Eleven Previously Unreported Common Proper Motion Systems

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Abstract: This paper presents information on 11 pairs of stars extracted from the UCAC4 catalog (Zacharias et al., 2012) where the similarities in the proper motions in both right ascension and in declination strongly suggest that the pairs share a common proper motion.

Method

All these pairs were discovered serendipitously during trials carried out using a range of different algorithms that had been created to speed up the process of identifying and characterising previously unreported common proper motion binary star systems.

The current system can process the astrometric and photometric data from 100,000 objects at a time. Pairs of stars separated by less than any user-selected value can be identified and the exact separation and position angle is output as a tab-delimited file.

This file acts as the input file for a second algorithm which calculates the total proper motion of both components of each pair. A list of candidate common proper motion pairs is generated based on the percentage difference between the total proper motion of the two stars. The cut-off point – in other words, the maximum acceptable difference between the two values – can also be user-selected.

The third and final algorithm checks the proper motion of both components of each candidate in both right ascension and in declination and generates the web address for an image of the candidate pair from the Digitized Sky Survey. A tab-delimited file is generated that can be used to identify systems already listed in the Washington Double Star Catalog (Mason et al., 2001-2014).

Results

The relative positions and proper motions of the 11 newly reported binary star systems are presented in Table 1. The images presented in the results section (Figures 1 to 11) were obtained from the Digitized Sky Survey. This can be accessed at http://archive.stsci.edu/cgi-bin/dss_form .

Acknowledgements

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Table 1: Results for the eleven new common proper motion systems.

RA	DEC	MAG 1	MAG 2	PM 1 mas/yr	PM1 mas/yr	PM2 mas/yr	PM2 mas/yr	SEP arcsec	PA deg	EPOCH
01 43 05.7	-66 40 31.1	9.61	11.74	59.3	27.8	61.0	25.8	121.6	97.4	1990.98
01 55 18.9	+24 17 33.6	11.75	11.87	73.5	-64.0	71.5	-66.8	111.3	38.4	1994.98
01 55 46.5	-60 51 39.5	6.10	9.83	13.4	66.0	18.0	66.1	151.8	150.6	1991.25
03 03 49.5	-13 40 02.7	11.54	12.21	57.5	24.4	56.7	24.2	130.4	248.8	1995.05
04 02 25.5	+26 11 37.0	11.79	11.79	106.3	-42.2	104.3	-42.1	121.7	58.3	1995.90
04 11 04.8	-14 45 49.5	9.69	9.89	-43.0	-43.0	-43.6	-42.8	141.7	102.9	1991.33
05 36 57.3	-54 23 03.5	10.14	10.16	-16.3	144.5	-20.7	146.1	144.5	317.0	1989.11
06 35 28.5	-25 51 26.7	9.42	10.23	-2.5	80.7	-2.1	80.9	136.5	354.6	1984.33
07 06 42.4	+00 24 19.3	11.40	11.46	-44.7	-49.2	-45.4	-49.6	146.4	139.1	1998.31
08 31 15.5	+24 24 37.5	9.39	11.37	-73.8	-32.5	-73.2	-34.4	111.5	175.4	1984.07
11 08 32.1	-29 39 11.5	11.46	12.23	-86.6	15.1	-87.4	14.0	119.1	333.7	1986.16

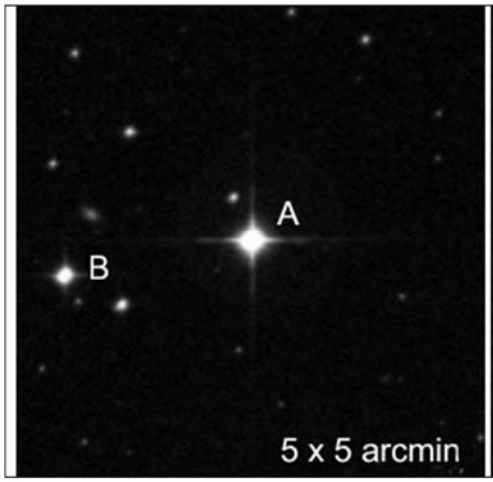


Figure 1.

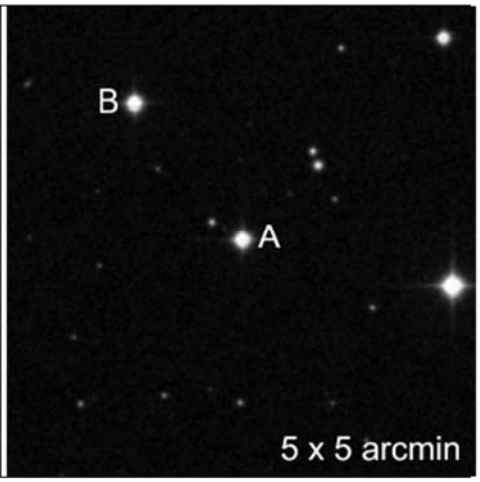


Figure 2.

Eleven Previously Unreported Common Proper Motion Systems

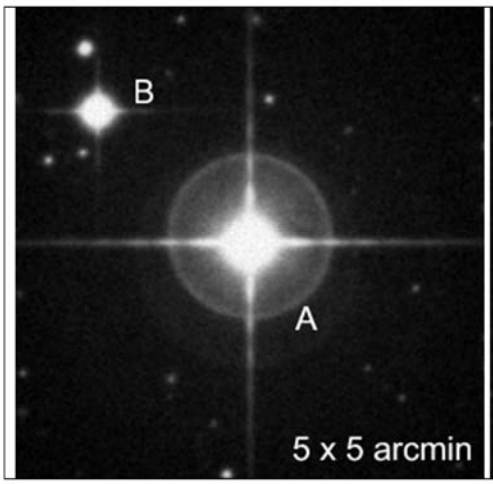


Figure 3.

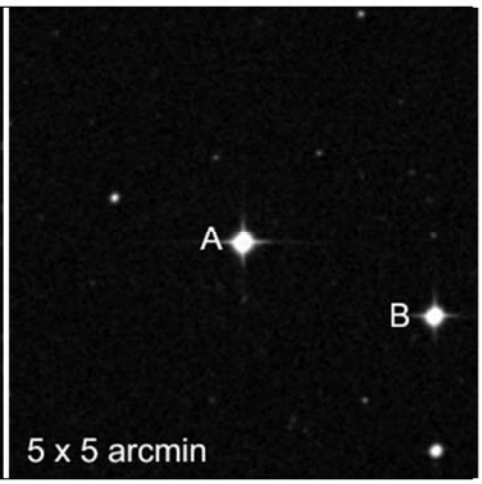


Figure 4.

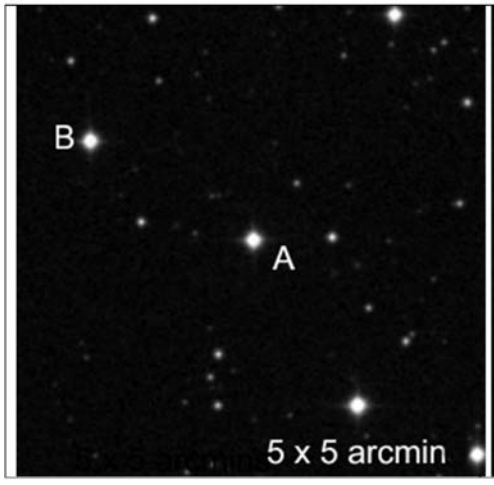


Figure 5.

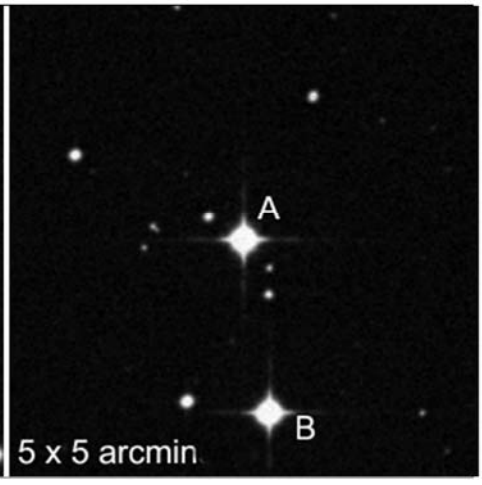
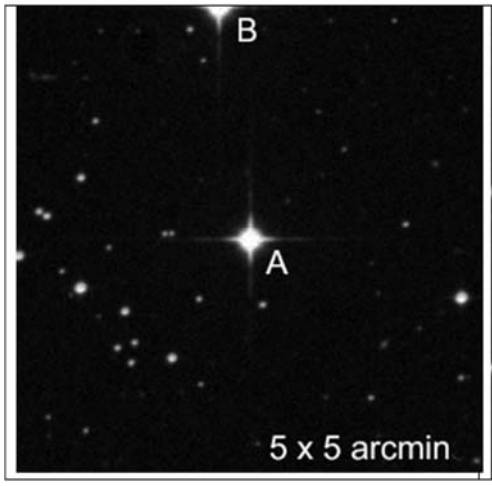


Figure 6.



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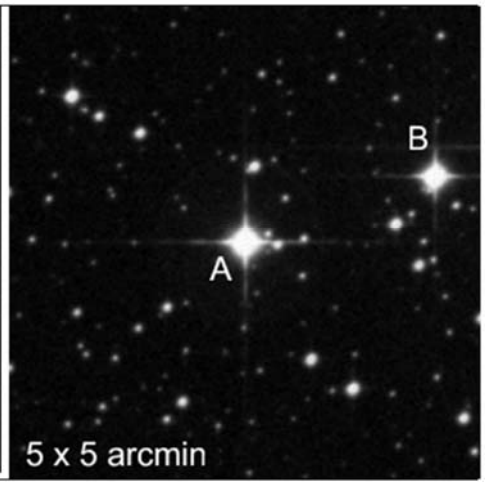
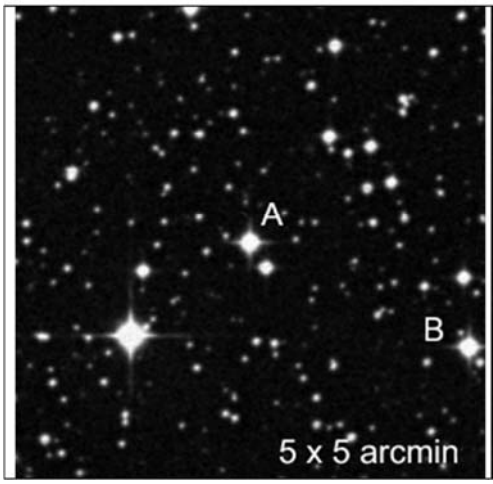


Figure 8.

Eleven Previously Unreported Common Proper Motion Systems



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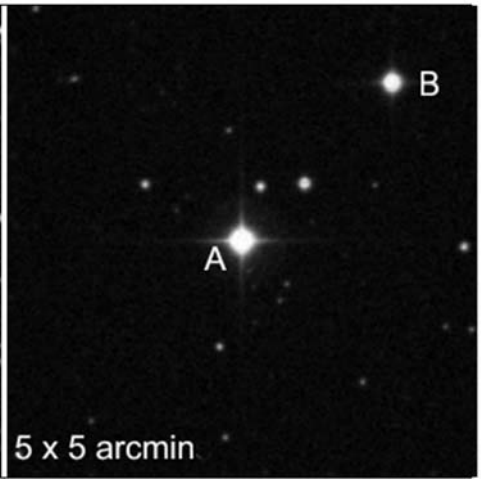

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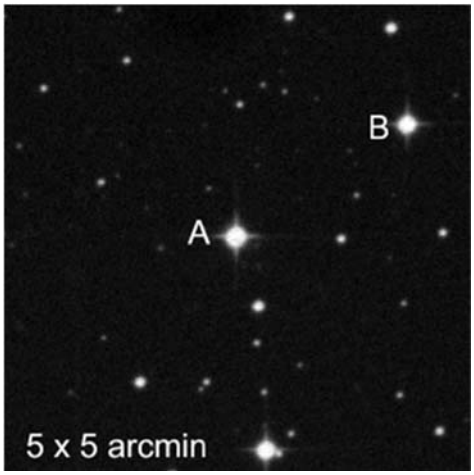

Figure 11.