Miscellaneous New Common Proper Motion Stars

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Abstract: We report the identification of fifteen new common proper motion stars detected during the course of an extensive data mining search in astrometric and non-astrometric databases. In order to compile our final list, several catalogs were searched and compared; this approach allows us to avoid overlooking potential pairs due to large differences in the proper motions quoted in different databases for the same pair of stars.

Introduction

Our data mining search was started about eight years ago, mainly as a first project for undergraduate astronomy students interested in learning the different options included in the - at that time - new tool called Virtual Observatory. In order to define a focus for the project, it was decided to aim the search at double stars in general, exploring them with a two-fold purpose: to detect unreported common proper motion stars (CPMS) and to improve the astrometric parameters (coordinates, proper motions, separations and position angles) of already known systems listed in the Washington Double Star Catalog (WDS). With the purpose of providing participants with comprehensive training, the idea was to work with a telescope and observe those pairs showing large variations and differences with the values quoted in the WDS.

After a short time of searching, a wealth of data was collected and some students had the opportunity to use the Yale Southern Observatory Double Astrograph, located on the eastern side of the Andes (San Juan, Argentina) where they were introduced to the use of CCD detectors. Reports about our data mining program in general have been published by López (2004, 2006) and López, Mallamaci and Veramendi (2004). For different reasons, the program was in some way discontinued and a large amount of information was left on stand by for roughly five years.

In 2009 it was decided to resume the search starting by a general revision of all the material. In doing so, new CPMS were identified and other types of objects were included in our search (see López, 2008 and López and Varela Mugas, 2008 for details). We are now able to communicate some results, while about 500 new additional CPMS are still being processed and will be communicated as soon as possible.

Search and Results

Our search was first conducted by analyzing southern areas of the SuperCOSMOS Sky Survey Catalogue (SSS) (Hambly *et al.* 2001) around LDS doubles. This approach was used to improve the astrometric data for the LDS themselves as well as to detect potential new members for those systems. At the same time, the search was oriented to the detection of new, unreported CPMS. To this end, different limits and constraints were applied to the detections. In all cases, Halbwachs' (1986) criteria were used to

keep or reject the pairs.

After a list of pre-selected objects was compiled, we made a comparison of the astrometric data quoted in SSS, NOMAD (VizieR I/297), UCAC3 (VizieR I/315), and 2MASS Point Sources (VizieR II/246). This step allowed us to detect large differences (mainly in proper motions) among the catalogs we used (see the comment below for the system 12AB).

Our identifications are listed in Table 1. We refer to them as unreported since they were not found in the online version of the WDS we checked on September 19, 2010. For each star, we list an object identification, Right Ascension and Declination (from 2MASS), magnitude, proper motion (in mas/yr), epoch and PA (in degrees) and Sep (in seconds of arc). This data was primarily taken from the SSS, although some information was extracted from NOMAD and UCAC3.

Since the data we present in Table 1 has been taken from a variety of astrometric sources, we decided to use the coordinates given in 2MASS to compute the PA and Sep in order to have a more uniform type of data. The epochs listed in this Table correspond to the 2MASS epoch for each Right Ascension and Declination.

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Table 1 begins on the next page.

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Table 1: Data on the individual star of each pair.

Object	RA (2000.0) Dec	Mag	pmRA	pmDec	Epoch	PA	Sep	Notes
1 A	00 00 03.819 -01 22 24.42	12.3	123.9	34.6	1998.8	347	6.2	1
B	00 00 03.725 -01 22 18.38				1998.8			
2 A	00 06 29.729 -07 37 07.73	14.6	-48.3	-49.6	1998.8	299	48.6	2
B	00 06 26.873 -07 36 44.13	17.2	-46	-42	1998.8			
3 A	00 17 38.109 -32 50 00.19	16.3	121.9	-100	1998.9	181	13.5	
B	00 17 38.084 -32 50 13.65	17.8	120.1	−93.7	1998.9			
4 A	00 44 36.893 -39 17 13.13	12.6	175.4	29	1999.6	152	92.4	
B	00 44 40.569 -39 18 35.07	19.7	181.5	32.1	1999.6			
5 A	01 20 46.347 -09 33 36.52	15.3	48	84	1998.8	90	8.9	3
B	01 20 46.946 -09 33 36.53	19.8	58	76	1998.8			
6 A	01 23 07.832 -32 40 23.42	17.3	100.9	-137.4	1998.9	286	44.7	
B	01 23 04.427 -32 40 11.06	18.6	102.6	-134.4	1998.9			
7 A	01 25 08.736 -15 47 02.88	18.1	55.7	-13	1998.6	335	25.8	
B	01 25 07.987 -15 46 39.44	19.2	57.2	-13.8	1998.6			
8 A	01 26 36.747 +00 37 30.94	18.1	-10	-62	2000.7	96	12.5	4
B	01 26 37.574 +00 37 29.56	18.9	-10	-60	2000.7			
9 A	01 32 45.961 -13 36 36.06	14.8	110.5	13.1	2000.9	347	14.3	
B	01 32 45.739 -13 36 22.17	18	104.4	9.1	2000.9			
10 A	02 42 43.914 -15 13 05.67	16.7	-20	-68	1998.6	224	28	5
B	02 42 42.580 -15 13 25.98	17.7	-20	-74	1998.6			
11 A	02 48 47.151 -03 01 08.05	10.8	171.9	100.3	1998.7	333	49.3	6
B	02 48 45.665 -03 00 24.11	19.8	160	106	1998.7			
12 A	02 57 06.336 -12 43 59.40	15	−37.0	-132	1998.6	18	8.9	7
B	02 57 06.520 -12 43 50.87	15.7	−42.0	-103	1998.6			
13 A	03 26 59.834 -20 47 22.29	13.8	150.5	-46.3	1998.9	28	61.9	
B	03 27 01.934 -20 46 27.79	14	143.6	−48.0	1998.9			
14 A	03 33 18.327 -43 25 10.02	14.5	239.1	146.9	1999.6	21	16.3	8
B	03 33 18.870 -43 24 54.81	19.8	220.6	144.7	1999.6			
15 A	09 25 58.176 -15 35 14.66	14.7	−44.0	−20.0	1998.2	19	37.2	9
B	09 25 59.017 -15 34 39.53	17.9	-52	-28.0	1998.2			

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Table Notes

1. Proper motion and V magnitude for the A component taken from NOMAD. The B component is not included in the SSS and the NOMAD proper motion is zero in both coordinates. The A component is also included in UCAC3. Due to the small separation between these two stars we have been not able to determine a reliable proper motion for both components, however the blinking of POSS1 and POSS2 images clearly shows these two stars share a very similar proper motion. A composite image of the pair is shown in Fig. 1.

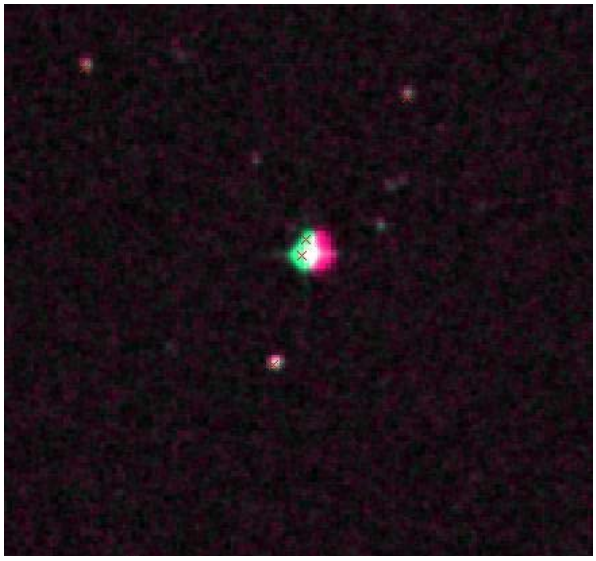

Figure 1: Aladin composite (POSS1, red and POSS2, green) image showing the motion of this pair. The crosses mark 2MASS positions. For all the figures, North is up and East is to the left.

2. Proper motions and B magnitudes taken from NOMAD.
3. Proper motions and B magnitudes taken from NOMAD.
4. Proper motions and B magnitudes taken from NOMAD.
5. Proper motions and B magnitudes taken from NOMAD. This pair should not be confused with the nearby LDS 5391. See Fig. 2 for a proper identification.
6. Proper motion and B magnitudes taken from NOMAD.
7. The available proper motion determinations of this system are very discordant. The two stars are included in UCAC3, but with no proper motion determination for the A component and zero for the B one. They are also included in NOMAD with zero proper motion for A and a motion for the B component that does not match what is seen in the blinking of POSS1 and POSS2 images. This system is also included in the SSS with a proper motion that depends on the passband. The proper motion quoted on Table 1 is a preliminary value determined by us through the rereduction of DSS plate areas around this pair. The B magnitudes are from NOMAD. These two stars should not be confused with the nearby LDS 5406. A composite image of the pair is shown in Fig. 3.

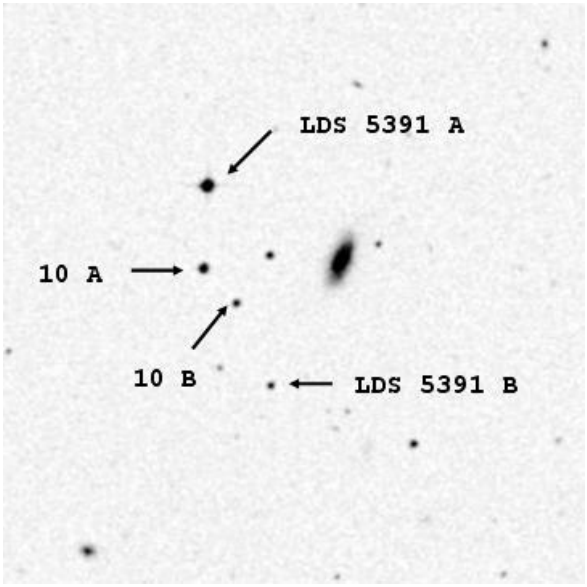

Figure 2: Location of pair 10 with respect to LDS 5391.

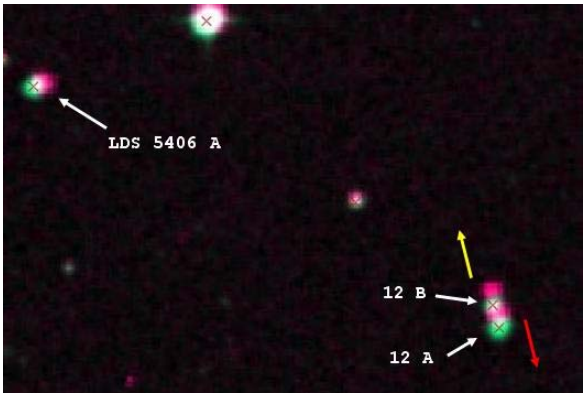

Figure 3: Aladin composite image showing the motion of pair 12. The yellow arrow shows the direction of motion according to the proper motion quoted by NOMAD for the B component. The red arrow represents the direction of motion suggested by the blinking of POSS1 (red, epoch 1955) and POSS2 (green, epoch 1995) images. The crosses mark 2MASS positions.

8. The A component is UCAC3 star, but with no proper motion determination.
9. Proper motions and B magnitudes taken from NOMAD. This pair is around 4.5 arc minutes to the south of the A component of LDS 3891. See Fig. 4 for a proper identification.

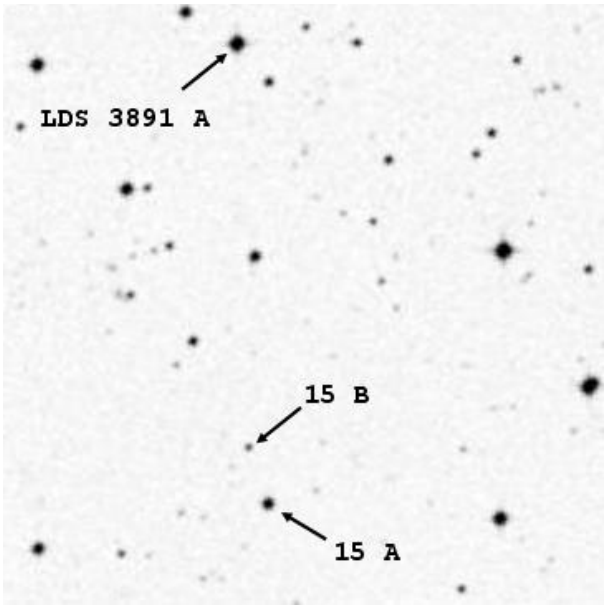

Figure 4: Location of pair 15 with respect to the A component of LDS 3891.

Carlos E. López teaches an introductory course in astronomy for undergraduate students at the National University of San Juan, Argentina.