.5	14.81	2011.879	1	
BUP 224	21054+0557	7.4, 12.7	296.9	32.28	2011.882	1	
HO 147AC	21002+3658	8.5, 11.9	254.8	27.82	2011.882	1	
SEI1347	20590+3655	12.3, 13.1	125.0	18.30	2011.882	1	
SEI1360AB	21000+3655	11.0, 12.4	44.7	21.81	2011.882	1	
TOB 208AC	21000+3655	11.0, 12.2	232.1	32.07	2011.882	1	
LDS1634AB	06438+7648	10.4, 14.3	35.0	32.47	2011.882	1	
SEI1365	21009+3900	11.7, 12.7	263.1	18.32	2011.882	1	
GRV 408	21039+3655	11.0, 13.9	310.4	32.27	2011.882	1	
HJ 1610	21043+3608	10.0, 11.9	245.7	11.43	2011.882	1	
J 1794	22110+1543	11.2, 11.8	229.9	5.28	2011.761	1	
ARA1235	22050-1953	10.4, 11.9	96.3	7.24	2011.761	1	
SEI1550	22019+3919	10.9, 11.4	222.0	22.88	2011.761	1	
STTA228AB	22019+0446	9.7, 10.6	23.7	85.61	2011.761	1	
ABH 166AE	22324-1056	8.6, 14.2	98.0	56.36	2011.761	1	
S 726AD	19466+3253	6.8, 8.7	194.4	29.94	2011.865	1	
J2369AB	22236+2652	12.5, 13.1	210.0	7.50	2011.761	1	
STF2914AC	22324-1056	8.6, 12.9	243.7	28.42	2011.761	1	

Table 4 Notes:

1. E is in fact the A component of BU 1363. So it seems there is some kind of duplicate.



## Neglected Double Star Measurements at the Astronomical Observatory of ...

Table 5. Neglected double stars measured but which could not be clearly identified

Name	RA+Dec	Mags	PA	Sep	Date	N	Notes
ARA 731	18089-1901	12.3, 14.2	213.1	14.80	2011.709	1	1
ARA 731	18089-1901	12.9, 13.1	223.4	6.19	2011.709	1	1
LDS1637	06523+7909	10.7, 14.9	46.5	62.87	2011.882	1	2
LDS1637	06523+7909	10.7, 15.1	70.7	37.50	2011.882	1	2

### Table 5 Notes:

1. At specified coordinates there is a double star that matches somewhat that described in the WDS but with some differences ( first from the table). At about 1.8 arcminutes in NE there is another one (second from table) which is very close to the description. We measured both of them but we consider that the most probable candidate is the one which is not at precise coordinates because it seems closer. Still the proper motion values from UCAC catalog is closer for the star which is at coordinates.
2. There is an object on the specified coordinates, but the primary star magnitude is considerably brighter. Moreover there are two stars that might be the secondary. The separation of one of them is closer than expected and the other is wider. Also the PA is smaller for one and larger for the other with quite close amounts. The magnitude of both candidates are almost same. We consider the one with smaller separation is the most likely candidate because the differences from the expected position is a little smaller. However, the differences are not big enough to be decisive, so we measured and presented both results.

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