

# 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

F. M. Rica

Double Star Section of Liga Iberoamericana de Astronomía (LIADA)  
Astronomical Society of Mérida  
[frica0@gmail.com](mailto:frica0@gmail.com)

**Abstract:** In this work the discovery of 145 new high ( $\mu > 0.15 \text{ mas yr}^{-1}$ ) common proper motion binaries selected from the LSPM-North Catalog is presented and the study of other 75 uncataloged binaries at the beginning of this work but recently discovered before the publication of this article. Four hundred fifty-three astrometric measures (position angles and angular distances) were performed using astrometric catalogs (2MASS, CMC14 and SDSS). Spectral types, photometric distances and kinematics were determined from data obtained consulting the literature. Orbital periods and the semimajor axes were calculated. Of the stars in the sample, there are 5 stars nearer than 25 pc, 73 subdwarfs and 9 white dwarfs unreported in the literature. Of the binaries, some are composed of two subdwarfs and others are composed of two white dwarfs. Others have very wide physical separations (13 binaries with  $s > 20,000 \text{ AU}$ ) and 4 binaries are very wide ( $s > 5,000 \text{ AU}$ ) low-mass ( $M_a + M_b < 0.4$ ) binaries.

## 1. Introduction

For several years double-star amateurs (most of them Spanish observers) have contributed to the astronomical community with interesting works (see *Introduction* section in Rica (2008)). Recently R. Caballero (2009, 2010a, 2010b) and R. Caballero *et al.* (2010) has published in JDSO articles reporting in total about 536 new uncataloged and wide common proper motion binaries. Other works are Benavides *et al.* (2010) with 141 new binary stars, Miret *et al.* (2011) and Miret & Tobal (2009, 2010) discovered 623 new binaries. Recently same Spanish amateurs have presented 387 new wide binaries in El Observador de Estrellas Dobles (OED) magazine (Agudo 2012; Benavides 2012; González 2012).

It is logical to think that most of the wide binaries have been discovered, but in this work 145 new high ( $> 0.15 \text{ arcsec yr}^{-1}$ ) common proper motion pairs

not cataloged are presented.

Section 2 details how these new binaries were discovered; sections 3-7 describe the astrophysical study consulting astronomical literature, spectral type estimates, distance estimations, reddening corrections and stellar masses. Section 8 explains how the semimajor axis and orbital periods were obtained. In section 9 the astrometric measures and the astrophysical results are presented.

## 2. Searching for New Binaries

Pairs of stars with similar proper motions were searched for in the *LSPM-North Catalog* (Lepine & Shara 2005). This table contains 61,977 stars with proper motion greater than  $0.15 \text{ arcsec yr}^{-1}$ . The search was performed using the *TopCat* tool, a tool of the Virtual Observatory, exactly using an internal join (*Internal Match*) and selecting all the pairs of entries with similar proper motions and with a maxi-

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

imum angular separation of 360 arcsec. This search selected 2398 pairs of stars.

The selected pairs of stars were crossed with the WDS catalog using the *VizieR* tool. Finally 802 new and uncataloged common proper motion pairs were found. A visual inspection is needed to confirm the real existence of these binaries and in this work we only present the 220 most conspicuous binaries which 75 binaries were recently discovered (Agudo 2012; Benavides 2012; R. Caballero (2012) (CBL); González 2012; López 2012) and same of them yet not cataloged in the WDS. Others binaries were recently listed in the Garraf Wide Pairs: CPM wide pairs ( $>50 \text{ mas yr}^{-1}$ ) discovered in the Garraf Astronomica Observatory (OAG) CPMWP Survey.

### 3. Consulting the Astronomical Literature

The astronomical literature was consulted in order to obtain photometric, astrometric, kinematical data and other information. *Aladin*, *VizieR*, *Simbad* (Wenger *et al.* 2003) and the “services abstract” tools were used from the website of Centre de Données Astronomiques de Strasbourg (CDS), maintained by the Strasbourg Observatory, and the Astrophysical Data Services (ADS) maintained by the NASA.

Photometry in B, V and I bands came from the Hipparcos (ESA 1997) and the Tycho-2 (Hog *et al.* 2000) catalogs. Infrared J, H and K photometry came from the Two Micron All Sky Survey (Cutri 2000), hereafter 2MASS. The proper motions came mainly from the *LSPM-North Catalog* (Lepine & Shara 2005) and from the Tycho-2, UCAC-3 (Zacharias *et al.* 2010) and the PPMXL (Roesser, Demleitner, & Schilbach 2010) catalogs. The Tycho-2 catalog was chosen because the Hipparcos proper motions could be affected by Keplerian motion due to its smaller baseline. Spectral types, radial velocity and other astrophysical data were taken from several sources from CDS web page.

### 4. Spectral Types and Luminosity Class Estimates

The spectral types and the luminosity classes were obtained using the same procedure published in Benavides *et al.* (2010). In this work we also obtained the spectral types for the cool subdwarfs using the relationship between the V - K color and the spectral types. We could not determine the spectral types for white dwarfs. They are listed as “wd”.

### 5. Distance Estimation and Reddening Correction

The distance was calculated using our determination of the absolute magnitude, therefore they are photometric distances. For the reddening correction, we followed the same procedure published in Benavides *et al.* (2010). In this work, we determined the absolute magnitude in the K band for cool subdwarf stars using the relation of Legget (1992) for halo stars, mainly using only V - K color in the range from 3.5 to 9.0. For subdwarfs with V - K  $< 3.5$  the absolute magnitude could not be obtained. For stars with no 2MASS counterpart but listed in SDSS, the spectral type and luminosity class could be obtained using SDSS photometry and reduced proper motion diagrams (Jones 1972, Salim & Gould 2002, Nelson *et al.* 2002).

### 6. Stellar Masses

In this work the luminosity-mass relation of Henry & McCarthy (1993) was used if the star has a K absolute magnitude between 3.07 and 9.81 (stellar masses of  $0.08 \leq M_{\text{sun}} \leq 1.0$ ). This relation uses the K absolute magnitude which is obtained from Mv and V - K color.

The mass error when the Henry & McCarthy (1993) relation is used, is 21% for 0.08-0.50 Msun and 15% for 0.50-1.0 Msun. For evolved stars an arbitrary error of 25% for stellar masses was fixed. Other mass-luminosity relations used include:

- The relation between absolute magnitude (in J, H and K band) and stellar mass of Delfosse *et al.* (2000) for stars with masses  $< 0.6 M_{\text{sun}}$ .
- The relation spectral type – absolute magnitude from the website <http://isthe.com/chongo/tech/astro/HR-temp-mass-table-byhrclass.html> for giant stars.
- The relation spectral types–stellar masses of Kirkpatrick & McCarthy (1994) for stars with spectral types M1V-M6.

The final stellar mass is an average of those intermediate values determined previously by the different relationships. The stellar masses for subdwarfs were calculated assuming that they are normal stars.

### 7. Studying the Nature of the Visual Stellar Systems

In this work a deep study of the nature for these pairs of common proper motion (MPC) was not per-

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

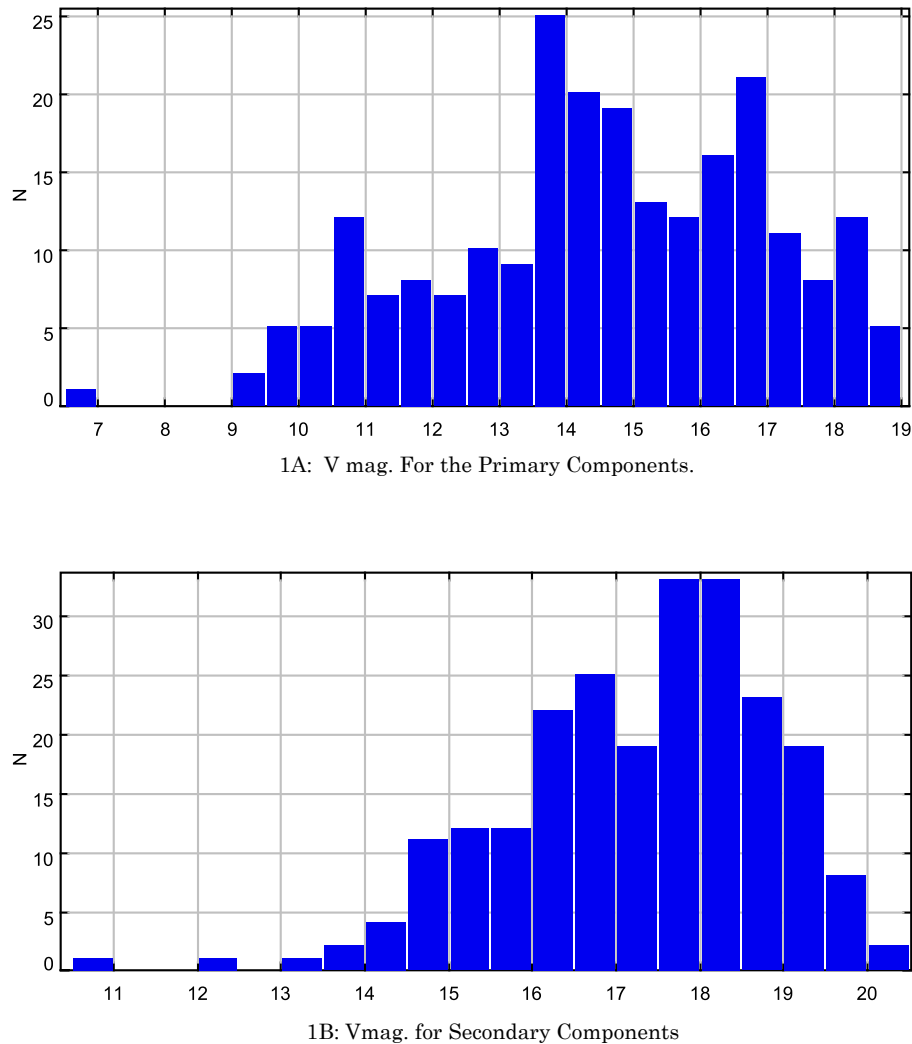
formed. Therefore, the only evidence of binarity is the high common proper motion ( $\mu \geq 0.15$  arcsec yr<sup>-1</sup>). Other binarity evidence could be the photometric distance of the stellar components, although due to the significant error in the distances calculated in this way, it must be used with caution. Most of the binaries listed in this work likely are common origin binaries, that is, binaries in which the stellar component does not orbit around the mass center. While a low-medium percentage of them could be physical binaries which stellar components is orbiting around the center of mass.

### 8. Semimajor Axis and Orbital Periods

For the semimajor axis and orbital period estimation, the same procedure published in Benavides et al. (2010) was followed.

### 9. Results

In this work astrometric measures for the 220 binaries was performed. In addition to this, an astrophysical characterization for the 440 stellar components was performed. The expected semimajor axes and orbital period was estimated for all the stellar systems. Most of the stars in my sample are red dwarfs (K-M spectral types) and cool subdwarfs in



**Figure 1:** (A) Distribution of the V magnitude for the primary components. (B) Distribution of the V magnitude for the secondary components.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

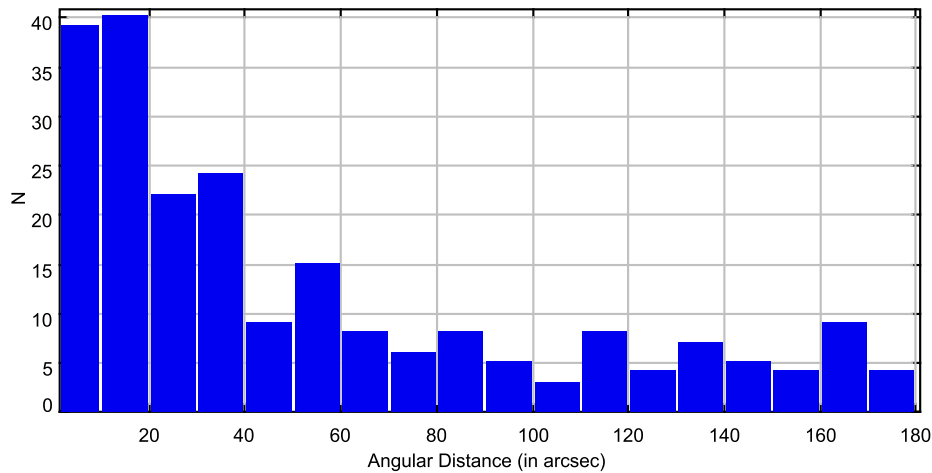


Figure 2: Distribution of the angular separations (in arcsec).

addition to a few white dwarfs. Therefore the weakness of the stars is shown in the apparent magnitudes with a weak end of 18-19 magnitude for the primary components and 20.0-20.5 magnitudes for the secondary components. Figures 1A and 1B show a magnitude distribution for the primary and secondary components.

### 9.1 Measurements of the Position Angle and Angular Separation

Table 1 lists 453 measurements of position angles ( $\theta$ ) and angular distances ( $\rho$ ) for 220 binaries stars. These measures were obtained automatically (programming small computed routines) using the positional data (RA and DEC) and epochs for the 2MASS, Carlsberg Meridian Catalog 14 (CMC 2006, hereafter CMC14) and Sloan Digital Sky Survey (Adelman-McCarthy *et al.* 2009, hereafter SDSS) catalog. When no counterpart in these catalogs exists, then the DSS photographic plates were used to obtain astrometric measures. The observational epochs range from 1951.513 to 2005.841 and the angular separation ranges from 4.54 to 177.17 arcsec (mean of 53.7 arcsec). In Table 1, column 1 lists the designation name proposed for the stellar system. For Lopez (2012) binaries we use the LSPM designation because they are not listed in WDS at the writing of this article. Columns 2 and 3 list the equatorial coordinate for equinox 2000. The Besselian epoch, theta ( $\theta$ ) and rho ( $\rho$ ) values are listed in columns 4-6. Positional angles are expressed for 2000 equinox. The observational method code is given in column 7. The code for the observational method is

2MASS for measures obtained from astrometric data (RA and DEC) of the 2MASS catalog; CMC14, if the AR and DEC came from the CMC14 catalog and SDSS, if the AR and DEC came from the SDSS catalog. If a DSS photographic plate was used, this column shows “DSS”.

Figure 2 shows the distribution of the angular separation. Most of the double stars have angular separations closer than 40 arcsec.

The CMC14 and the SDSS catalogs were accessed via *VizieR* tools. The CMC14 is an astrometric and photometric catalogue of 95.9 million stars in the red (SDSS  $r'$ ) magnitude range 9 to 17 and covers the declination range  $-30^\circ$  to  $+50^\circ$ . It was compiled using digital images taken by a CCD camera attached on the Carlsberg Meridian Telescope, a refractor of 17.8 cm of diameter. The CCD camera was built by the Copenhagen University Observatory and it has a Kodak 2060 x 2048 (KAF-4202 Grade:C1) chip. The astrometric data (RA and DEC) is on ICRS system and it has an external accuracy of 33-34 mas for stars with  $r' < 13$  (88 and 63 mas in RA and DEC, for stars with  $r' = 16$ .)

The SDSS catalog was compiled using the CCD images taken by a 2.5 m telescope at Apache Point Observatory in New Mexico (USA). This telescope takes images using a photometric system of five filters (named  $u$ ,  $g$ ,  $r$ ,  $i$  and  $z$ ). The telescope's camera is made up of 30 CCD chips each with a resolution of  $2048 \times 2048$  pixels, totaling approximately 120 megapixels. The astrometric data (RA and DEC) is on ICRS system and it has an error of 45 mas.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

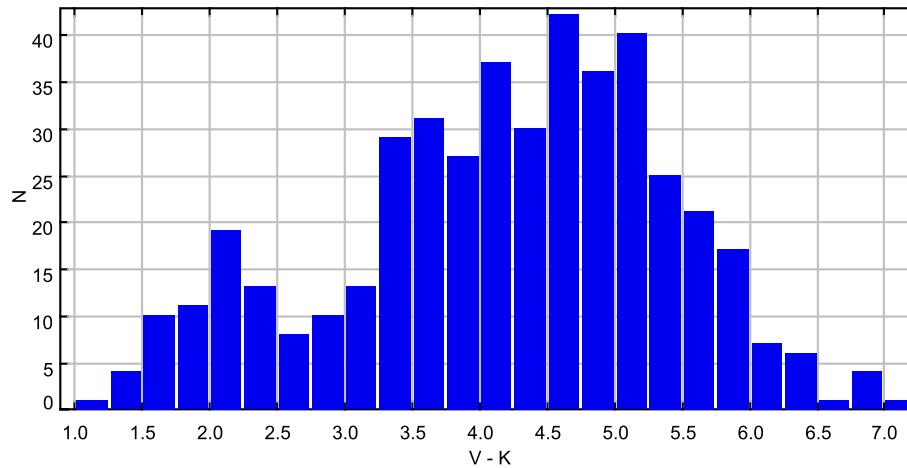


Figure 3. Distribution of the V – K colors.

### 9.2 Astrophysical Results

These binaries with high common proper motions have an important astrophysical interest. An astrophysical characterization was performed for the 440 stellar components determining the spectral types, absolute magnitudes, photometric distances, tangential velocities and stellar masses. Photometric data was corrected by the interstellar reddening.

Table 2 presents the astrophysical characterization for the stellar components. Column 1 lists the proposed designation name and the stellar component. Column 2 and 3 list the RA and DEC position for 2000 Equinox. These positional data were taken from the 2MASS catalog. Columns 4 – 8 show photometric data (V, B - V, K, J - K and V - K). Columns 9 and 10 list the proper motions in RA and DEC extracted from the *LSPM-North Catalog*. Columns 11 through 14 list the spectral type, V absolute magnitude, photometric distance (in pc) and tangential velocity (in  $\text{km s}^{-1}$ ). And finally the columns 15 and 16 list the stellar mass, in solar mass, and the reddening in B-V.

#### 9.2.1 Photometric data and Estimation of the V magnitude

Photometric data in the Hipparcos, Tycho-2, SDSS, CMC14 and UCAC3 catalogs were used. For each star, the procedure to select the V magnitude is as follows: if the star is listed in the Hipparcos catalog, the V magnitude is used if it is brighter than 10<sup>th</sup>. Otherwise, if the star is listed in the Tycho-2 catalog, the  $V_{\text{TYC}}$  photometry (converting to Johnson system

using standard transformations) is used if  $V_{\text{TYC}} < 11.25$  and the error in  $V_{\text{TYC}} < 0.2$ . Otherwise, the averaged V magnitude is estimated from the CMC14 and the UCAC3 catalogs (Rica 2011). If the star is not listed in the CMC14 and the UCAC3 catalogs then the V magnitudes inferred using SDSS photometry (Rica 2011) is selected.

In spite of this procedure, weak stars were found for which no V magnitude was estimated. For these stars, the V magnitudes listed in the *LSPM-North Catalog* were used, which were determined using photographic magnitudes from the USNO-B1.0 catalog ( $\pm 0.5$  mag). For the other stars, the V magnitudes were checked comparing them with the estimated V from the *LSPM-North Catalog*. When the difference was greater than 0.5 magnitudes, other values for V using GSC2.3 and USNO-B1.0 was estimated to reject wrong values.

For a few stars, the B - V color was listed. It mainly came from the Hipparcos and the Tycho-2 catalogs. The J, H, and K photometry came from the 2MASS catalog. Figure 3 shows the distribution in the V - K colors

#### 9.2.2 Spectral Type Estimation

The spectral types and luminosity classes for 456 stars were estimated. Two hundred and eighty eight stars were classified as M red dwarfs. The coolest star was 0550+0939 B, a near star (18.9 pc) of M6V spec-

(Continued on page 293)

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1. Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
FMR 29	00 11 41.96	+03 23 17.6	1998.877	189.11	6.74	2MASS
FMR 29	00 11 41.96	+03 23 17.6	2001.134	186.98	6.77	CMC14
FMR 30	00 23 55.55	+16 46 45.9	1997.544	57.06	173.39	2MASS
FMR 30	00 23 55.55	+16 46 45.9	2001.594	57.02	173.65	CMC14
FMR 31	00 41 30.19	+07 28 34.8	2000.724	262.22	32.08	2MASS
FMR 31	00 41 30.19	+07 28 34.8	2005.742	262.22	32.11	SDSS
FMR 32	00 42 15.23	+07 31 18.6	2000.724	275.16	13.10	2MASS
FMR 32	00 42 15.23	+07 31 18.6	2005.742	275.53	13.38	SDSS
FMR 33	00 44 27.83	+19 35 05.3	1997.760	253.80	9.11	2MASS
FMR 33	00 44 27.83	+19 35 05.3	2001.501	253.44	9.08	CMC14
FMR 34BC	00 50 21.36	+59 23 19.4	2000.033	135.35	15.75	2MASS
FMR 35	00 50 12.71	+62 34 58.8	1999.869	112.48	20.29	2MASS
FMR 36	00 53 11.05	+31 44 13.5	1997.916	39.79	159.68	2MASS
FMR 36	00 53 11.05	+31 44 13.5	2001.986	39.75	159.54	CMC14
FMR 37	00 56 17.47	+81 03 15.3	2000.760	177.05	63.89	2MASS
FMR 38	00 59 51.55	+27 01 28.8	1997.828	261.41	72.91	2MASS
FMR 38	00 59 51.55	+27 01 28.8	2001.679	261.50	73.03	CMC14
FMR 39	01 00 30.94	+09 33 09.8	2000.748	250.41	19.42	2MASS
FMR 39	01 00 30.94	+09 33 09.8	2001.129	250.16	19.46	CMC14
FMR 40	01 05 16.73	+16 20 24.9	1997.678	188.28	7.72	2MASS
FMR 40	01 05 16.73	+16 20 24.9	2001.619	188.80	7.74	CMC14
FMR 41	01 07 43.48	+57 59 11.5	1998.990	246.79	116.16	2MASS
0111+4248	01 11 55.14	+42 48 02.4	1998.839	215.27	115.15	2MASS
0111+4248	01 11 55.14	+42 48 02.4	2002.847	215.29	115.17	CMC14
FMR 42AB	01 15 50.17	+47 02 02.3	1998.839	330.37	27.14	2MASS
FMR 42AB	01 15 50.17	+47 02 02.3	2002.658	330.09	27.11	CMC14
FMR 43	01 21 32.50	+39 20 35.2	2000.752	238.86	15.80	2MASS
FMR 43	01 21 32.50	+39 20 35.2	2003.323	238.95	15.76	CMC14
FMR 43	01 21 32.50	+39 20 35.2	2004.653	238.63	15.76	SDSS
FMR 44	01 31 01.43	+54 31 55.4	1999.790	153.86	42.98	2MASS
FMR 45	01 56 19.06	+37 28 48.7	1998.858	33.76	6.79	2MASS
FMR 45	01 56 19.06	+37 28 48.7	2002.710	33.29	6.67	CMC14
FMR 46	02 00 01.17	+07 32 46.8	2000.732	342.30	18.13	2MASS
FMR 46	02 00 01.17	+07 32 46.8	2004.953	341.41	18.32	SDSS
FMR 47	02 00 20.14	+26 35 59.9	1997.842	94.91	13.96	2MASS
FMR 47	02 00 20.14	+26 35 59.9	2001.649	94.79	13.93	CMC14
0201+0218	02 01 15.09	+02 18 25.7	2000.656	151.50	63.84	2MASS
FMR 48	02 05 24.83	+17 09 22.1	1998.730	71.85	11.90	2MASS
FMR 49	02 12 39.74	+01 18 31.7	2000.205	46.48	7.33	CMC14
FMR 49	02 12 39.74	+01 18 31.7	2000.631	45.19	7.24	2MASS
FMR 50	02 22 41.63	+56 27 03.1	1954.754	14.21	30.47	DSS
FMR 50	02 22 41.63	+56 27 03.1	1957.965	14.16	30.37	DSS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
FMR 50	02 22 41.63	+56 27 03.1	1995.790	14.69	30.00	DSS
FMR 51	02 26 02.36	+53 24 49.3	1998.927	142.86	114.74	2MASS
FMR 52	02 27 41.12	+06 13 53.9	2000.741	279.34	6.95	2MASS
FMR 52	02 27 41.12	+06 13 53.9	2001.762	279.12	6.97	CMC14
FMR 52	02 27 41.12	+06 13 53.9	2005.781	279.34	6.96	SDSS
FMR 53	02 30 55.18	+62 48 50.8	1999.012	126.90	19.62	2MASS
FMR 54	02 31 33.05	+38 53 14.3	1998.774	209.76	7.34	2MASS
FMR 54	02 31 33.05	+38 53 14.3	2003.208	209.55	7.36	CMC14
FMR 55	02 32 29.68	+06 06 15.6	2000.661	56.49	18.47	2MASS
FMR 55	02 32 29.68	+06 06 15.6	2005.781	56.21	18.25	SDSS
CBL 212	02 32 43.60	+74 08 54.9	1999.823	160.42	14.78	2MASS
CBL 212	02 32 43.60	+74 08 54.9	2005.841	160.89	14.76	SDSS
CBL 213	02 33 01.14	+01 05 38.9	1999.970	344.52	29.17	CMC14
CBL 213	02 33 01.14	+01 05 38.9	2000.661	344.49	29.09	2MASS
CBL 213	02 33 01.14	+01 05 38.9	2001.890	344.56	29.13	SDSS
FMR 56	02 34 03.02	+09 50 14.0	2000.746	273.42	6.70	2MASS
FMR 57	02 40 09.93	+14 38 47.6	1998.735	97.61	9.75	2MASS
FMR 57	02 40 09.93	+14 38 47.6	2001.882	97.59	9.70	CMC14
FMR 58	02 44 21.78	+32 07 16.5	1999.845	48.29	63.38	2MASS
FMR 58	02 44 21.78	+32 07 16.5	2002.208	48.26	63.54	CMC14
FMR 59	02 51 07.90	+06 48 23.3	1999.959	322.65	47.04	2MASS
FMR 59	02 51 07.90	+06 48 23.3	2001.408	322.66	47.10	CMC14
FMR 59	02 51 07.90	+06 48 23.3	2004.953	322.74	47.16	SDSS
FMR 60	02 51 30.43	+34 06 37.5	1994.172	48.27	77.38	SDSS
FMR 60	02 51 30.43	+34 06 37.5	1997.962	48.22	77.25	2MASS
FMR 60	02 51 30.43	+34 06 37.5	2003.685	48.25	77.36	CMC14
FMR 61	02 53 59.42	+66 06 07.3	2000.170	343.65	9.10	2MASS
FMR 62	03 17 26.20	+64 03 57.8	1999.022	172.20	52.28	2MASS
GWP 453	03 20 52.06	+12 09 56.4	1998.738	215.32	53.81	2MASS
GWP 453	03 20 52.06	+12 09 56.4	2000.901	215.20	53.69	CMC14
0323+1506	03 23 27.30	+15 06 52.0	1998.738	185.33	67.85	2MASS
0323+1506	03 23 27.30	+15 06 52.0	2001.036	185.32	67.71	CMC14
GWP 512	03 47 07.04	+05 20 16.9	1955.939	246.25	6.80	DSS
GWP 512	03 47 07.04	+05 20 16.9	1996.686	242.61	6.90	DSS
FMR 63	03 50 50.19	+45 45 34.1	1999.766	327.37	27.69	2MASS
FMR 63	03 50 50.19	+45 45 34.1	2002.858	327.68	27.83	CMC14
FMR 64	04 11 26.59	+54 24 02.9	2000.793	168.42	172.08	2MASS
FMR 64	04 11 26.59	+54 24 02.9	2004.790	168.49	172.11	SDSS
FMR 65	04 17 51.16	+51 43 36.7	1999.785	333.09	13.10	2MASS
FMR 66	04 24 49.26	+01 06 56.1	1999.986	106.45	25.89	CMC14
FMR 66	04 24 49.26	+01 06 56.1	2000.071	106.71	25.82	2MASS
0433+0013	04 33 17.84	+00 13 59.5	1999.953	40.72	19.03	CMC14

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
0433+0013	04 33 17.84	+00 13 59.5	2000.071	40.59	19.07	2MASS
FMR 67	04 48 06.47	+41 38 04.7	1998.779	94.23	8.39	2MASS
0509+1038	05 09 42.59	+10 38 43.8	1999.987	316.91	45.43	2MASS
FMR 68	05 19 34.13	+34 20 38.7	1998.088	122.53	50.72	2MASS
FMR 68	05 19 34.13	+34 20 38.7	2002.937	122.51	50.77	CMC14
0524+0315	05 24 49.76	+03 15 15.4	2000.082	245.93	48.26	2MASS
0524+0315	05 24 49.76	+03 15 15.4	2000.597	245.96	48.31	CMC14
FMR 69	05 44 17.22	+30 38 31.6	1998.091	88.19	50.04	2MASS
FMR 69	05 44 17.22	+30 38 31.6	2002.797	88.18	50.02	CMC14
FMR 70	05 45 45.39	+66 38 30.2	2000.703	129.57	11.17	2MASS
0546+1116	05 46 17.26	+11 16 46.6	1999.765	207.08	53.81	2MASS
0550+0939	05 50 11.74	+09 39 49.2	1999.705	317.28	16.19	2MASS
0550+0939	05 50 11.74	+09 39 49.2	2000.940	317.27	15.81	CMC14
FMR 71	05 51 49.91	+18 04 29.4	1998.752	195.81	20.27	2MASS
FMR 71	05 51 49.91	+18 04 29.4	2002.074	195.93	20.43	CMC14
GWP 736	06 05 03.52	+07 23 30.5	1999.812	347.26	8.75	2MASS
GWP 736	06 05 03.52	+07 23 30.5	2000.825	347.54	8.57	CMC14
GWP 744	06 06 13.38	+06 48 22.3	2000.025	297.70	9.22	2MASS
0610+2802	06 10 25.64	+28 02 23.6	1998.020	170.88	161.00	2MASS
0610+2802	06 10 25.64	+28 02 23.6	2002.773	170.90	160.99	CMC14
0610+4439	06 10 43.98	+44 39 49.8	1998.843	39.49	142.03	2MASS
0610+4439	06 10 43.98	+44 39 49.8	2003.008	39.53	141.80	CMC14
FMR 72	06 10 48.30	+03 15 12.9	1999.894	280.87	45.47	2MASS
FMR 73	06 15 40.49	+34 27 03.8	1995.122	119.04	7.52	SDSS
FMR 73	06 15 40.49	+34 27 03.8	1998.891	119.18	7.55	2MASS
FMR 73	06 15 40.49	+34 27 03.8	2002.825	120.38	7.36	CMC14
FMR 74	06 18 10.57	+67 04 15.2	1999.820	25.55	7.61	2MASS
0628+2829	06 28 28.26	+28 29 23.0	1998.037	148.22	100.24	2MASS
0628+2829	06 28 28.26	+28 29 23.0	2002.129	148.24	100.15	CMC14
FMR 75	06 28 31.05	+59 06 23.1	1999.009	349.44	36.68	2MASS
0649+2942	06 49 53.22	+29 42 03.8	1995.131	181.73	34.23	SDSS
0649+2942	06 49 53.22	+29 42 03.8	1998.058	181.77	34.23	2MASS
0649+2942	06 49 53.22	+29 42 03.8	2002.063	181.66	34.22	CMC14
FMR 83	06 51 04.45	+18 43 43.1	1997.908	330.63	111.71	2MASS
FMR 83	06 51 04.45	+18 43 43.1	2001.666	330.66	111.83	CMC14
FMR 76	06 58 34.34	+75 14 17.7	1999.156	169.93	131.42	2MASS
0705+4129	07 05 32.54	+41 29 10.0	1998.247	134.90	87.21	2MASS
0705+4129	07 05 32.54	+41 29 10.0	2003.159	134.89	87.18	CMC14
GWP 876	07 10 52.54	+06 12 30.6	1999.922	334.68	21.38	2MASS
GWP 876	07 10 52.54	+06 12 30.6	2001.178	334.77	21.39	CMC14
FMR 77	07 15 21.11	+03 01 27.8	1999.946	214.74	19.32	2MASS
0727+4228	07 27 50.77	+42 28 19.8	1998.302	172.75	32.08	2MASS

Table 1 continues on next page.



## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
0727+4228	07 27 50.77	+42 28 19.8	2003.838	172.84	31.85	CMC14
0727+4228	07 27 50.77	+42 28 19.8	2003.886	172.80	32.09	SDSS
CBL 235	07 28 20.77	+31 00 13.0	1995.128	296.10	9.40	SDSS
CBL 235	07 28 20.77	+31 00 13.0	1998.900	295.93	9.38	2MASS
CBL 235	07 28 20.77	+31 00 13.0	2003.115	296.02	9.65	CMC14
FMR 78	07 38 12.77	+43 34 24.0	1998.916	283.38	177.17	2MASS
FMR 79	07 40 57.40	+06 41 04.8	1999.924	353.01	6.91	2MASS
FMR 79	07 40 57.40	+06 41 04.8	2000.433	351.93	6.98	CMC14
0749+2435	07 49 54.56	+24 35 13.1	1998.774	342.11	96.92	2MASS
0749+2435	07 49 54.56	+24 35 13.1	2002.099	342.10	96.79	CMC14
0749+2435	07 49 54.56	+24 35 13.1	2002.106	342.05	96.85	SDSS
FMR 80	07 49 19.76	+49 50 31.2	2000.157	321.98	66.66	2MASS
FMR 80	07 49 19.76	+49 50 31.2	2002.959	322.08	66.63	CMC14
0802+0019	08 02 50.06	+00 19 09.1	2000.057	114.94	78.83	CMC14
0802+0019	08 02 50.06	+00 19 09.1	2000.072	114.95	78.68	2MASS
FMR 81	08 20 39.80	+48 03 18.0	2000.217	77.85	166.83	2MASS
FMR 81	08 20 39.80	+48 03 18.0	2000.258	77.93	166.95	SDSS
FMR 81	08 20 39.80	+48 03 18.0	2002.981	77.89	166.58	CMC14
BVD 202	08 31 20.84	+44 24 07.1	1998.302	27.64	34.75	2MASS
BVD 202	08 31 20.84	+44 24 07.1	2001.145	27.78	34.78	SDSS
CBL 263	08 37 33.75	+24 41 32.1	1998.091	132.75	99.38	2MASS
CBL 263	08 37 33.75	+24 41 32.1	2004.130	132.79	99.64	SDSS
0840+6144	08 40 04.61	+61 44 44.4	2000.225	74.94	84.72	2MASS
0840+6144	08 40 04.61	+61 44 44.4	2003.886	74.86	84.74	SDSS
FMR 82	08 48 51.11	+17 17 32.3	1998.878	244.72	168.16	2MASS
FMR 82	08 48 51.11	+17 17 32.3	2005.047	244.87	168.57	SDSS
0855+3732	08 55 59.87	+37 32 10.8	1998.253	125.48	80.25	2MASS
0855+3732	08 55 59.87	+37 32 10.8	2000.195	125.37	80.08	CMC14
0855+3732	08 55 59.87	+37 32 10.8	2002.038	125.50	80.23	SDSS
0900+0643	09 00 52.07	+06 43 31.5	2000.140	198.55	44.70	2MASS
0900+0643	09 00 52.07	+06 43 31.5	2000.238	198.61	44.65	CMC14
0900+0643	09 00 52.07	+06 43 31.5	2002.868	198.62	44.59	SDSS
FMR 84	09 00 26.61	+53 06 57.9	1999.826	35.23	99.24	2MASS
FMR 84	09 00 26.61	+53 06 57.9	2000.258	35.24	99.30	SDSS
0902+0600	09 02 51.27	+06 00 28.0	2000.083	15.86	105.48	2MASS
0902+0600	09 02 51.27	+06 00 28.0	2000.219	15.86	105.54	CMC14
0902+0600	09 02 51.27	+06 00 28.0	2002.868	15.85	105.65	SDSS
0906+7226	09 06 56.14	+72 26 09.3	1999.315	73.82	24.44	2MASS
FMR 85	09 16 22.75	+25 39 49.8	1999.225	333.43	44.00	2MASS
FMR 85	09 16 22.75	+25 39 49.8	2004.291	333.62	44.12	SDSS
FMR 86	09 21 18.96	+24 43 32.3	1999.225	42.48	7.14	2MASS
FMR 86	09 21 18.96	+24 43 32.3	2004.948	42.19	7.14	SDSS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
0929+0350	09 29 09.81	+03 50 07.9	2000.113	227.74	37.84	2MASS
0929+0350	09 29 09.81	+03 50 07.9	2000.167	227.37	37.69	CMC14
0929+0350	09 29 09.81	+03 50 07.9	2001.140	227.77	37.85	SDSS
FMR 87	09 41 15.75	+07 07 43.4	2000.614	244.87	22.73	CMC14
FMR 87	09 41 15.75	+07 07 43.4	2000.903	244.95	22.77	2MASS
FMR 87	09 41 15.75	+07 07 43.4	2002.933	244.95	22.72	SDSS
CBL 288	09 42 22.64	+64 22 23.3	1999.048	277.45	14.82	2MASS
CBL 288	09 42 22.64	+64 22 23.3	2003.810	277.52	14.80	SDSS
FMR 88	09 47 44.84	+35 08 27.4	1998.182	298.21	138.86	2MASS
FMR 88	09 47 44.84	+35 08 27.4	2003.087	298.25	138.62	SDSS
FMR 88	09 47 44.84	+35 08 27.4	2003.159	298.26	138.64	CMC14
FMR 89	10 01 21.81	+23 52 27.1	1998.067	171.92	6.25	2MASS
FMR 89	10 01 21.81	+23 52 27.1	2005.047	171.60	6.29	SDSS
CBL 304	10 13 59.78	+03 05 56.4	1955.222	97.68	26.34	DSS
CBL 304	10 13 59.78	+03 05 56.4	1997.178	97.45	26.39	DSS
FMR 90	10 17 33.63	+26 10 37.1	1998.149	90.12	168.67	2MASS
FMR 90	10 17 33.63	+26 10 37.1	2004.951	90.07	168.22	SDSS
FMR 91	10 18 07.84	+54 22 48.6	1999.187	139.40	72.19	2MASS
FMR 91	10 18 07.84	+54 22 48.6	2002.024	139.40	72.17	SDSS
FMR 92	10 31 39.65	+43 51 15.4	1998.370	218.47	129.80	2MASS
FMR 92	10 31 39.65	+43 51 15.4	2002.663	218.47	129.77	CMC14
FMR 93	10 34 36.13	+53 23 23.9	1998.936	90.43	49.44	2MASS
FMR 93	10 34 36.13	+53 23 23.9	2001.888	90.43	49.39	SDSS
FMR 94 AC	10 45 21.40	+18 14 29.0	1998.078	333.39	113.36	2MASS
FMR 94 AC	10 45 21.40	+18 14 29.0	2002.129	333.39	113.44	CMC14
FMR 95	10 46 33.43	+19 06 37.3	1998.078	115.44	36.31	2MASS
FMR 95	10 46 33.43	+19 06 37.3	2005.356	115.48	36.36	SDSS
FMR 96	10 46 58.66	+24 36 52.4	1999.400	50.94	9.95	2MASS
FMR 96	10 46 58.66	+24 36 52.4	2001.663	49.42	9.79	CMC14
FMR 96	10 46 58.66	+24 36 52.4	2005.047	49.44	9.89	SDSS
FMR 97	10 51 02.12	+38 57 37.7	1998.258	3.37	8.71	2MASS
FMR 97	10 51 02.12	+38 57 37.7	2004.130	2.75	8.71	SDSS
GWP1473	10 51 03.61	+14 58 19.8	1997.955	73.98	14.02	2MASS
GWP1473	10 51 03.61	+14 58 19.8	2001.745	73.14	14.12	CMC14
GWP1473	10 51 03.61	+14 58 19.8	2003.076	73.85	13.96	SDSS
CBL 323	10 54 16.16	+00 02 59.5	1995.541	117.27	42.13	SDSS
CBL 323	10 54 16.16	+00 02 59.5	1999.447	117.54	41.97	CMC14
CBL 323	10 54 16.16	+00 02 59.5	2000.116	117.49	42.09	2MASS
CRB 87	10 57 30.49	+30 08 29.8	1998.185	257.92	7.26	2MASS
CRB 87	10 57 30.49	+30 08 29.8	2001.792	255.14	7.31	CMC14
CRB 87	10 57 30.49	+30 08 29.8	2004.362	256.87	7.40	SDSS
1102+2353	11 02 01.98	+23 53 08.5	1998.080	118.99	97.75	2MASS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
1102+2353	11 02 01.98	+23 53 08.5	2001.668	119.03	97.79	CMC14
1102+2353	11 02 01.98	+23 53 08.5	2005.096	118.96	97.80	SDSS
BVD 216	11 08 21.35	+47 51 38.5	1999.239	223.02	23.01	2MASS
BVD 216	11 08 21.35	+47 51 38.5	2002.219	222.63	22.92	SDSS
BVD 216	11 08 21.35	+47 51 38.5	2002.740	222.91	23.00	CMC14
GWP1557	11 11 59.28	+04 02 42.0	2000.236	55.11	25.44	2MASS
GWP1557	11 11 59.28	+04 02 42.0	2001.290	54.93	25.74	SDSS
FMR 98	11 19 44.46	+06 11 24.9	2000.173	106.24	147.94	2MASS
FMR 98	11 19 44.46	+06 11 24.9	2003.248	106.38	147.83	SDSS
FMR 99	11 22 27.00	+52 46 46.7	2000.157	98.38	15.54	2MASS
FMR 99	11 22 27.00	+52 46 46.7	2002.035	98.42	15.48	SDSS
FMR 100	11 23 42.68	+65 54 31.7	1999.228	132.30	33.79	2MASS
FMR 100	11 23 42.68	+65 54 31.7	2000.321	132.19	34.00	SDSS
FMR 101	11 31 49.44	+35 13 06.8	1998.187	144.02	7.36	2MASS
FMR 101	11 31 49.44	+35 13 06.8	2002.373	144.08	7.41	CMC14
FMR 101	11 31 49.44	+35 13 06.8	2004.283	143.92	7.38	SDSS
1135+3109	11 35 11.94	+31 09 26.7	1998.357	350.70	131.31	2MASS
1135+3109	11 35 11.94	+31 09 26.7	2002.685	350.60	131.26	CMC14
1135+3109	11 35 11.94	+31 09 26.7	2004.368	350.74	131.32	SDSS
CBL 346	11 35 40.36	+04 57 29.5	2000.176	30.40	10.16	2MASS
CBL 346	11 35 40.36	+04 57 29.5	2001.290	30.54	10.16	SDSS
FMR 102	11 39 07.20	+16 34 42.9	1999.955	212.17	8.15	2MASS
FMR 102	11 39 07.20	+16 34 42.9	2001.342	212.01	8.19	CMC14
FMR 102	11 39 07.20	+16 34 42.9	2005.416	211.99	8.18	SDSS
1147+1640	11 47 16.86	+16 40 07.4	1998.023	153.80	8.38	2MASS
1147+1640	11 47 16.86	+16 40 07.4	2001.342	154.17	8.38	CMC14
GWP1677	11 48 06.30	+03 06 20.2	2000.074	237.65	22.65	CMC14
GWP1677	11 48 06.30	+03 06 20.2	2000.111	237.82	22.71	2MASS
GWP1677	11 48 06.30	+03 06 20.2	2000.979	237.43	22.26	SDSS
1148+0018	11 48 51.56	+00 18 03.8	1999.221	154.92	4.54	SDSS
1148+0018	11 48 51.56	+00 18 03.8	2000.111	155.28	4.61	2MASS
BVD 221	12 02 37.52	+44 17 57.8	1999.111	239.30	12.91	2MASS
BVD 221	12 02 37.52	+44 17 57.8	2003.226	239.26	12.87	SDSS
1206+1218	12 06 02.12	+12 18 19.0	1998.031	269.50	38.07	2MASS
1206+1218	12 06 02.12	+12 18 19.0	2001.326	269.39	37.99	CMC14
1206+1218	12 06 02.12	+12 18 19.0	2003.245	269.49	38.12	SDSS
1209+2818	12 09 41.82	+28 18 08.8	1998.171	193.85	13.43	2MASS
1209+2818	12 09 41.82	+28 18 08.8	2005.047	193.83	13.46	SDSS
FMR 103	12 16 36.93	+40 57 36.2	1998.275	163.87	29.58	2MASS
FMR 103	12 16 36.93	+40 57 36.2	2003.316	164.54	29.51	SDSS
FMR 104	12 17 05.76	+07 42 30.2	2000.203	273.95	11.61	2MASS
FMR 104	12 17 05.76	+07 42 30.2	2003.248	274.12	11.47	SDSS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
FMR 105	12 23 23.67	+39 20 15.7	1998.283	293.79	9.23	2MASS
FMR 105	12 23 23.67	+39 20 15.7	2003.316	292.63	9.07	SDSS
1223+0625	12 23 43.48	+06 25 10.3	2000.203	159.47	23.43	2MASS
1223+0625	12 23 43.48	+06 25 10.3	2003.248	159.32	23.33	SDSS
FMR 106	12 27 45.45	+75 53 57.7	1999.209	338.10	35.35	2MASS
1233+0824	12 33 13.45	+08 24 03.9	2003.248	147.19	110.88	SDSS
FMR 107	12 35 52.36	+69 39 27.9	1999.215	208.34	8.05	2MASS
1235+4402	12 35 54.41	+44 02 49.7	2003.226	298.76	36.88	SDSS
1236+1457	12 36 13.40	+14 57 17.1	1998.040	14.13	80.49	2MASS
1236+1457	12 36 13.40	+14 57 17.1	2004.075	14.23	80.54	SDSS
FMR 108	12 36 16.09	+21 13 17.4	1999.313	311.43	37.13	2MASS
FMR 108	12 36 16.09	+21 13 17.4	2005.195	311.38	37.09	SDSS
CBL 390	12 40 08.21	+37 21 46.8	2000.286	76.60	33.02	2MASS
CBL 390	12 40 08.21	+37 21 46.8	2002.063	76.51	32.93	CMC14
CBL 390	12 40 08.21	+37 21 46.8	2004.207	76.62	33.03	SDSS
FMR 109	12 43 07.93	+35 53 19.7	2000.286	92.88	89.22	2MASS
FMR 109	12 43 07.93	+35 53 19.7	2002.227	92.76	88.82	CMC14
FMR 109	12 43 07.93	+35 53 19.7	2004.291	92.68	89.01	SDSS
FMR 110	12 44 50.98	+77 40 20.7	1999.209	295.73	51.36	2MASS
FMR 111	12 52 53.82	+28 35 45.9	2000.031	178.32	125.90	2MASS
FMR 111	12 52 53.82	+28 35 45.9	2004.392	178.22	125.84	SDSS
1310+3252	13 10 21.43	+32 52 58.4	1998.193	359.91	66.47	2MASS
1310+3252	13 10 21.43	+32 52 58.4	2001.940	359.98	66.52	CMC14
1310+3252	13 10 21.43	+32 52 58.4	2004.362	359.92	66.43	SDSS
1311+1106	13 11 41.81	+11 06 24.7	2000.231	252.52	146.73	2MASS
1311+1106	13 11 41.81	+11 06 24.7	2000.249	252.53	146.51	CMC14
1311+1106	13 11 41.81	+11 06 24.7	2003.223	252.54	146.73	SDSS
FMR 112	13 23 13.02	+36 33 39.1	1998.292	94.11	28.00	2MASS
FMR 112	13 23 13.02	+36 33 39.1	2001.438	94.16	27.85	CMC14
FMR 112	13 23 13.02	+36 33 39.1	2004.130	94.13	28.02	SDSS
FMR 113	13 43 09.06	+25 53 06.4	2000.264	330.03	130.85	2MASS
FMR 113	13 43 09.06	+25 53 06.4	2004.447	330.04	130.81	SDSS
1352+2806	13 52 02.28	+28 06 48.8	1999.431	0.85	11.38	2MASS
1352+2806	13 52 02.28	+28 06 48.8	2001.247	1.67	11.44	CMC14
1352+2806	13 52 02.28	+28 06 48.8	2004.392	5.36	11.81	SDSS
1358+3842	13 58 44.94	+38 42 32.8	1998.297	348.06	39.79	2MASS
1358+3842	13 58 44.94	+38 42 32.8	2003.313	347.90	39.75	SDSS
LDS2333	14 00 23.58	+66 37 28.8	1999.261	76.75	51.30	2MASS
1424+1804	14 24 36.02	+18 04 14.0	2000.029	224.81	33.33	2MASS
1424+1804	14 24 36.02	+18 04 14.0	2005.354	224.82	33.32	SDSS
CBL 461	14 35 45.90	+04 58 11.6	1999.918	335.38	51.75	CMC14
CBL 461	14 35 45.90	+04 58 11.6	2000.264	335.33	51.72	2MASS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
CBL 461	14 35 45.90	+04 58 11.6	2001.214	335.37	51.82	SDSS
FMR 114	14 42 52.06	+07 23 56.3	2000.239	278.21	111.08	2MASS
FMR 114	14 42 52.06	+07 23 56.3	2002.575	278.17	111.19	CMC14
CBL 468	14 46 08.44	+10 59 02.1	2000.310	86.43	20.68	2MASS
CBL 468	14 46 08.44	+10 59 02.1	2003.047	86.54	20.57	CMC14
CBL 468	14 46 08.44	+10 59 02.1	2003.314	86.34	20.68	SDSS
FMR 115	14 52 21.74	+12 31 22.3	1998.349	127.53	108.95	2MASS
FMR 115	14 52 21.74	+12 31 22.3	2003.409	127.52	109.01	SDSS
FMR 116	14 54 55.24	+23 06 47.1	1997.434	36.68	6.66	2MASS
FMR 116	14 54 55.24	+23 06 47.1	2004.450	36.76	6.66	SDSS
CBL 477	15 00 51.87	+13 14 47.4	1998.335	234.75	19.34	2MASS
CBL 477	15 00 51.87	+13 14 47.4	2000.753	234.32	19.31	CMC14
CBL 477	15 00 51.87	+13 14 47.4	2005.364	234.55	19.23	SDSS
FMR 117	15 11 46.72	+00 04 32.6	1999.214	179.57	128.14	2MASS
FMR 117	15 11 46.72	+00 04 32.6	1999.218	179.55	128.05	SDSS
CBL 485	15 17 22.83	+09 04 01.6	2000.310	338.01	18.11	2MASS
CBL 485	15 17 22.83	+09 04 01.6	2003.314	337.80	18.13	SDSS
FMR 118	15 17 36.63	+15 17 13.8	2000.029	22.05	12.62	2MASS
FMR 118	15 17 36.63	+15 17 13.8	2005.354	21.93	12.62	SDSS
FMR 119	15 19 49.96	+64 15 41.6	1955.370	207.64	5.76	DSS
FMR 119	15 19 49.96	+64 15 41.6	1992.400	208.16	6.30	DSS
FMR 120	15 42 33.51	+00 52 06.5	2000.329	295.43	85.67	2MASS
FMR 120	15 42 33.51	+00 52 06.5	2001.858	295.38	85.53	CMC14
FMR 121	15 54 53.03	+48 52 28.9	2000.155	127.81	31.16	2MASS
FMR 121	15 54 53.03	+48 52 28.9	2001.392	127.81	31.14	SDSS
FMR 121	15 54 53.03	+48 52 28.9	2002.290	128.14	31.14	CMC14
FMR 122	16 01 49.43	+25 18 42.6	2000.207	192.82	8.29	2MASS
FMR 122	16 01 49.43	+25 18 42.6	2001.252	192.82	8.21	CMC14
FMR 123	16 12 02.59	+31 58 47.6	1998.256	104.38	8.83	2MASS
FMR 123	16 12 02.59	+31 58 47.6	2001.392	103.75	8.59	CMC14
FMR 123	16 12 02.59	+31 58 47.6	2003.404	104.49	8.83	SDSS
FMR 124	16 12 38.93	+23 41 05.3	2000.127	330.12	60.27	2MASS
FMR 124	16 12 38.93	+23 41 05.3	2002.340	329.65	60.04	CMC14
FMR 125	16 21 38.86	+02 54 58.3	1999.803	135.93	32.08	CMC14
FMR 125	16 21 38.86	+02 54 58.3	2000.401	135.81	32.11	2MASS
FMR 126	16 39 35.67	+41 24 55.1	1998.327	261.85	83.40	2MASS
FMR 126	16 39 35.67	+41 24 55.1	2000.261	261.84	83.38	SDSS
FMR 126	16 39 35.67	+41 24 55.1	2001.510	261.83	83.51	CMC14
FMR 127	16 41 52.51	+10 34 33.8	2000.346	180.29	14.13	2MASS
FMR 128	16 54 42.98	+46 54 33.5	1998.428	222.04	9.17	2MASS
FMR 128	16 54 42.98	+46 54 33.5	2001.578	221.84	9.17	CMC14
FMR 128	16 54 42.98	+46 54 33.5	2003.481	221.97	9.14	SDSS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
CBL 511	16 58 09.97	+26 52 27.4	1999.433	272.45	18.45	2MASS
CBL 511	16 58 09.97	+26 52 27.4	2001.288	272.30	18.38	CMC14
CBL 511	16 58 09.97	+26 52 27.4	2002.353	272.40	18.42	SDSS
FMR 129	16 58 51.61	+32 11 46.5	1999.253	182.87	161.05	2MASS
FMR 129	16 58 51.61	+32 11 46.5	2002.438	182.81	160.97	SDSS
FMR 130	17 01 43.51	+38 06 58.0	1998.352	135.35	9.86	2MASS
FMR 130	17 01 43.51	+38 06 58.0	2001.225	135.57	9.89	SDSS
FMR 131	17 02 22.12	+16 47 32.2	1999.158	331.40	9.27	2MASS
FMR 131	17 02 22.12	+16 47 32.2	2000.496	331.21	9.35	CMC14
FMR 131	17 02 22.12	+16 47 32.2	2003.330	331.26	9.30	SDSS
1712+0132	17 12 43.18	+01 32 04.4	2000.507	145.10	22.43	2MASS
1712+0132	17 12 43.18	+01 32 04.4	2003.805	145.24	22.61	CMC14
FMR 132	17 22 35.02	+29 31 03.9	1994.635	342.18	31.56	SDSS
FMR 132	17 22 35.02	+29 31 03.9	2000.168	342.23	31.54	2MASS
FMR 133	17 32 51.62	+43 45 08.9	1998.447	127.46	147.03	2MASS
FMR 133	17 32 51.62	+43 45 08.9	2001.537	127.51	147.02	CMC14
FMR 134	17 33 10.94	+04 31 55.9	2000.404	291.78	10.25	2MASS
FMR 134	17 33 10.94	+04 31 55.9	2003.279	289.94	9.57	CMC14
1734+4858	17 34 39.68	+48 58 04.9	1998.472	145.04	55.41	2MASS
1734+4858	17 34 39.68	+48 58 04.9	2001.603	145.03	55.43	CMC14
FMR 135	17 35 15.19	+81 19 05.8	1999.439	89.00	162.98	2MASS
1738+3939	17 38 08.57	+39 39 15.4	1999.300	157.48	21.16	2MASS
FMR 136	17 38 33.26	+63 32 29.5	1999.360	280.21	14.33	2MASS
FMR 136	17 38 33.26	+63 32 29.5	2001.720	280.27	14.24	SDSS
FMR 137	17 39 46.45	+05 37 29.3	2000.060	250.52	9.42	CMC14
FMR 137	17 39 46.45	+05 37 29.3	2000.404	250.08	9.34	2MASS
FMR 138	17 47 24.95	+40 08 52.2	1998.371	318.96	63.53	2MASS
FMR 138	17 47 24.95	+40 08 52.2	2001.490	318.82	63.52	CMC14
FMR 139	18 09 05.99	+53 13 41.5	2000.324	149.17	22.23	2MASS
BVD 262	18 15 16.20	+40 54 19.5	1951.643	307.34	21.00	DSS
BVD 262	18 15 16.20	+40 54 19.5	1992.482	307.74	21.06	DSS
1823+0403	18 23 19.83	+04 03 16.4	1999.523	9.21	78.99	CMC14
1823+0403	18 23 19.83	+04 03 16.4	1999.600	9.46	78.99	2MASS
1823+2022	18 23 59.62	+20 22 48.7	2000.242	50.87	87.71	2MASS
FMR 140	18 25 54.70	+53 37 43.4	1998.486	84.43	16.13	2MASS
FMR 141	18 54 05.07	+39 22 18.5	1999.445	344.62	31.18	2MASS
FMR 141	18 54 05.07	+39 22 18.5	2002.814	344.57	31.03	CMC14
FMR 141	18 54 05.07	+39 22 18.5	2005.444	344.58	31.23	SDSS
FMR 142	19 00 17.37	+64 59 08.0	1999.406	344.97	8.59	2MASS
FMR 143	19 06 57.51	+21 34 30.7	2000.281	98.30	36.13	2MASS
FMR 143	19 06 57.51	+21 34 30.7	2001.455	98.21	36.04	CMC14
FMR 144	19 09 19.19	+39 12 03.7	1998.398	116.39	162.42	2MASS

Table 1 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (continued). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
FMR 144	19 09 19.19	+39 12 03.7	2003.378	116.43	162.52	CMC14
FMR 145	19 14 05.54	+28 25 53.3	1997.699	135.36	9.62	2MASS
FMR 145	19 14 05.54	+28 25 53.3	2001.430	134.86	9.47	CMC14
FMR 146	19 15 26.40	+54 24 30.7	2000.768	156.46	17.21	2MASS
FMR 147	19 25 04.23	+22 47 56.4	1997.451	265.09	13.95	2MASS
FMR 148	19 32 56.04	+17 23 56.7	1998.729	159.68	150.58	2MASS
FMR 149	19 32 57.27	+04 57 08.8	1999.590	23.85	53.52	2MASS
FMR 149	19 32 57.27	+04 57 08.8	2003.636	23.86	53.51	CMC14
FMR 150	19 35 39.88	+06 16 42.4	1999.557	185.95	17.16	2MASS
FMR 150	19 35 39.88	+06 16 42.4	2001.556	185.81	17.19	CMC14
FMR 151	19 38 12.41	+01 40 30.3	1999.592	146.64	93.39	2MASS
FMR 152	19 42 07.35	+28 40 17.9	1997.726	24.02	56.97	2MASS
FMR 152	19 42 07.35	+28 40 17.9	2001.436	23.92	57.05	CMC14
FMR 153	19 43 19.57	+54 33 45.5	2000.365	102.86	36.77	2MASS
FMR 154	19 45 30.41	+46 50 07.5	1998.448	1.50	8.65	2MASS
FMR 155	19 50 56.24	+04 34 55.3	2000.551	46.84	172.41	2MASS
FMR 155	19 50 56.24	+04 34 55.3	2001.578	46.84	172.46	CMC14
FMR 156	20 03 00.32	+08 03 35.0	1953.678	170.21	11.25	DSS
FMR 156	20 03 00.32	+08 03 35.0	1995.554	172.06	11.03	DSS
FMR 157	20 04 57.78	+25 25 39.1	1997.770	355.56	24.54	2MASS
FMR 157	20 04 57.78	+25 25 39.1	2001.463	355.60	24.58	CMC14
FMR 158	20 16 12.36	+19 27 12.0	1999.494	41.04	22.15	2MASS
FMR 158	20 16 12.36	+19 27 12.0	2001.542	41.15	22.16	CMC14
FMR 159	20 39 52.60	+42 20 33.5	1998.839	75.81	135.76	2MASS
FMR 159	20 39 52.60	+42 20 33.5	2002.458	75.82	135.80	CMC14
FMR 160	20 40 13.46	+29 15 35.4	2000.336	215.36	59.69	2MASS
FMR 161	20 41 07.02	+16 30 55.7	1951.513	320.67	27.77	DSS
FMR 161	20 41 07.02	+16 30 55.7	1953.749	320.60	27.98	DSS
FMR 161	20 41 07.02	+16 30 55.7	1993.531	322.50	28.09	DSS
CRB 13	20 56 51.17	+08 42 09.1	2000.658	357.34	131.53	2MASS
CRB 13	20 56 51.17	+08 42 09.1	2002.559	357.26	131.73	CMC14
FMR 162	20 57 45.93	+13 38 47.4	2000.792	290.07	13.03	2MASS
2106+5924	21 06 18.29	+59 24 01.8	1999.713	332.37	120.27	2MASS
FMR 163	21 25 05.84	+03 29 30.0	2000.630	11.72	15.40	2MASS
FMR 164	21 39 28.15	+05 44 06.9	1999.578	88.32	148.23	CMC14
FMR 164	21 39 28.15	+05 44 06.9	2000.541	88.30	148.37	2MASS
FMR 164	21 39 28.15	+05 44 06.9	2005.736	88.32	148.35	SDSS
2146+1550	21 46 32.30	+15 50 38.9	1997.686	324.44	154.97	2MASS
2146+1550	21 46 32.30	+15 50 38.9	2000.934	324.45	155.01	CMC14
FMR 165	21 50 51.16	+12 43 21.5	1997.686	305.88	38.13	2MASS
FMR 165	21 50 51.16	+12 43 21.5	2000.685	305.64	38.28	CMC14
FMR 165	21 50 51.16	+12 43 21.5	2000.740	305.56	38.29	SDSS

Table 1 concludes on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 1 (concluded). Astrometric measures

Double	AR <sub>2000</sub>	DEC <sub>2000</sub>	Epoch	$\theta$	$\rho$	Method
FMR 166	22 03 11.60	+57 07 39.3	1999.768	95.35	10.31	2MASS
FMR 167	22 04 14.78	+10 04 10.5	2000.532	286.18	12.36	2MASS
FMR 167	22 04 14.78	+10 04 10.5	2000.603	285.60	12.28	CMC14
FMR 168	22 05 32.99	+25 23 59.7	1999.858	243.07	75.43	2MASS
FMR 168	22 05 32.99	+25 23 59.7	2001.499	243.06	75.56	CMC14
LDS4945	22 08 32.20	+02 09 37.6	2000.598	187.92	32.26	2MASS
LDS4945	22 08 32.20	+02 09 37.6	2001.175	187.78	32.28	CMC14
2211+1819	22 11 43.89	+18 19 14.1	1999.853	170.72	17.32	2MASS
2211+1819	22 11 43.89	+18 19 14.1	2000.764	171.05	17.31	CMC14
FMR 169	22 16 40.97	+29 10 23.8	1997.842	257.46	154.79	2MASS
CBL 540	22 20 25.38	+05 19 57.5	2000.543	271.31	31.54	2MASS
CBL 540	22 20 25.38	+05 19 57.5	2005.742	271.33	31.54	SDSS
2222+2309	22 22 33.61	+23 09 49.6	2000.398	204.15	119.04	2MASS
2222+2309	22 22 33.61	+23 09 49.6	2001.493	204.21	119.04	CMC14
2222+2309	22 22 33.61	+23 09 49.6	2004.712	204.19	118.92	SDSS
FMR 170	22 29 43.90	+24 23 29.2	1953.706	171.48	49.26	DSS
FMR 170	22 29 43.90	+24 23 29.2	1995.546	170.75	49.14	DSS
CRB 20	22 35 01.25	+41 03 37.3	1998.773	195.16	23.43	2MASS
CRB 20	22 35 01.25	+41 03 37.3	2002.167	195.02	23.44	CMC14
FMR 171	22 58 05.84	+28 08 52.3	1994.955	120.41	59.48	SDSS
FMR 171	22 58 05.84	+28 08 52.3	1997.874	120.31	59.38	2MASS
FMR 171	22 58 05.84	+28 08 52.3	2001.518	120.45	59.41	CMC14
2312+2701	23 12 47.00	+27 01 04.5	1998.748	109.38	53.33	2MASS
AZC 129	23 22 49.17	+23 22 28.1	1997.776	176.63	12.70	2MASS
AZC 129	23 22 49.17	+23 22 28.1	2001.112	176.93	12.48	CMC14
FMR 172	23 28 13.66	+33 59 45.7	1999.754	76.23	162.97	2MASS
FMR 172	23 28 13.66	+33 59 45.7	2001.923	76.29	163.05	CMC14
2335+6750	23 35 38.00	+67 50 01.6	1999.779	330.90	133.84	2MASS
2343+1345	23 43 18.10	+13 45 43.0	1997.746	118.63	160.02	2MASS
2343+1345	23 43 18.10	+13 45 43.0	2001.715	118.62	160.06	SDSS
2349+1108	23 49 17.66	+11 08 51.4	2000.721	45.79	16.98	2MASS
2352+4625	23 52 15.05	+46 25 52.0	1998.825	347.09	56.41	2MASS
2352+4625	23 52 15.05	+46 25 52.0	2002.677	347.12	56.50	CMC14



## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2. Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 29A	00 11 41.96	+03 23 17.6	16.10		11.98	0.67	4.12	286	-45	M1.5V	10.14	151.7	208	0.37	0.02
FMR 29B	00 11 41.89	+03 23 10.9	16.20		12.09	0.74	4.11	286	-45	M1.5V	9.98	170.2	234	0.37	0.02
FMR 30A	00 23 55.55	+16 46 45.9	16.41		13.28	0.77	3.13	48	-156	K7VI					
FMR 30B	00 24 05.68	+16 48 20.2	16.56		12.14	0.83	4.43	53	-163	M2V	10.46	153.6	125	0.37	0.05
FMR 31A	00 41 30.19	+07 28 34.8	15.10		11.06	0.80	4.04	152	-79	M1V	9.58	119.8	97	0.54	0.03
FMR 31B	00 41 28.05	+07 28 30.4	19.39		13.37	0.90	6.02	152	-79	M4.5V	14.10	108.1	88	0.18	0.03
FMR 32A	00 42 15.23	+07 31 18.6	14.85		12.58	0.59	2.27	175	-77	G/K VI					
FMR 32B	00 42 14.35	+07 31 19.8	19.32		14.92	1.00	4.40	175	-77	M3VI	11.40	351.3	318	0.26	0.06
FMR 33A	00 44 27.83	+19 35 05.3	15.03		10.66	0.77	4.37	90	-143	M2.5V	10.66	73.1	59	0.37	0.01
FMR 33B	00 44 27.21	+19 35 02.7	15.83		11.27	0.82	4.56	90	-143	M2.5V	11.01	89.6	72	0.37	0.02
FMR 34B	00 50 21.36	+59 23 19.4	14.00		9.47	0.80	4.53	153	-157	M2.5V	11.02	38.5	40	0.37	0.02
FMR 34C	00 50 22.81	+59 23 08.2	18.01		15.23	0.81	2.79	153	-157						
FMR 35A	00 50 12.71	+62 34 58.8	16.76		11.23	0.86	5.54	-102	-117	M4.5V	13.41	46.6	34	0.18	0.00
FMR 35B	00 50 15.42	+62 34 51.0	17.41		11.04	0.86	6.37	-102	-117	M5V	15.13	28.6	21	0.12	0.00
FMR 36A	00 53 11.05	+31 44 13.5	10.06	0.91	7.89	0.59	2.17	19	-175	K1V	6.18	58.6	49	0.74	0.01
FMR 36B	00 53 19.06	+31 46 16.2	14.93		10.47	0.80	4.46	32	-175	M2.5V	10.87	63.4	53	0.37	0.01
FMR 37A	00 56 17.47	+81 03 15.3	16.92		12.88	0.82	4.04	170	85	K9V	8.60	358.1	323	0.63	0.15
FMR 37B	00 56 18.88	+81 02 11.5	17.52		13.68	0.69	3.84	170	85	M0VI	9.76	292.2	263	0.46	0.13
FMR 38A	00 59 51.55	+27 01 28.8	10.35	0.92	8.13	0.54	2.22	-182	-82	K1V	6.18	66.3	63	0.74	0.02
FMR 38B	00 59 46.15	+27 01 17.9	17.80		12.06	0.88	5.74	-175	-73	M4.5V	13.67	65.0	58	0.18	0.02
FMR 39A	01 00 30.94	+09 33 09.8	14.97		11.41	0.86	3.56	156	21	K9V	8.26	208.4	156	0.66	0.04
FMR 39B	01 00 29.70	+09 33 03.3	16.44		11.43	0.82	5.01	156	21	M3.5V	12.16	69.5	52	0.18	0.02
FMR 40A	01 05 16.73	+16 20 24.9	14.70		12.70	0.77	2.00	196	14	G VI					
FMR 40B	01 05 16.65	+16 20 17.2	15.52		11.11	0.82	4.41	196	14	M2.5V	10.67	90.2	84	0.37	0.02
FMR 41A	01 07 43.48	+57 59 11.5	17.31		13.20	0.81	4.11	152	-63	M0V	9.10	357.8	279	0.58	0.12
FMR 41B	01 07 30.06	+57 58 25.7	17.97		13.12	0.85	4.85	158	-45	M3V	11.39	186.2	145	0.26	0.06
0111+428A	01 11 55.14	+42 48 02.4	11.23	0.58	9.19	0.51	2.04	126	-170	G9V	5.74	125.2	126	0.81	0.02
0111+428B	01 11 49.09	+42 46 28.3	14.50		10.74	0.73	3.76	128	-182	M0V	9.06	118.1	125	0.57	0.02
FMR 42Aa, Ab	01 15 50.17	+47 02 02.3	14.70		9.31	0.90	5.39	186	-14	M4V	13.02	21.5	19	0.18	0.00
FMR 42B	01 15 48.85	+47 02 25.9	17.71		11.28	0.91	6.43	186	-14	M5V	15.16	32.1	28	0.12	0.01
FMR 43A	01 21 32.50	+39 20 35.2	11.61	1.30	8.82	0.73	2.80	200	12	K5V	7.30	71.4	68	0.59	0.01
FMR 43B	01 21 31.33	+39 20 27.1	15.37		10.65	0.83	4.72	173	-4	M3V	11.51	58.1	48	0.26	0.01
FMR 44A	01 31 01.43	+54 31 55.4	16.87		11.65	0.84	5.22	202	2	M3.5V	12.58	69.2	66	0.18	0.02
FMR 44B	01 31 03.61	+54 31 16.8	18.23		12.67	0.86	5.56	202	2	M4V	13.19	96.0	92	0.18	0.03
FMR 45A	01 56 19.06	+37 28 48.7	17.20		11.55	0.89	5.65	206	-46	M4.5V	13.55	52.8	53	0.18	0.01
FMR 45B	01 56 19.38	+37 28 54.3	17.22		11.69	0.90	5.53	206	-46	M4V	13.23	61.7	62	0.18	0.01
FMR 46A	02 00 01.17	+07 32 46.8	15.12		10.38	0.86	4.74	144	-102	M3V	11.45	52.3	44	0.26	0.02
FMR 46B	02 00 00.80	+07 33 04.1	18.00		12.98	0.86	5.02	144	-102	M3.5V	11.88	155.0	130	0.18	0.04
FMR 47A	02 00 20.14	+26 35 59.9	10.99	1.54	7.59	0.77	3.40	174	69	K8V	8.18	35.8	32	0.66	0.01
FMR 47B	02 00 21.17	+26 35 58.7	14.77		10.02	0.84	4.75	152	60	M3V	11.49	44.3	34	0.26	0.01
0201+0218A	02 01 15.09	+02 18 25.7	17.44		14.44	0.75	3.00	217	-33						
0201+0218B	02 01 17.13	+02 17 29.6	18.50		14.64	0.95	3.86	217	-33	M1VI	10.42	398.0	414	0.54	0.03

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 48A	02 05 24.83	+17 09 22.1	12.85		10.96	0.44	1.89	138	-135	G VI					
FMR 48B	02 05 25.61	+17 09 25.8	16.69		14.30	0.78	2.39	138	-135	K VI					
FMR 49A	02 12 39.74	+01 18 31.7	14.90		10.39	0.85	4.51	157	-96	M2.5V	10.98	59.6	52	0.37	0.01
FMR 49B	02 12 40.08	+01 18 36.8	17.06		11.83	0.81	5.23	157	-96	M4V	12.73	71.9	63	0.18	0.01
FMR 50A	02 22 41.63	+56 27 03.1	16.27					181	-14	?					
FMR 50B	02 22 40.64	+56 26 32.7	16.63		11.94	0.81	4.69	181	-14	M3V	11.36	108.2	93	0.26	0.03
FMR 51A	02 26 02.36	+53 24 49.3	17.86		13.52	0.86	4.34	165	-1	M2V	10.06	326.8	256	0.37	0.06
FMR 51B	02 26 10.11	+53 23 17.9	18.29		13.61	0.78	4.68	165	-1	M2.5V	11.11	250.3	196	0.37	0.05
FMR 52A	02 27 41.12	+06 13 53.9	14.48		9.90	0.80	4.58	-72	-150	M2.5V	11.15	45.2	36	0.37	0.02
FMR 52B	02 27 40.66	+06 13 55.0	16.17		10.87	0.82	5.30	-72	-150	M4V	12.77	46.6	37	0.18	0.02
FMR 53A	02 30 55.18	+62 48 50.8	13.50		11.09	0.59	2.41	177	10	K2VI					
FMR 53B	02 30 57.47	+62 48 39.0	16.17		12.98	0.79	3.19	177	10	K6VI					
FMR 54A	02 31 33.05	+38 53 14.3	13.31		10.97	0.81	2.34	155	-111	K2V	6.46	226.9	205	0.69	0.02
FMR 54B	02 31 32.74	+38 53 07.9	15.56		11.40	0.79	4.16	155	-111	M2V	10.12	120.0	108	0.37	0.01
FMR 55A	02 32 29.68	+06 06 15.6	14.44		10.52	0.80	3.92	137	-97	M0.5V	9.38	97.1	77	0.55	0.03
FMR 55B	02 32 30.72	+06 06 25.8	18.45		13.17	0.81	5.27	137	-97	M3.5V	12.55	140.7	112	0.18	0.04
CBL 212A	02 32 43.60	+74 08 54.9	18.42		14.33	0.89	4.09	215	-58	K9VI	9.24	449.3	474	0.51	0.29
CBL 212B	02 32 44.81	+74 08 41.0	18.61		14.25	0.88	4.36	215	-58	M1VI	10.41	313.1	330	0.54	0.22
CBL 213A	02 33 01.14	+01 05 38.9	15.69		10.62	0.83	5.07	157	-53	M3.5V	12.32	46.7	37	0.18	0.01
CBL 213B	02 33 00.63	+01 06 07.0	16.16		10.95	0.83	5.22	157	-53	M4V	12.64	50.1	39	0.18	0.01
FMR 56A	02 34 03.02	+09 50 14.0	17.77		13.71	0.83	4.06	61	-153	M0.5V	9.41	413.3	323	0.55	0.07
FMR 56B	02 34 02.56	+09 50 14.4	18.77		14.30	0.93	4.48	61	-153	M3VI	11.48	257.3	201	0.26	0.06
FMR 57A	02 40 09.93	+14 38 47.6	15.28		10.80	0.90	4.48	172	-62	M2V	10.51	81.6	71	0.37	0.06
FMR 57B	02 40 10.59	+14 38 46.3	17.53		12.43	0.85	5.10	172	-62	M3V	11.89	118.0	102	0.26	0.08
FMR 58A	02 44 21.78	+32 07 16.5	10.81	0.51	8.34	0.55	2.47	175	-110	K0V	5.90	88.2	86	0.79	0.05
FMR 58B	02 44 25.51	+32 07 58.6	16.52		11.27	0.82	5.25	173	-107	M3.5V	12.47	60.2	58	0.18	0.04
FMR 59A	02 51 07.90	+06 48 23.3	13.67		9.72	0.89	3.95	140	-129	M0.5V	9.16	72.8	66	0.57	0.05
FMR 59B	02 51 05.99	+06 49 00.7	16.35		11.23	0.85	5.12	140	-129	M3.5V	12.11	64.7	58	0.18	0.05
FMR 60A	02 51 30.43	+34 06 37.5	10.54	0.87	8.10	0.57	2.45	171	-107	K2V	6.46	63.7	61	0.69	0.02
FMR 60B	02 51 35.07	+34 07 29.0	16.72		11.45	0.85	5.27	173	-113	M4V	12.70	61.8	61	0.18	0.02
FMR 61A	02 53 59.42	+66 06 07.3	14.74		10.82	0.86	3.92	158	-82	K9V	8.49	143.1	121	0.63	0.13
FMR 61B	02 53 58.99	+66 06 16.0	14.52		10.14	0.82	4.39	158	-82	M2V	10.36	62.0	52	0.37	0.06
FMR 62A	03 17 26.20	+64 03 57.8	11.47	0.75	8.13	0.78	3.34	112	-134	K5V	7.30	62.7	52	0.78	0.05
FMR 62B	03 17 27.28	+64 03 06.0	14.91		9.86	0.85	5.05	107	-133	M3.5V	12.10	34.7	28	0.18	0.03
GWP 453A	03 20 52.06	+12 09 56.4	15.49		12.54	0.64	2.95	100	-129	K6VI					
GWP 453B	03 20 49.94	+12 09 12.5	16.30		13.04	0.67	3.26	100	-129	K8/9VI					
0323+1506A	03 23 27.30	+15 06 52.0	14.26		10.06	0.79	4.21	-61	-152	M1.5V	9.83	69.8	54	0.37	0.06
0323+1506B	03 23 26.86	+15 05 44.4	16.13		11.08	0.77	5.05	-61	-152	M3.5V	12.03	60.5	47	0.18	0.05
GWP 512A	03 47 07.04	+05 20 16.9	17.29		11.96	0.82	5.33	168	-53	M3.5V	12.37	83.1	69	0.18	0.09
GWP 512B	03 47 06.59	+05 20 15.4	18.11					168	-53	?					
FMR 63A	03 50 50.19	+45 45 34.1	14.29		10.74	0.81	3.55	24	-192	K8V	8.32	139.4	128	0.63	0.07
FMR 63B	03 50 48.77	+45 45 57.5	18.29		13.36	0.73	4.93	24	-192	M3V	11.41	201.8	185	0.26	0.10

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 64A	04 11 26.59	+54 24 02.9	10.38	0.88	7.77	0.68	2.60	-11	-179	K3V	6.74	51.4	44	0.66	0.02
FMR 64B	04 11 30.55	+54 21 14.3	15.89		11.16	0.80	4.73	5	-178	M3V	11.43	74.0	62	0.26	0.03
FMR 65A	04 17 51.16	+51 43 36.7	14.98		10.85	0.87	4.13	75	-143	M1.5V	9.95	99.1	76	0.37	0.01
FMR 65B	04 17 50.53	+51 43 48.4	15.23		11.17	0.85	4.06	75	-143	M1.5V	9.74	121.6	93	0.37	0.02
FMR 66A	04 24 49.26	+01 06 56.1	12.90		8.49	0.89	4.41	155	11	M2.5V	10.63	27.6	20	0.37	0.02
FMR 66B	04 24 50.91	+01 06 48.7	16.56		10.75	0.85	5.81	155	11	M4.5V	13.85	33.6	25	0.18	0.02
0433+0013A	04 33 17.84	+00 13 59.5	11.48	0.61	9.78	0.43	1.70	-60	-151	G6VI					
0433+0013B	04 33 18.67	+00 14 14.0	16.85		12.58	0.76	4.27	-62	-149	M2V	10.25	195.6	150	0.37	0.04
FMR 67A	04 48 06.47	+41 38 04.7	14.68		10.33	0.85	4.35	128	-165	M2.5V	10.57	65.0	64	0.37	0.01
FMR 67B	04 48 07.22	+41 38 04.0	16.04		11.96	0.88	4.09	128	-165	M1.5V	9.66	179.5	178	0.37	0.03
0509+1038A	05 09 42.59	+10 38 43.8	14.70		11.19	0.79	3.51	-36	-177	K6V	7.64	193.5	166	0.55	0.17
0509+1038B	05 09 40.48	+10 39 17.0	18.99		13.57	0.76	5.42	-36	-177	M3.5V	12.11	180.3	154	0.18	0.16
FMR 68A	05 19 34.13	+34 20 38.7	15.86		10.92	0.84	4.94	67	-199	M3.5V	12.00	58.0	58	0.18	0.01
FMR 68B	05 19 37.59	+34 20 11.4	16.07		11.09	0.86	4.99	67	-199	M3.5V	12.06	62.2	62	0.18	0.01
0524+0315A	05 24 49.76	+03 15 15.4	10.71	1.59	7.56	0.79	3.15	271	-127	K8V	8.32	29.7	42	0.60	0.01
0524+0315B	05 24 46.82	+03 14 55.7	14.70		13.01	0.58	1.69	253	-120	G7VI					
FMR 69A	05 44 17.22	+30 38 31.6	10.68	0.80	8.61	0.51	2.07	44	-154	K0V	5.90	89.2	68	0.79	0.01
FMR 69B	05 44 21.10	+30 38 33.2	15.61		11.10	0.82	4.51	53	-160	M2.5V	11.01	82.2	66	0.37	0.01
FMR 70A	05 45 45.39	+66 38 30.2	12.51		9.37	0.82	3.14	30	-153	K6V	7.64	88.2	65	0.55	0.04
FMR 70B	05 45 46.84	+66 38 23.1	14.06		9.44	0.82	4.62	30	-153	M3V	11.17	36.7	27	0.26	0.02
0546+1116A	05 46 17.26	+11 16 46.6	16.50		10.75	0.85	5.75	-124	-155	M4.5V	13.75	34.4	32	0.18	0.02
0546+1116B	05 46 15.59	+11 15 58.7	18.21		15.63	0.70	2.58	-124	-155	K2VI					
0550+0939A	05 50 11.74	+09 39 49.2	16.01		10.33	0.85	5.68	258	235	M4.5V	13.62	29.4	49	0.18	0.01
0550+0939B	05 50 10.99	+09 40 01.1	17.75		10.64	0.94	7.11	258	235	M6V	16.34	18.9	31	0.09	0.01
FMR 71A	05 51 49.91	+18 04 29.4	17.49		12.55	0.73	4.94	107	-198	M3V	11.79	127.9	136	0.26	0.05
FMR 71B	05 51 49.52	+18 04 09.9	17.98		13.32	0.73	4.66	107	-198	M2.5V	10.97	221.5	236	0.37	0.08
GWP 736A	06 05 03.52	+07 23 30.5	14.99		11.96	0.81	3.03	-197	-100	K4VI					
GWP 736B	06 05 03.39	+07 23 39.1	16.83		13.08	0.75	3.75	-197	-100	M0VI	9.88	218.7	229	0.46	0.08
GWP 744A	06 06 13.38	+06 48 22.3	16.73		11.00	0.82	5.73	21	269	M4.5V	13.74	38.7	49	0.18	0.01
GWP 744B	06 06 12.84	+06 48 26.6	18.90		12.30	0.89	6.60	21	269	M5.5V	15.38	49.0	63	0.09	0.02
0610+2802A	06 10 25.64	+28 02 23.6	10.80	0.86	8.03	0.65	2.77	-100	-143	K4V	7.02	54.8	45	0.62	0.02
0610+2802B	06 10 27.56	+27 59 44.7	13.41		9.25	0.86	4.16	-97	-144	M1.5V	10.00	46.5	38	0.37	0.02
0610+4439A	06 10 43.98	+44 39 49.8	16.73		13.10	0.79	3.63	193	-143	M0VI	9.76	230.2	262	0.46	0.05
0610+4439B	06 10 52.44	+44 41 39.5	17.93		14.43	0.77	3.50	179	-140	M0VI					
FMR 72A	06 10 48.30	+03 15 12.9	15.92		11.34	0.85	4.58	-40	-151	M2V	10.41	106.9	79	0.37	0.10
FMR 72B	06 10 45.32	+03 15 21.5	18.23		12.82	0.84	5.41	-40	-151	M3.5V	12.34	124.3	92	0.18	0.11
FMR 73A	06 15 40.49	+34 27 03.8	16.75		11.89	0.84	4.86	60	-144	M3V	11.55	102.0	75	0.26	0.04
FMR 73B	06 15 41.02	+34 27 00.2	18.16		12.85	0.83	5.32	60	-144	M3.5V	12.62	118.5	88	0.18	0.05
FMR 74A	06 18 10.57	+67 04 15.2	18.39		12.08	0.94	6.31	55	-264	M5V	14.80	50.9	65	0.12	0.02
FMR 74B	06 18 11.13	+67 04 22.0	19.00		12.73	0.98	6.27	55	-264	M5V	14.69	70.1	90	0.12	0.02
0628+2829A	06 28 28.26	+28 29 23.0	16.03		12.13	0.77	3.90	-115	-152	M0V	9.12	221.3	200	0.57	0.05
0628+2829B	06 28 32.27	+28 27 57.8	17.59		12.83	0.77	4.76	-115	-152	M3V	11.40	161.6	146	0.26	0.04

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 75A	06 28 31.05	+59 06 23.1	17.19		11.47	0.92	5.73	58	-168	M4.5V	13.66	49.7	42	0.18	0.01
FMR 75B	06 28 30.18	+59 06 59.1	19.00		12.85	0.91	6.15	58	-168	M5V	14.50	77.2	65	0.12	0.02
0649+2942A	06 49 53.22	+29 42 03.8	13.70		9.32	0.82	4.38	-28	189	M2.5V	10.69	39.6	36	0.37	0.01
0649+2942B	06 49 53.13	+29 41 29.6	15.98		10.83	0.87	5.15	-28	189	M3.5V	12.43	50.5	46	0.18	0.01
FMR 83A	06 51 04.45	+18 43 43.1	17.65		12.22	0.77	5.43	205	-241	M4V	13.15	78.2	117	0.18	0.01
FMR 83B	06 51 00.59	+18 45 20.5	18.07		12.21	0.77	5.86	205	-241	M4.5V	14.11	61.3	92	0.18	0.01
FMR 76A	06 58 34.34	+75 14 17.7	15.79		10.73	0.82	5.06	39	-195	M3.5V	12.29	49.0	46	0.18	0.01
FMR 76B	06 58 40.35	+75 12 08.3	18.99		13.21	0.77	5.78	83	-174	M4.5V	13.78	105.7	97	0.18	0.02
0705+4129A	07 05 32.54	+41 29 10.0	16.39		12.66	0.82	3.73	138	-94	K9V	8.75	310.0	245	0.60	0.05
0705+4129B	07 05 38.04	+41 28 08.4	13.98		10.51	0.79	3.48	138	-94	K8V	8.21	136.2	108	0.66	0.03
GWP 876A	07 10 52.54	+06 12 30.6	14.05		10.34	0.75	3.71	94	-258	M0V	8.99	100.2	130	0.58	0.01
GWP 876B	07 10 51.93	+06 12 49.9	16.94		11.80	0.74	5.14	94	-258	M3.5V	12.56	73.8	96	0.18	0.01
FMR 77A	07 15 21.11	+03 01 27.8	13.83		10.17	0.86	3.66	26	-152	M0V	8.77	99.9	73	0.60	0.02
FMR 77B	07 15 20.37	+03 01 11.9	18.65		12.87	0.84	5.78	26	-152	M4.5V	13.84	89.3	65	0.18	0.01
0727+4228A	07 27 50.77	+42 28 19.8	16.03		10.94	0.81	5.09	60	-155	M3.5V	12.39	52.4	41	0.18	0.01
0727+4228B	07 27 51.14	+42 27 48.0	17.89		12.43	0.77	5.47	60	-155	M4V	13.19	84.5	67	0.18	0.02
CBL 235A	07 28 20.77	+31 00 13.0	15.11		10.94	0.86	4.17	31	-155	M2V	10.10	97.7	73	0.37	0.02
CBL 235B	07 28 20.12	+31 00 17.1	17.91		12.67	0.86	5.24	31	-155	M4V	12.60	111.7	84	0.18	0.02
FMR 78A	07 38 12.77	+43 34 24.0	9.64	0.97	7.42	0.55	2.22	-116	-150	K2V	6.46	42.6	38	0.69	0.01
FMR 78B	07 37 56.91	+43 35 05.0	18.46		14.79	0.69	3.67	-52	-162	M0VI	9.87	485.2	391	0.46	0.05
FMR 79A	07 40 57.40	+06 41 04.8	16.00		10.87	0.83	5.13	161	-41	M3.5V	12.49	50.1	39	0.18	0.00
FMR 79B	07 40 57.35	+06 41 11.7	15.90		11.63	0.79	4.27	161	-41	M2V	10.43	122.6	97	0.37	0.01
0749+2435A	07 49 54.56	+24 35 13.1	11.98		8.31	0.83	3.67	-14	-178	M0V	8.89	40.9	35	0.59	0.01
0749+2435B	07 49 52.37	+24 36 45.4	15.08		10.19	0.81	4.88	-14	-178	M3.5V	11.87	43.1	36	0.18	0.01
FMR 80A	07 49 19.76	+49 50 31.2	10.40	0.73	8.73	0.43	1.67	-38	-168	G5V	5.10	110.2	90	0.94	0.02
FMR 80B	07 49 15.52	+49 51 23.7	18.00		12.83	0.79	5.17	-47	-175	M3.5V	12.47	121.6	104	0.18	0.03
0802+0019A	08 02 50.06	+00 19 09.1	13.41		9.89	0.80	3.52	-119	-141	K9V	8.49	94.5	83	0.63	0.01
0802+0019B	08 02 54.81	+00 18 35.9	16.83		12.06	0.78	4.77	-119	-141	M3V	11.65	106.4	93	0.26	0.01
FMR 81A	08 20 39.80	+48 03 18.0	15.32		10.61	0.76	4.71	227	-83	M3V	11.52	56.7	65	0.26	0.01
FMR 81B	08 20 56.07	+48 03 53.1	17.18		15.78	0.33	1.40	227	-79	wd	14.00	43.2	49		0.01
BVD 202A	08 31 20.84	+44 24 07.1	12.75		9.48	0.79	3.27	-113	-144	K7V	7.98	88.6	77	0.67	0.01
BVD 202B	08 31 22.34	+44 24 37.9	18.84		13.08	0.83	5.76	-113	-144	M4.5V	13.84	98.2	85	0.18	0.01
CBL 263A	08 37 33.75	+24 41 32.1	13.84		9.98	0.83	3.86	-149	-128	M0.5V	9.32	78.8	73	0.56	0.01
CBL 263B	08 37 39.11	+24 40 24.7	18.53		12.57	0.88	5.97	-149	-128	M4.5V	14.20	72.2	67	0.18	0.01
0840+6144A	08 40 04.61	+61 44 44.4	18.68		14.79	0.84	3.89	-75	-228	M1VI	10.15	446.0	507	0.54	0.08
0840+6144B	08 40 16.13	+61 45 06.5	19.09		15.36	0.46	3.73	-75	-228	M0VI	9.76	638.1	726	0.46	0.09
FMR 82A	08 48 51.11	+17 17 32.3	17.04		11.54	0.92	5.51	119	-248	M4V	13.25	57.0	74	0.18	0.00
FMR 82B	08 48 40.49	+17 16 20.5	19.70		12.73	0.96	6.97	3	-236	M5.5V	16.12	51.7	58	0.09	0.00
0855+3732A	08 55 59.87	+37 32 10.8	13.91		10.05	0.83	3.87	-174	38	M0.5V	9.32	80.8	68	0.56	0.01
0855+3732B	08 56 05.36	+37 31 24.2	17.37		12.18	0.83	5.19	-174	38	M3.5V	12.54	90.0	76	0.18	0.02
0900+0643A	09 00 52.07	+06 43 31.5	13.53		9.80	0.80	3.73	-154	53	M0V	8.97	79.3	61	0.59	0.02
0900+0643B	09 00 51.11	+06 42 49.1	16.14		11.17	0.81	4.98	-154	53	M3.5V	12.09	63.1	49	0.18	0.01

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 84A	09 00 26.61	+53 06 57.9	15.83		10.87	0.80	4.96	-114	-162	M3.5V	12.14	54.4	51	0.18	0.00
FMR 84B	09 00 32.97	+53 08 18.9	19.58		14.07	0.75	5.51	-61	-192	M4V	13.45	165.7	158	0.18	0.01
0902+0600A	09 02 51.27	+06 00 28.0	9.80	0.62	8.28	0.38	1.51	-149	111	G0V	4.40	116.0	102	1.12	0.02
0902+0600B	09 02 53.20	+06 02 09.5	14.35		10.45	0.81	3.90	-144	107	M0.5V	9.38	95.6	81	0.55	0.02
0906+7226A	09 06 56.14	+72 26 09.3	16.03		11.05	0.77	4.98	175	-465	M3.5V	12.08	59.9	141	0.18	0.02
0906+7226B	09 07 01.33	+72 26 16.2	17.93		12.05	0.79	5.88	175	-465	M4.5V	14.08	57.1	135	0.18	0.02
FMR 85A	09 16 22.75	+25 39 49.8	11.62	1.33	8.12	0.81	3.50	167	-171	K9V	8.40	43.5	49	0.64	0.01
FMR 85B	09 16 21.30	+25 40 29.1	17.75		16.31	0.22	1.45	149	-180	wd	15.24	31.8	35		0.00
FMR 86A	09 21 18.96	+24 43 32.3	16.36		12.35	0.74	4.01	-236	-40	M1V	9.72	205.7	233	0.54	0.02
FMR 86B	09 21 19.32	+24 43 37.6	17.62		13.26	0.73	4.36	-236	-40	M2V	10.65	238.5	271	0.37	0.02
0929+0350A	09 29 09.81	+03 50 07.9	16.21		11.11	0.82	5.10	-119	-167	M3.5V	12.36	57.6	56	0.18	0.01
0929+0350B	09 29 07.94	+03 49 42.4	16.65		11.42	0.83	5.23	-119	-167	M4V	12.65	61.8	60	0.18	0.01
FMR 87A	09 41 15.75	+07 07 43.4	16.09		11.51	0.78	4.58	-58	-158	M2.5V	11.15	95.0	76	0.37	0.01
FMR 87B	09 41 14.36	+07 07 33.7	16.75		11.99	0.74	4.76	-58	-158	M3V	11.63	103.0	82	0.26	0.01
CBL 288A	09 42 22.64	+64 22 23.3	12.93		10.80	0.54	2.13	-157	-76	K0/1VI					
CBL 288B	09 42 20.38	+64 22 25.3	18.48		14.09	0.62	4.39	-157	-76	M2V	10.77	324.6	268	0.37	0.04
FMR 88A	09 47 44.84	+35 08 27.4	14.18		11.44	0.71	2.74	-208	-121	K3/4VI					
FMR 88B	09 47 34.86	+35 09 33.0	16.54		12.46	0.82	4.08	-172	-131	M1.5V	9.90	210.7	216	0.37	0.01
FMR 89A	10 01 21.81	+23 52 27.1	16.54		11.67	0.82	4.88	-161	-33	M3V	11.85	85.1	66	0.26	0.01
FMR 89B	10 01 21.87	+23 52 20.9	18.05		12.78	0.83	5.27	-161	-33	M4V	12.76	111.5	87	0.18	0.01
CBL 304A	10 13 59.78	+03 05 56.4	18.03					106	-113	wd	14.55	49.7	37		0.01
CBL 304B	10 14 01.52	+03 05 53.0	18.29					106	-113	wd	15.00	45.5	33		0.01
FMR 90A	10 17 33.63	+26 10 37.1	18.48		14.68	0.84	3.79	-125	-162	M1VI	10.27	420.6	408	0.54	0.03
FMR 90B	10 17 46.16	+26 10 36.8	18.98		13.56	0.74	5.42	-180	-126	M4V	13.12	144.5	151	0.18	0.02
FMR 91A	10 18 07.84	+54 22 48.6	13.93		10.37	0.78	3.56	-181	39	K9V	8.62	114.7	101	0.62	0.00
FMR 91B	10 18 13.22	+54 21 53.8	16.66		12.17	0.78	4.49	-181	39	M2.5V	10.99	135.1	119	0.37	0.00
FMR 92A	10 31 39.65	+43 51 15.4	11.64	0.58	9.72	0.48	1.92	-169	-65	G9V	5.74	151.4	130	0.87	0.01
FMR 92B	10 31 32.18	+43 49 33.7	15.26		11.10	0.80	4.16	-176	-75	M2V	10.15	103.6	94	0.37	0.01
FMR 93A	10 34 36.13	+53 23 23.9	16.58		11.90	0.80	4.68	6	-220	M3V	11.43	105.6	110	0.26	0.01
FMR 93B	10 34 41.66	+53 23 23.5	19.61		13.77	0.97	5.84	6	-220	M4.5V	13.81	141.9	148	0.18	0.01
FMR 94A	10 45 21.40	+18 14 29.0	9.58	0.66	7.86	0.36	1.72	-183	-38	G6V	5.26	72.1	64	0.91	0.01
FMR 94C	10 45 17.83	+18 16 10.4	16.01		11.12	0.80	4.89	-164	-35	M3.5V	11.93	64.5	51	0.18	0.01
FMR 95A	10 46 33.43	+19 06 37.3	13.34		9.37	0.85	3.97	-144	-91	M1V	9.49	56.7	46	0.54	0.02
FMR 95B	10 46 35.74	+19 06 21.7	18.40		12.89	0.88	5.51	-144	-91	M4V	13.05	110.7	89	0.18	0.04
FMR 96A	10 46 58.66	+24 36 52.4	13.31		9.32	0.84	3.99	-164	-30	M1V	9.67	52.5	41	0.54	0.01
FMR 96B	10 46 59.23	+24 36 58.7	14.64		10.40	0.84	4.24	-164	-30	M2V	10.26	73.5	58	0.37	0.01
FMR 97A	10 51 02.12	+38 57 37.7	18.28		13.09	0.77	5.19	-160	-47	M4V	12.64	132.5	105	0.18	0.01
FMR 97B	10 51 02.16	+38 57 46.4	19.49		14.15	0.71	5.34	-160	-47	M4V	12.98	196.6	155	0.18	0.01
GWP1473A	10 51 03.61	+14 58 19.8	16.19		11.02	0.86	5.17	29	-168	M3.5V	12.58	52.4	42	0.18	0.01
GWP1473B	10 51 04.54	+14 58 23.7	17.95		12.25	0.85	5.70	29	-168	M4.5V	13.73	69.2	56	0.18	0.01
CBL 323A	10 54 16.16	+00 02 59.5	12.64		9.63	0.72	3.01	111	-106	K5V	7.30	113.0	82	0.59	0.02
CBL 323B	10 54 18.65	+00 02 40.1	17.02		11.92	0.76	5.10	111	-106	M3.5V	12.43	80.5	59	0.18	0.02

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
CRB 87A	10 57 30.49	+30 08 29.8	16.64		11.26	0.83	5.38	122	-230	M4V	13.05	51.8	64	0.18	0.00
CRB 87B	10 57 29.94	+30 08 28.3	17.50		15.98	0.43	1.51	122	-230	wd	13.87	53.1	66		0.01
1102+2353A	11 02 01.98	+23 53 08.5	14.15		10.80	0.77	3.35	-157	-100	K8V	8.32	144.0	127	0.63	0.01
1102+2353B	11 02 08.21	+23 52 21.1	16.69		12.12	0.82	4.57	-157	-100	M2.5V	11.14	126.3	111	0.37	0.01
BVD 216A	11 08 21.35	+47 51 38.5	13.97		10.00	0.82	3.97	-117	-182	M1V	9.64	72.3	74	0.54	0.01
BVD 216B	11 08 19.79	+47 51 21.7	16.44		11.11	0.84	5.33	-117	-182	M4V	12.94	49.5	51	0.18	0.01
GWP1557 A	11 11 59.28	+04 02 42.0	18.15		14.42	1.06	3.73	-185	-71	M1VI	10.05	392.5	369	0.54	0.04
GWP1557B	11 12 00.67	+04 02 56.6	19.39		15.63	0.77	3.76	-185	-71	M1VI	10.09	677.9	637	0.54	0.04
FMR 98A	11 19 44.46	+06 11 24.9	9.20	0.73	7.42	0.43	1.78	119	-213	G6V	5.26	59.1	68	0.91	0.02
FMR 98B	11 19 53.98	+06 10 43.5	19.48		13.72	0.89	5.75	17	-213	M4.5V	13.49	146.1	148	0.18	0.04
FMR 99A	11 22 27.00	+52 46 46.7	14.99		11.21	0.82	3.78	-156	78	M0.5V	9.12	146.6	121	0.57	0.01
FMR 99B	11 22 28.69	+52 46 44.4	15.38		11.26	0.80	4.12	-156	78	M1.5V	10.05	115.0	95	0.37	0.01
FMR 100A	11 23 42.68	+65 54 31.7	13.65		10.37	0.78	3.28	-151	-75	K7V	7.98	135.0	108	0.67	0.00
FMR 100B	11 23 46.76	+65 54 08.9	18.95		15.31	0.65	3.65	-151	-75	M0VI	10.06	593.7	474	0.44	0.01
FMR 101A	11 31 49.44	+35 13 06.8	15.39		11.56	0.85	3.83	-160	-14	M0.5V	9.19	169.4	129	0.57	0.02
FMR 101B	11 31 49.80	+35 13 00.8	15.54		11.60	0.85	3.94	-160	-14	M1V	9.51	156.9	119	0.54	0.01
1135+3109A	11 35 11.94	+31 09 26.7	16.45		11.46	0.84	4.99	-161	-46	M3.5V	12.14	71.4	57	0.18	0.01
1135+3109B	11 35 10.29	+31 11 36.3	18.29		13.60	0.74	4.69	-157	-42	M3V	11.43	227.7	175	0.26	0.02
CBL 346A	11 35 40.36	+04 57 29.5	14.73		10.84	0.78	3.89	-218	23	M0.5V	9.39	114.2	119	0.55	0.01
CBL 346B	11 35 40.71	+04 57 38.3	19.70		13.29	0.83	6.40	-218	23	M5V	15.12	80.6	84	0.12	0.01
FMR 102A	11 39 07.20	+16 34 42.9	15.64		11.27	0.84	4.37	-291	-18	M2.5V	10.59	99.9	138	0.37	0.01
FMR 102B	11 39 06.90	+16 34 36.0	16.33		11.46	0.83	4.87	-291	-18	M3V	11.80	79.3	110	0.26	0.01
1147+1640A	11 47 16.86	+16 40 07.4	16.57		13.08	0.72	3.49	-294	-90	M0VI					
1147+1640B	11 47 17.12	+16 39 59.9	16.63		13.43	0.74	3.20	-294	-90	K8VI					
GWP1677A	11 48 06.30	+03 06 20.2	14.93		10.88	0.79	4.05	-72	-148	M1.5V	9.83	102.6	80	0.37	0.01
GWP1677B	11 48 05.02	+03 06 08.1	17.04		12.04	0.76	5.00	-72	-148	M3.5V	12.21	90.8	71	0.18	0.01
1148+0018A	11 48 51.56	+00 18 03.8	15.13		12.70	0.73	2.43	-176	-3	K2VI					
1148+0018B	11 48 51.69	+00 17 59.6	18.04		14.30	0.83	3.74	-176	-3	M1VI	10.15	363.6	303	0.54	0.03
BVD 221A	12 02 37.52	+44 17 57.8	16.97		12.04	0.81	4.93	-168	-72	M3.5V	12.04	95.6	83	0.18	0.01
BVD 221B	12 02 36.49	+44 17 51.2	19.44		13.57	0.89	5.87	-168	-72	M4.5V	13.98	121.9	106	0.18	0.01
1206+1218A	12 06 02.12	+12 18 19.0	13.23	0.52	11.65	0.38	1.58	-6	-182	G VI					
1206+1218B	12 05 59.52	+12 18 18.7	16.53		13.38	0.77	3.15	-6	-182	K8VI					
1209+2818A	12 09 41.82	+28 18 08.8	18.85		14.15	0.72	4.70	-168	-55	M3V	11.56	278.1	233	0.26	0.02
1209+2818B	12 09 41.58	+28 17 55.7	19.58		14.61	0.73	4.97	-168	-55	M3.5V	12.15	296.1	248	0.18	0.02
FMR 103A	12 16 36.93	+40 57 36.2	18.56		15.36	0.73	3.20	-185	-84	K8VI					
FMR 103B	12 16 37.66	+40 57 07.8	18.72		13.50	0.81	5.22	-185	-84	M4V	12.63	161.1	155	0.18	0.01
FMR 104A	12 17 05.76	+07 42 30.2	15.25		13.03	0.53	2.23	24	-167	K1VI					
FMR 104B	12 17 04.98	+07 42 31.0	18.14		14.89	0.53	3.25	24	-167	K8/9VI					
FMR 105A	12 23 23.67	+39 20 15.7	18.27		14.54	1.26	3.73	-135	-97	M1VI	10.14	408.2	322	0.54	0.03
FMR 105B	12 23 22.94	+39 20 19.4	19.32		15.96	0.54	3.37	-135	-97	K9VI					
1223+0625A	12 23 43.48	+06 25 10.3	13.85		11.13	0.73	2.72	-183	-29	K4/5VI					
1223+0625B	12 23 44.03	+06 24 48.3	18.33		13.80	0.83	4.53	-183	-29	M2.5V	10.86	302.1	265	0.37	0.02

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 106A	12 27 45.45	+75 53 57.7	12.16	0.81	9.98	0.53	2.18	-138	-138	K1VI					
FMR 106B	12 27 41.84	+75 54 30.5	19.31		13.79	0.73	5.52	-115	-145	M4V	13.33	151.1	133	0.18	0.02
1233+0824A	12 33 13.45	+08 24 03.9	18.53					-172	132	wd	13.96	82.1	84		0.01
1233+0824B	12 33 17.47	+08 22 30.4	19.09					-172	132	wd	14.70	75.5	78		0.01
FMR 107A	12 35 52.36	+69 39 27.9	14.29		9.77	0.82	4.52	146	-63	M2.5V	11.06	44.0	33	0.37	0.00
FMR 107B	12 35 51.63	+69 39 20.8	18.35		14.65	2.00	3.70	146	-63	M1VI	10.13	430.0	324	0.54	0.02
1235+4402A	12 35 54.41	+44 02 49.7	13.00		9.21	0.87	3.79	188	-266	M0.5V	9.07	60.3	93	0.58	0.01
1235+4402B	12 35 51.46	+44 03 07.5	19.55					188	-266	wd	15.17	75.3	116		0.01
1236+1457A	12 36 13.40	+14 57 17.1	15.85		11.32	0.79	4.52	-159	-118	M2.5V	11.03	89.2	84	0.37	0.02
1236+1457B	12 36 14.76	+14 58 35.2	17.83		12.61	0.83	5.22	-159	-118	M4V	12.54	110.3	103	0.18	0.02
FMR 108A	12 36 16.09	+21 13 17.4	10.42	1.09	7.98	0.58	2.44	-183	-112	K3V	6.74	53.3	54	0.66	0.01
FMR 108B	12 36 14.09	+21 13 42.0	19.46		12.69	0.97	6.78	-179	-107	M5.5V	15.69	55.7	55	0.09	0.01
CBL 390A	12 40 08.21	+37 21 46.8	14.08		9.59	0.82	4.50	138	-196	M2.5V	11.02	40.6	46	0.37	0.00
CBL 390B	12 40 10.90	+37 21 54.5	17.31		11.45	0.87	5.86	138	-196	M4.5V	14.02	45.2	51	0.18	0.00
FMR 109A	12 43 07.93	+35 53 19.7	10.91	0.98	8.68	0.52	2.23	-150	79	K2V	6.46	76.9	62	0.69	0.01
FMR 109B	12 43 15.27	+35 53 15.2	17.37		12.23	0.85	5.15	-147	78	M3.5V	12.49	93.7	74	0.18	0.01
FMR 110A	12 44 50.98	+77 40 20.7	11.52	1.01	9.33	0.55	2.19	-21	-171	K1V	6.18	113.4	93	0.74	0.02
FMR 110B	12 44 36.54	+77 40 43.0	15.76		11.65	0.76	4.11	-37	-174	M1.5V	9.96	139.2	117	0.37	0.02
FMR 111A	12 52 53.82	+28 35 45.9	14.66		10.45	0.83	4.21	-190	-31	M2V	10.30	74.0	68	0.37	0.00
FMR 111B	12 52 54.10	+28 33 40.1	20.31		14.17	0.83	6.15	-167	-6	M5V	14.70	131.4	104	0.12	0.01
1310+3252A	13 10 21.43	+32 52 58.4	14.33	1.41	9.66	0.83	4.67	-173	11	M3V	11.41	38.1	31	0.26	0.00
1310+3252B	13 10 21.44	+32 54 04.9	17.30	1.46	11.59	0.86	5.71	-173	11	M4.5V	13.74	51.0	42	0.18	0.00
1311+1106A	13 11 41.81	+11 06 24.7	12.84		11.45	0.38	1.39	-111	-130	F VI					
1311+1106B	13 11 32.30	+11 05 40.6	17.56		14.30	0.73	3.26	-115	-122	K8/9VI					
FMR 112A	13 23 13.02	+36 33 39.1	13.01		10.27	0.67	2.74	-178	0	K4V	7.02	155.4		0.62	0.01
FMR 112B	13 23 15.34	+36 33 37.1	17.78		12.52	0.87	5.26	-178	0	M4V	12.81	97.6		0.18	0.01
FMR 113A	13 43 09.06	+25 53 06.4	12.11	0.86	9.73	0.60	2.38	-161	5	K2V	6.46	132.8	101	0.69	0.01
FMR 113B	13 43 04.21	+25 54 59.7	18.20		12.75	0.74	5.45	-158	-4	M4V	13.29	94.7	71	0.18	0.01
1352+2806A	13 52 02.28	+28 06 48.8	14.01		10.03	0.84	3.98	-188	54	M1V	9.71	71.7	66	0.54	0.01
1352+2806B	13 52 02.29	+28 07 00.1	14.39		9.92	0.95	4.47	-188	54	M2.5V	10.78	52.2	48	0.37	0.00
1358+3842A	13 58 44.94	+38 42 32.8	14.15		10.70	0.80	3.45	-201	-21	K8V	8.27	147.5	141	0.65	0.01
1358+3842B	13 58 44.23	+38 43 11.7	18.55		13.56	0.81	4.99	-201	-21	M3.5V	12.11	189.5	181	0.18	0.01
LDS2333A	14 00 23.58	+66 37 28.8	11.53	0.92	9.35	0.56	2.18	89	-137	K1V	6.18	115.4	89	0.74	0.01
LDS2333B	14 00 31.98	+66 37 40.6	17.80		12.87	0.84	4.93	103	-157	M3.5V	11.92	146.7	131	0.18	0.01
1424+1804A	14 24 36.02	+18 04 14.0	16.53		12.00	0.82	4.53	-149	-70	M2.5V	11.06	121.1	95	0.37	0.01
1424+1804B	14 24 34.37	+18 03 50.3	18.84		13.46	0.84	5.38	-149	-70	M4V	12.92	149.0	116	0.18	0.02
CBL 461A	14 35 45.90	+04 58 11.6	17.46		13.22	0.80	4.24	36	-178	M2V	10.17	272.9	235	0.37	0.03
CBL 461B	14 35 44.46	+04 58 58.6	17.61		13.29	0.85	4.32	36	-178	M2V	10.36	268.6	231	0.37	0.03
FMR 114A	14 42 52.06	+07 23 56.3	9.60	0.54	8.18	0.32	1.42	-189	40	F8V	4.00	128.6	118	1.23	0.02
FMR 114B	14 42 44.67	+07 24 12.1	17.23		12.24	0.80	4.99	-158	35	M3.5V	12.18	100.0	77	0.18	0.01
CBL 468A	14 46 08.44	+10 59 02.1	12.39		10.18	0.57	2.21	72	-149	K1V	6.18	169.7	133	0.74	0.02
CBL 468B	14 46 09.84	+10 59 03.4	17.17		12.63	0.73	4.54	72	-149	M2.5V	11.10	159.3	125	0.37	0.02

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 115A	14 52 21.74	+12 31 22.3	18.50		13.94	0.70	4.56	-170	-99	M2.5V	11.20	277.7	259	0.37	0.02
FMR 115B	14 52 27.64	+12 30 15.9	19.29		13.56	0.69	5.73	-170	-99	M4.5V	13.92	115.5	108	0.18	0.01
FMR 116A	14 54 55.24	+23 06 47.1	17.72		12.75	0.83	4.97	-125	99	M3.5V	11.98	135.6	103	0.18	0.02
FMR 116B	14 54 55.52	+23 06 52.4	19.38		13.57	0.82	5.82	-125	99	M4.5V	13.89	121.1	92	0.18	0.02
CBL 477A	15 00 51.87	+13 14 47.4	15.68		10.57	0.87	5.12	37	-164	M3.5V	12.41	44.4	35	0.18	0.01
CBL 477B	15 00 50.78	+13 14 36.3	15.95		10.75	0.86	5.20	37	-164	M4V	12.59	46.0	37	0.18	0.01
FMR 117A	15 11 46.72	+00 04 32.6	14.04		12.37	0.38	1.67	-165	-25	G VI					
FMR 117B	15 11 46.79	+00 02 24.4	18.39		14.67	1.04	3.72	-201	-9	M0VI	9.98	446.5	426	0.45	0.05
CBL 485A	15 17 22.83	+09 04 01.6	16.68		13.91	0.67	2.77	-94	-125	K2/4VI					
CBL 485B	15 17 22.38	+09 04 18.4	18.23		14.87	0.80	3.36	-94	-125	K9VI					
FMR 118A	15 17 36.63	+15 17 13.8	15.69		10.57	0.83	5.12	-203	31	M3.5V	12.40	44.9	44	0.18	0.01
FMR 118B	15 17 36.96	+15 17 25.5	19.52		12.61	0.92	6.91	-203	31	M5.5V	16.01	49.7	48	0.09	0.01
FMR 119A	15 19 49.96	+64 15 41.6	18.30					-186	180	?					
FMR 119B	15 19 49.61	+64 15 35.9	19.06					-186	180	?					
FMR 120A	15 42 33.51	+00 52 06.5	9.77	0.68	7.95	0.43	1.82	-168	27	G5V	5.10	81.4	66	0.94	0.03
FMR 120B	15 42 28.35	+00 52 43.2	17.08		12.00	0.77	5.08	-162	7	M3.5V	12.21	88.6	68	0.18	0.04
FMR 121A	15 54 53.03	+48 52 28.9	14.09		12.15	0.47	1.94	-103	-134	G/K VI					
FMR 121B	15 54 55.53	+48 52 09.8	18.13		13.60	0.73	4.53	-74	-147	M2.5V	11.16	242.0	189	0.37	0.01
FMR 122A	16 01 49.43	+25 18 42.6	15.20		10.33	0.85	4.87	-194	-72	M3V	11.80	46.9	46	0.26	0.01
FMR 122B	16 01 49.30	+25 18 34.6	16.42		11.45	0.85	4.97	-194	-72	M3.5V	11.97	74.9	73	0.18	0.02
FMR 123A	16 12 02.59	+31 58 47.6	14.44		9.43	0.84	5.01	-269	-46	M3.5V	12.22	27.7	36	0.18	0.00
FMR 123B	16 12 03.27	+31 58 45.4	16.64		10.94	0.91	5.70	-269	-46	M4.5V	13.66	39.1	51	0.18	0.01
FMR 124A	16 12 38.93	+23 41 05.3	13.64		11.41	0.51	2.23	-67	-155	K1VI					
FMR 124B	16 12 36.74	+23 41 57.6	17.93		14.48	0.80	3.45	-67	-155	M0VI					
FMR 125A	16 21 38.86	+02 54 58.3	13.67		11.86	0.43	1.81	-41	-179	G VI					
FMR 125B	16 21 40.35	+02 54 35.2	16.71		13.39	0.78	3.32	-41	-179	K9VI					
FMR 126A	16 39 35.67	+41 24 55.1	13.52		9.90	0.80	3.62	-65	-155	M0V	8.80	87.4	70	0.60	0.00
FMR 126B	16 39 28.33	+41 24 43.2	16.91		11.81	0.78	5.10	-65	-155	M3.5V	12.49	76.3	61	0.18	0.00
FMR 127A	16 41 52.51	+10 34 33.8	13.68		9.24	0.82	4.44	-322	-294	M2.5V	10.86	36.1	75	0.37	0.01
FMR 127B	16 41 52.50	+10 34 19.6	18.50		14.92	2.01	3.58	-322	-294	wd					
FMR 128A	16 54 42.98	+46 54 33.5	14.64		10.06	0.82	4.58	-44	215	M2.5V	11.18	48.7	51	0.37	0.01
FMR 128B	16 54 42.38	+46 54 26.7	16.16		11.50	0.78	4.67	-44	215	M3V	11.42	87.4	91	0.26	0.01
CBL 511A	16 58 09.97	+26 52 27.4	12.63		10.65	0.49	1.98	-85	-141	G/K VI					
CBL 511B	16 58 08.59	+26 52 28.2	17.52		13.30	0.72	4.22	-85	-141	M1.5V	10.04	285.8	223	0.37	0.05
FMR 129A	16 58 51.61	+32 11 46.5	17.76		14.09	0.75	3.67	-33	-199	M0VI	10.00	343.2	328	0.45	0.03
FMR 129B	16 58 50.98	+32 09 05.7	17.92		13.15	0.74	4.77	24	-197	M3V	11.59	178.2	168	0.26	0.02
FMR 130A	17 01 43.51	+38 06 58.0	17.73		13.10	0.72	4.63	-113	-110	M3V	11.33	186.0	139	0.26	0.01
FMR 130B	17 01 44.09	+38 06 51.0	18.92		13.51	0.82	5.41	-113	-110	M4V	13.08	144.2	108	0.18	0.01
FMR 131A	17 02 22.12	+16 47 32.2	15.70		11.15	0.73	4.55	-99	-147	M2.5V	11.08	80.8	68	0.37	0.02
FMR 131B	17 02 21.81	+16 47 40.4	16.43		11.90	0.70	4.52	-99	-147	M2.5V	11.01	115.5	97	0.37	0.03
1712+0132A	17 12 43.18	+01 32 04.4	13.50		9.38	0.85	4.12	-152	23	M1.5V	9.72	54.0	39	0.37	0.03
1712+0132B	17 12 44.04	+01 31 46.0	15.42		11.25	0.81	4.17	-152	23	M1V	9.73	123.5	90	0.54	0.06

Table 2 continues on next page.



## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 132A	17 22 35.02	+29 31 03.9	14.57		10.44	0.87	4.13	-21	-176	M2V	10.01	80.4	68	0.37	0.01
FMR 132B	17 22 34.29	+29 31 33.9	19.29		13.44	0.88	5.84	-21	-176	M4.5V	13.90	117.1	98	0.18	0.01
FMR 133A	17 32 51.62	+43 45 08.9	13.99		10.90	0.78	3.10	61	-231	K7/8VI					
FMR 133B	17 33 02.39	+43 43 39.4	15.47		11.04	0.80	4.43	33	-220	M2.5V	10.81	84.5	89	0.37	0.01
FMR 134A	17 33 10.94	+04 31 55.9	16.43		12.19	0.77	4.24	-83	123	M1.5V	9.89	179.4	126	0.37	0.07
FMR 134B	17 33 10.30	+04 31 59.7	17.92		13.45	0.74	4.48	-83	123	M2V	10.31	280.2	197	0.37	0.10
1734+4858A	17 34 39.68	+48 58 04.9	13.87		10.42	0.81	3.45	-54	155	K8V	8.23	131.2	102	0.66	0.01
1734+4858B	17 34 42.90	+48 57 19.5	13.95		10.47	0.81	3.48	-54	155	K9V	8.35	129.1	100	0.64	0.01
FMR 135A	17 35 15.19	+81 19 05.8	14.77		10.44	0.83	4.33	-53	219	M2V	10.42	70.8	76	0.37	0.03
FMR 135B	17 36 27.16	+81 19 08.6	14.91		11.05	0.81	3.87	-88	195	M0V	9.06	136.6	139	0.58	0.05
1738+3939A	17 38 08.57	+39 39 15.4	16.66		11.66	0.86	5.00	-55	150	M3.5V	12.12	79.7	60	0.18	0.01
1738+3939B	17 38 09.27	+39 38 55.8	19.94		13.51	1.02	6.43	-55	150	M5V	15.00	95.6	72	0.12	0.01
FMR 136A	17 38 33.26	+63 32 29.5	12.44		9.01	0.81	3.43	15	-210	K8V	8.24	68.6	68	0.65	0.01
FMR 136B	17 38 31.15	+63 32 32.0	16.12		11.19	0.79	4.94	15	-210	M3.5V	12.06	64.5	64	0.18	0.01
FMR 137A	17 39 46.45	+05 37 29.3	17.18		13.72	0.74	3.46	-129	-161	M0VI					
FMR 137B	17 39 45.86	+05 37 26.1	17.53		13.92	0.75	3.61	-129	-161	K9VI	9.24	398.6	390	0.51	0.09
FMR 138A	17 47 24.95	+40 08 52.2	16.16		10.95	0.79	5.21	-176	-56	M4V	12.72	48.3	42	0.18	0.01
FMR 138B	17 47 21.31	+40 09 40.1	16.59		13.88	0.71	2.71	-155	-83	K3/4VI					
FMR 139A	18 09 05.99	+53 13 41.5	18.32		13.11	0.82	5.22	-73	173	M4V	12.62	134.9	120	0.18	0.01
FMR 139B	18 09 07.26	+53 13 22.4	20.30		14.28	0.79	6.02	-73	173	M5V	14.42	146.7	131	0.12	0.01
BVD 262A	18 15 16.20	+40 54 19.5	17.32		15.52	1.15	1.80	-76	-158	wd					
BVD 262B	18 15 14.58	+40 54 33.3	17.86					-76	-158	?					
1823+0403A	18 23 19.83	+04 03 16.4	16.52		11.94	0.72	4.58	-170	9	M2.5V	10.94	117.9	95	0.37	0.06
1823+0403B	18 23 20.70	+04 04 34.3	17.57		12.71	0.78	4.86	-170	9	M3V	11.42	149.1	120	0.26	0.08
1823+2022A	18 23 59.62	+20 22 48.7	18.13		15.93	0.67	2.20	-166	-78	wd					
1823+2022B	18 24 04.46	+20 23 44.1	18.73		11.85	0.92	6.88	-166	-78	M5.5V	15.89	36.1	31	0.09	0.01
FMR 140A	18 25 54.70	+53 37 43.4	15.28		11.58	0.75	3.70	-92	-129	M0V	9.01	176.2	132	0.58	0.01
FMR 140B	18 25 56.50	+53 37 44.9	18.85		13.86	0.67	4.99	-92	-129	M3.5V	12.26	203.7	153	0.18	0.01
FMR 141A	18 54 05.07	+39 22 18.5	11.29	0.80	8.32	0.72	2.97	58	-138	K4V	7.02	70.2	50	0.62	0.01
FMR 141B	18 54 04.35	+39 22 48.6	15.54		10.74	0.69	4.80	58	-138	M3V	11.83	54.3	39	0.26	0.01
FMR 142A	19 00 17.37	+64 59 08.0	16.62		13.10	0.82	3.52	-98	-118	M0VI					
FMR 142B	19 00 17.02	+64 59 16.3	17.22		13.49	0.79	3.73	-98	-118	M1VI	10.12	252.7	184	0.54	0.03
FMR 143A	19 06 57.51	+21 34 30.7	12.60		9.19	0.82	3.41	16	-182	K7V	7.98	76.4	66	0.67	0.06
FMR 143B	19 07 00.07	+21 34 25.4	18.21		12.22	0.85	5.99	16	-182	M4.5V	14.11	61.2	53	0.18	0.04
FMR 144A	19 09 19.19	+39 12 03.7	11.21	1.68	7.16	0.80	4.05	-113	-179	M2V	9.84	18.5	19	0.37	0.01
FMR 144B	19 09 31.70	+39 10 51.5	12.21	0.88	8.03	0.81	4.18	-105	-185	M0V	10.19	24.9	25	0.49	0.01
FMR 145A	19 14 05.54	+28 25 53.3	16.26		12.79	0.74	3.47	-299	-445	M0VI					
FMR 145B	19 14 06.06	+28 25 46.4	17.32		13.33	0.79	3.99	-299	-445	M1VI	10.54	208.8	531	0.54	0.06
FMR 146A	19 15 26.40	+54 24 30.7	10.68	1.44	8.25	0.67	2.43	-125	-147	K4V	7.02	53.0	48	0.62	0.01
FMR 146B	19 15 27.19	+54 24 15.0	14.74		11.33	0.79	3.42	-128	-149	K8V	8.32	182.2	170	0.63	0.03
FMR 147A	19 25 04.23	+22 47 56.4	11.09	0.90	8.89	0.56	2.20	49	281	K1VI					
FMR 147B	19 25 03.22	+22 47 55.2	15.56		12.59	0.75	2.97	67	285	K4/5VI					

Table 2 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (continued). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 148A	19 32 56.04	+17 23 56.7	14.86		10.60	0.83	4.26	172	-198	M2V	10.08	83.7	104	0.37	0.05
FMR 148B	19 32 59.69	+17 21 35.5	18.18		12.86	0.80	5.32	165	-210	M3.5V	12.45	124.1	157	0.18	0.07
FMR 149A	19 32 57.27	+04 57 08.8	13.98		9.45	0.82	4.53	-62	-159	M2.5V	11.01	38.4	31	0.37	0.01
FMR 149B	19 32 58.72	+04 57 57.7	15.47		10.67	0.81	4.80	-62	-159	M3V	11.65	56.3	46	0.26	0.02
FMR 150A	19 35 39.88	+06 16 42.4	14.22		10.79	0.79	3.43	-142	-81	K8V	8.32	143.5	111	0.63	0.03
FMR 150B	19 35 39.76	+06 16 25.4	14.66		10.96	0.80	3.70	-142	-81	K9V	8.74	144.7	112	0.61	0.03
FMR 151A	19 38 12.41	+01 40 30.3	13.17		9.50	0.83	3.67	-18	-236	K9V	8.60	76.7	86	0.62	0.04
FMR 151B	19 38 15.83	+01 39 12.3	18.10		12.72	0.84	5.38	-18	-236	M4V	12.62	113.1	127	0.18	0.06
FMR 152A	19 42 07.35	+28 40 17.9	12.22	0.83	10.57	0.28	1.65	-115	-153	G VI					
FMR 152B	19 42 09.11	+28 41 10.0	14.29		11.35	0.69	2.94	-123	-156	K4/5VI					
FMR 153A	19 43 19.57	+54 33 45.5	13.63		9.14	0.85	4.50	89	162	M2.5V	10.94	34.0	30	0.37	0.01
FMR 153B	19 43 23.69	+54 33 37.3	15.36		9.74	0.86	5.62	89	162	M4.5V	13.57	22.5	20	0.18	0.01
FMR 154A	19 45 30.41	+46 50 07.5	17.77		15.25	0.59	2.52	-455	-414	wd					
FMR 154B	19 45 30.43	+46 50 16.1	17.49		15.48	0.40	2.02	-455	-414	wd					
FMR 155A	19 50 56.24	+04 34 55.3	12.82		11.20	0.37	1.62	-22	-199	G VI					
FMR 155B	19 51 04.65	+04 36 53.2	13.94		10.50	0.83	3.44	-31	-199	K8V	8.32	126.9	121	0.63	0.03
FMR 156A	20 03 00.32	+08 03 35.0	17.46					-117	-183	?					
FMR 156B	20 03 00.30	+08 03 44.4	11.94		8.73	0.81	3.21	-117	-183	K7V	7.98	60.2	62	0.65	0.02
FMR 157A	20 04 57.78	+25 25 39.1	12.17		9.11	0.75	3.06	-141	-140	K5V	7.30	83.7	79	0.59	0.07
FMR 157B	20 04 57.64	+25 26 03.6	16.93		11.74	0.82	5.19	-141	-140	M3.5V	12.18	79.4	75	0.18	0.07
FMR 158A	20 16 12.36	+19 27 12.0	14.76		11.19	0.76	3.57	88	-142	K8V	8.32	176.8	140	0.64	0.05
FMR 158B	20 16 13.39	+19 27 28.7	16.37		11.60	0.70	4.77	88	-142	M3V	11.61	85.5	68	0.26	0.03
FMR 159A	20 39 52.60	+42 20 33.5	15.09		10.88	0.77	4.21	367	124	M1.5V	9.96	97.7	179	0.37	0.05
FMR 159B	20 40 04.47	+42 21 06.8	17.44		12.04	0.73	5.40	381	130	M4V	12.99	73.8	141	0.18	0.03
FMR 160A	20 40 13.46	+29 15 35.4	16.53		10.89	0.82	5.64	28	-188	M4.5V	13.55	38.1	34	0.18	0.02
FMR 160B	20 40 10.82	+29 14 46.7	18.79		12.56	0.90	6.24	28	-188	M5V	14.58	65.9	59	0.12	0.03
FMR 161A	20 41 07.02	+16 30 55.7	13.47		9.63	0.79	3.84	243	116	M0.5V	9.24	68.8	88	0.56	0.01
FMR 161B	20 41 05.71	+16 31 19.3	18.42					243	116	?					
CRB 13A	20 56 51.17	+08 42 09.1	14.32		10.32	0.78	4.00	160	-13	M1V	9.70	81.6	62	0.54	0.02
CRB 13B	20 56 50.76	+08 44 20.5	17.03		12.28	0.79	4.75	155	-8	M3V	11.46	124.9	92	0.26	0.02
FMR 162A	20 57 45.93	+13 38 47.4	18.62		13.43	0.82	5.19	162	-52	M3.5V	12.38	165.6	134	0.18	0.04
FMR 162B	20 57 45.09	+13 38 51.9	18.79		13.52	0.84	5.27	162	-52	M3.5V	12.48	170.4	137	0.18	0.04
2106+5924A	21 06 18.29	+59 24 01.8	10.91	1.51	8.48	0.63	2.42	-110	-119	K2V	6.46	70.0	54	0.69	0.06
2106+5924B	21 06 10.99	+59 25 48.3	15.31		10.54	0.85	4.77	-108	-115	M2.5V	11.22	59.4	44	0.37	0.06
FMR 163A	21 25 05.84	+03 29 30.0	18.39		14.04	0.85	4.35	-72	-152	M2V	10.14	406.8	324	0.37	0.05
FMR 163B	21 25 06.05	+03 29 45.1	18.51		14.46	0.70	4.05	-72	-152	M2VI	10.69	339.0	270	0.37	0.05
FMR 164A	21 39 28.15	+05 44 06.9	13.59		10.26	0.83	3.33	-153	-63	K7V	7.98	127.6	100	0.67	0.02
FMR 164B	21 39 38.08	+05 44 11.3	15.11		11.11	0.76	4.00	-168	-67	M1V	9.70	116.2	100	0.54	0.02
2146+1550A	21 46 32.30	+15 50 38.9	16.54		15.53	0.40	1.01	309	116	wd					
2146+1550B	21 46 26.06	+15 52 44.9	16.56		12.04	0.76	4.52	304	121	M2.5V	10.77	132.7	206	0.37	0.05
FMR 165A	21 50 51.16	+12 43 21.5	10.67	0.84	8.47	0.55	2.20	158	-83	K1V	6.18	75.7	64	0.74	0.03
FMR 165B	21 50 49.04	+12 43 43.8	18.08		14.70	0.65	3.37	161	-98	K9VI					

Table 2 concludes on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 2 (concluded). Astrophysical properties for the stellar components.

ID	AR	DEC	V	B-V	K	J-K	V-K	$\mu(\alpha)$	$\mu(\delta)$	spT	Mv	Dist (pc)	Vtan (km/s)	Mass	E (B-V)
FMR 166A	22 03 11.60	+57 07 39.3	17.80		11.99	0.88	5.81	191	5	M4.5V	13.85	59.8	54	0.18	0.02
FMR 166B	22 03 12.86	+57 07 38.4	17.94		11.80	0.88	6.14	191	5	M5V	14.52	47.1	43	0.12	0.01
FMR 167A	22 04 14.78	+10 04 10.5	11.17	1.13	8.71	0.61	2.46	-126	-98	K3V	6.74	75.0	57	0.66	0.01
FMR 167B	22 04 13.97	+10 04 13.9	15.58		11.50	0.81	4.08	-126	-98	M1.5V	9.81	137.2	104	0.37	0.02
FMR 168A	22 05 32.99	+25 23 59.7	16.07		11.13	0.74	4.94	-13	-176	M3.5V	12.08	61.2	51	0.18	0.02
FMR 168B	22 05 28.02	+25 23 25.6	16.77		11.53	0.72	5.24	-13	-176	M4V	12.76	61.7	52	0.18	0.01
LDS4945A	22 08 32.20	+02 09 37.6	14.23		10.92	0.77	3.31	118	-182	K7V	7.98	170.7	175	0.67	0.02
LDS4945B	22 08 31.91	+02 09 05.7	18.12		12.63	0.77	5.49	118	-182	M4V	13.27	91.0	94	0.18	0.02
2211+1819A	22 11 43.89	+18 19 14.1	14.12		10.55	0.78	3.57	-68	-135	K9V	8.41	133.6	96	0.64	0.02
2211+1819B	22 11 44.08	+18 18 57.0	14.75		10.86	0.78	3.89	-68	-135	M0.5V	9.37	115.2	83	0.55	0.02
FMR 169A	22 16 40.97	+29 10 23.8	6.67	0.95	4.31	0.75	2.36	155	24	G8III	0.58	156.1	116	1.00	0.03
FMR 169B	22 16 29.44	+29 09 50.2	10.55	0.97	8.45	0.52	2.10	164	-1	K1V	6.18	72.7	57	0.74	0.02
CBL 540A	22 20 25.38	+05 19 57.5	16.95		12.34	0.81	4.62	-105	-108	M2.5V	10.92	146.3	104	0.37	0.06
CBL 540B	22 20 23.27	+05 19 58.2	18.62		13.42	0.94	5.20	-104	-108	M3.5V	12.09	181.1	129	0.18	0.06
2222+2309A	22 22 33.61	+23 09 49.6	13.91		9.88	0.82	4.03	-167	-122	M1.5V	9.83	64.0	63	0.37	0.01
2222+2309B	22 22 30.08	+23 08 01.0	16.10		11.38	0.82	4.72	-182	-111	M3V	11.47	82.2	83	0.26	0.01
FMR 170A	22 29 43.90	+24 23 29.2	9.38	0.87	7.38	0.51	1.99	165	-23	K0V	5.90	49.0	39	0.79	0.01
FMR 170B	22 29 44.41	+24 22 41.7	19.05					172	-29	?					
CRB 20A	22 35 01.25	+41 03 37.3	12.39	1.53	9.29	0.77	3.10	170	-33	K7V	7.98	72.4	59	0.52	0.03
CRB 20B	22 35 00.71	+41 03 14.7	18.02		12.48	0.80	5.54	170	-33	M4V	13.23	85.7	70	0.18	0.03
FMR 171A	22 58 05.84	+28 08 52.3	10.93	0.78	9.11	0.52	1.83	-96	-119	G7V	5.42	122.2	89	0.88	0.02
FMR 171B	22 58 09.72	+28 08 22.4	15.42		11.36	0.84	4.06	-90	-131	M1.5V	9.73	132.3	100	0.37	0.02
2312+2701A	23 12 47.00	+27 01 04.5	11.56	0.51	9.03	0.61	2.53	169	-24	K1V	6.18	112.5	91	0.74	0.04
2312+2701B	23 12 50.76	+27 00 46.8	19.30		13.62	0.95	5.68	161	-25	M4.5V	13.36	142.8	110	0.18	0.04
AZC 129A	23 22 49.17	+23 22 28.1	15.87		11.21	0.91	4.66	152	-36	M3V	11.21	82.9	61	0.26	0.02
AZC 129B	23 22 49.22	+23 22 15.5	16.58		11.13	0.91	5.46	152	-36	M4V	13.11	48.5	36	0.18	0.01
FMR 172A	23 28 13.66	+33 59 45.7	13.56		10.70	0.71	2.86	27	-215	K4VI					
FMR 172B	23 28 26.38	+34 00 24.5	18.01		13.51	0.74	4.50	31	-210	M2V	10.51	279.5	281	0.37	0.07
2335+6750A	23 35 38.00	+67 50 01.6	10.56	0.83	8.70	0.48	1.86	139	63	G3V	4.82	113.7	82	1.01	0.13
2335+6750B	23 35 26.50	+67 51 58.5	17.89		12.70	0.83	5.19	141	60	M3V	11.41	147.1	107	0.26	0.17
2343+1345A	23 43 18.10	+13 45 43.0	17.74		11.73	0.87	6.01	-29	-170	M5V	14.27	48.1	39	0.12	0.01
2343+1345B	23 43 27.74	+13 44 26.3	18.22		12.50	0.84	5.71	-27	-170	M4.5V	13.63	79.8	65	0.18	0.02
2349+1108A	23 49 17.66	+11 08 51.4	13.78		10.03	0.82	3.75	84	-154	M0V	8.94	88.5	74	0.59	0.03
2349+1108B	23 49 18.49	+11 09 03.2	18.89		13.05	0.82	5.84	84	-154	M4.5V	13.87	95.9	80	0.18	0.03
2352+4625A	23 52 15.05	+46 25 52.0	16.98		12.35	0.78	4.63	165	33	M2.5V	11.20	136.9	109	0.37	0.03
2352+4625B	23 52 13.83	+46 26 47.0	17.58		12.89	0.76	4.69	165	33	M3V	11.32	169.2	135	0.26	0.03

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 3. Binary Stars

Desig.	RA	DEC	V pri.	V sec.	SpT pri.	SpT sec.	$\rho$ ["]	$\Delta(V-M_V)$	E(a) [AU]	$\Delta\mu$ (mas yr <sup>-1</sup> )	$M_{pri} + M_{sec}$ [ $M_{sun}$ ]	Period [yrs]
FMR 29	00 11 41.96	+03 23 17.6	16.10	16.20	M1.5V	M1.5V	6.76	0.25	1370	0	0.74	59000
FMR 30	00 23 55.55	+16 46 45.9	16.41	16.56	K7VI	M2V	173.52		33582	9		
FMR 31	00 41 30.19	+07 28 34.8	15.10	19.39	M1V	M4.5V	32.10	-0.23	4608	0	0.71	370000
FMR 32	00 42 15.23	+07 31 18.6	14.85	19.32	G/KVI	M3VI	13.24		5862	0		
FMR 33	00 44 27.83	+19 35 05.3	15.03	15.83	M2.5V	M2.5V	9.10	0.45	932	0	0.74	33000
FMR 34BC	00 50 21.36	+59 23 19.4	14.00	18.01	M2.5V	K VI	15.75		763	0		
FMR 35	00 50 12.71	+62 34 58.8	16.76	17.41	M4.5V	M5V	20.29	-1.07	960	0	0.30	54000
FMR 36	00 53 11.05	+31 44 13.5	10.06	14.93	K1V	M2.5V	159.61	0.17	12265	13	1.11	1300000
FMR 37	00 56 17.47	+81 03 15.3	16.92	17.52	K9V	M0VI	63.89	-0.56	26175	0	1.09	4000000
FMR 38	00 59 51.55	+27 01 28.8	10.35	17.80	K1V	M4.5V	72.97	-0.04	6033	11	0.91	500000
FMR 39	01 00 30.94	+09 33 09.8	14.97	16.44	K9V	M3.5V	19.44	-2.44	3405	0	0.84	220000
FMR 40	01 05 16.73	+16 20 24.9	14.70	15.52	G VI	M2.5V	7.73		878	0		
FMR 41	01 07 43.48	+57 59 11.5	17.31	17.97	M0V	M3V	116.16	-1.64	39813	19	0.83	8700000
0111+4248	01 11 55.14	+42 48 02.4	11.23	14.50	G9V	M0V	115.16	-0.05	17653	12	1.39	1200000
FMR 42AB	01 15 50.17	+47 02 02.3	14.70	17.71	M4V	M5V	27.12	0.88	915	0	0.30	50000
FMR 43	01 21 32.50	+39 20 35.2	11.61	15.37	K5V	M3V	15.77	-0.46	1287	31	0.85	50000
FMR 44	01 31 01.43	+54 31 55.4	16.87	18.23	M3.5V	M4V	42.98	0.74	4472	0	0.36	500000
FMR 45	01 56 19.06	+37 28 48.7	17.20	17.22	M4.5V	M4V	6.73	0.34	485	0	0.36	18000
FMR 46	02 00 01.17	+07 32 46.8	15.12	18.00	M3V	M3.5V	18.23	2.45	2380	0	0.43	175000
FMR 47	02 00 20.14	+26 35 59.9	10.99	14.77	K8V	M3V	13.94	0.47	704	24	0.91	20000
0201+0218	02 01 15.09	+02 18 25.7	17.44	18.50	K7VI	M1VI	63.84		32014	0		
FMR 48	02 05 24.83	+17 09 22.1	12.85	16.69	G VI	K VI	11.90			0		
FMR 49	02 12 39.74	+01 18 31.7	14.90	17.06	M2.5V	M4V	7.28	0.42	604	0	0.55	20000
FMR 50	02 22 41.63	+56 27 03.1	16.27	16.63	?	M3V	30.28			0		
FMR 51	02 26 02.36	+53 24 49.3	17.86	18.29	M2V	M2.5V	114.74	-0.62	41718	0	0.74	10000000
FMR 52	02 27 41.12	+06 13 53.9	14.48	16.17	M2.5V	M4V	6.96	0.07	402	0	0.55	11000
FMR 53	02 30 55.18	+62 48 50.8	13.50	16.17	K2VI	K6VI	19.62			0		
FMR 54	02 31 33.05	+38 53 14.3	13.31	15.56	K2V	M2V	7.35	-1.41	1606	0	1.06	62000
FMR 55	02 32 29.68	+06 06 15.6	14.44	18.45	M0.5V	M3.5V	18.36	0.84	2751	0	0.73	169000
CBL 212	02 32 43.60	+74 08 54.9	18.42	18.61	K9VI	M1VI	14.77	-0.98	7094	0	1.04	584000
CBL 213	02 33 01.14	+01 05 38.9	15.69	16.16	M3.5V	M4V	29.13	0.16	1776	0	0.36	125000
FMR 56	02 34 03.02	+09 50 14.0	17.77	18.77	M0.5V	M3VI	6.70	-1.07	2831	0	0.80	170000
FMR 57	02 40 09.93	+14 38 47.6	15.28	17.53	M2V	M3V	9.73	0.87	1223	0	0.63	54000
FMR 58	02 44 21.78	+32 07 16.5	10.81	16.52	K0V	M3.5V	63.46	-0.87	5933	4	0.96	465000
FMR 59	02 51 07.90	+06 48 23.3	13.67	16.35	M0.5V	M3.5V	47.10	-0.27	4080	0	0.75	300000
FMR 60	02 51 30.43	+34 06 37.5	10.54	16.72	K2V	M4V	77.33	-0.06	6111	6	0.87	510000
FMR 61	02 53 59.42	+66 06 07.3	14.74	14.52	K9V	M2V	9.10	-2.09	1175	0	1.01	40000
FMR 62	03 17 26.20	+64 03 57.8	11.47	14.91	K5V	M3.5V	52.28	-1.36	3211	5	0.96	185000
GWP 453	03 20 52.06	+12 09 56.4	15.49	16.30	K6VI	K8/9VI	53.75			0		
0323+1506	03 23 27.30	+15 06 52.0	14.26	16.13	M1.5V	M3.5V	67.78	-0.33	5566	0	0.55	560000
GWP 512	03 47 07.04	+05 20 16.9	17.29	18.11	M3.5V	?	6.85			0		
FMR 63	03 50 50.19	+45 45 34.1	14.29	18.29	K8V	M3V	27.76	0.91	5969	0	0.89	490000

Table 3 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 3 (continued). Binary Stars

Desig.	RA	DEC	V pri.	V sec.	SpT pri.	SpT sec.	$\rho$ ["]	$\Delta(V-M_V)$	E(a) [AU]	$\Delta\mu$ (mas yr <sup>-1</sup> )	$M_{\text{pri}} + M_{\text{sec}}$ [ $M_{\text{sun}}$ ]	Period [yrs]
FMR 64	04 11 26.59	+54 24 02.9	10.38	15.89	K3V	M3V	172.09	0.83	13589	16	0.91	1660000
FMR 65	04 17 51.16	+51 43 36.7	14.98	15.23	M1.5V	M1.5V	13.10	0.46	1822	0	0.74	90000
FMR 66	04 24 49.26	+01 06 56.1	12.90	16.56	M2.5V	M4.5V	25.85	0.44	996	0	0.55	42000
0433+0013	04 33 17.84	+00 13 59.5	11.48	16.85	G6VI	M2V	19.05		4694	3		
FMR 67	04 48 06.47	+41 38 04.7	14.68	16.04	M2.5V	M1.5V	8.39	2.28	1292	0	0.74	50000
0509+1038	05 09 42.59	+10 38 43.8	14.70	18.99	K6V	M3.5V	45.43	-0.18	10699	0	0.73	1300000
FMR 68	05 19 34.13	+34 20 38.7	15.86	16.07	M3.5V	M3.5V	50.75	0.16	3842	0	0.36	400000
0524+0315	05 24 49.76	+03 15 15.4	10.71	14.70	K8V	G7VI	48.28		1806	19		
FMR 69	05 44 17.22	+30 38 31.6	10.68	15.61	K0V	M2.5V	50.03	-0.18	5402	11	1.16	370000
FMR 70	05 45 45.39	+66 38 30.2	12.51	14.06	K6V	M3V	11.17	-1.98	879	0	0.81	29000
0546+1116	05 46 17.26	+11 16 46.6	16.50	18.21	M4.5V	K2VI	53.81		2333	0		
0550+0939	05 50 11.74	+09 39 49.2	16.01	17.75	M4.5V	M6V	16.00	-0.97	487	0	0.26	21000
FMR 71	05 51 49.91	+18 04 29.4	17.49	17.98	M3V	M2.5V	20.35	1.31	4479	0	0.63	378000
GWP 736	06 05 03.52	+07 23 30.5	14.99	16.83	K4VI	M0VI	8.66		2387	0		
GWP 744	06 06 13.38	+06 48 22.3	16.73	18.90	M4.5V	M5.5V	9.22	0.53	510	0	0.26	22000
0610+2802	06 10 25.64	+28 02 23.6	10.80	13.41	K4V	M1.5V	160.99	-0.37	10266	3	0.99	1000000
0610+4439	06 10 43.98	+44 39 49.8	16.73	17.93	M0VI	M0VI	141.92		41161	14	0.46	12300000
FMR 72	06 10 48.30	+03 15 12.9	15.92	18.23	M2V	M3.5V	45.47	0.38	6622	0	0.55	730000
FMR 73	06 15 40.49	+34 27 03.8	16.75	18.16	M3V	M3.5V	7.48	0.35	1038	0	0.43	51000
FMR 74	06 18 10.57	+67 04 15.2	18.39	19.00	M5V	M5V	7.61	0.71	580	0	0.25	28000
0628+2829	06 28 28.26	+28 29 23.0	16.03	17.59	M0V	M3V	100.19	-0.73	24173	0	0.83	4100000
FMR 75	06 28 31.05	+59 06 23.1	17.19	19.00	M4.5V	M5V	36.68	0.98	2933	0	0.30	290000
0649+2942	06 49 53.22	+29 42 03.8	13.70	15.98	M2.5V	M3.5V	34.23	0.53	1942	0	0.55	115000
FMR 83	06 51 04.45	+18 43 43.1	17.65	18.07	M4V	M4.5V	111.77	-0.54	9826	0	0.36	1600000
FMR 76	06 58 34.34	+75 14 17.7	15.79	18.99	M3.5V	M4.5V	131.42	1.72	12810	49	0.36	2400000
0705+4129	07 05 32.54	+41 29 10.0	13.98	16.39	K8V	K9V	87.20	1.87	24510	0	1.26	3400000
GWP 876	07 10 52.54	+06 12 30.6	14.05	16.94	M0V	M3.5V	21.39	-0.68	2346	0	0.76	130000
FMR 77	07 15 21.11	+03 01 27.8	13.83	18.65	M0V	M4.5V	19.32	-0.25	2304	0	0.78	125000
0727+4228	07 27 50.77	+42 28 19.8	16.03	17.89	M3.5V	M4V	32.00	1.06	2759	0	0.36	243000
CBL 235	07 28 20.77	+31 00 13.0	15.11	17.91	M2V	M4V	9.48	0.30	1250	0	0.55	60000
FMR 78	07 38 12.77	+43 34 24.0	9.64	18.46	K2V	M0VI	177.17	5.42		65		
FMR 79	07 40 57.40	+06 41 04.8	15.90	16.00	M2V	M3.5V	6.95	-1.96	756	0	0.55	28000
0749+2435	07 49 54.56	+24 35 13.1	11.98	15.08	M0V	M3.5V	96.86	0.11	5128	0	0.77	420000
FMR 80	07 49 19.76	+49 50 31.2	10.40	18.00	G5V	M3.5V	66.65	0.22	9734	11	1.12	907000
0802+0019	08 02 50.06	+00 19 09.1	13.41	16.83	K9V	M3V	78.76	0.26	9969	0	0.88	1050000
FMR 81	08 20 39.80	+48 03 18.0	15.32	17.18	M3V	wd	166.78	-0.82	8303	4		
BVD 202	08 31 20.84	+44 24 07.1	12.75	18.84	K7V	M4.5V	34.77	0.23	4091	0	0.85	285000
CBL 263	08 37 33.75	+24 41 32.1	13.84	18.53	M0.5V	M4.5V	99.51	-0.19	9465	0	0.73	1075000
0840+6144	08 40 04.61	+61 44 44.4	18.68	19.09	M1VI	M0VI	84.73	0.81	57871	0	1.00	14000000
FMR 82	08 48 51.11	+17 17 32.3	17.04	19.70	M4V	M5.5V	168.37	-0.21		117		
0855+3732	08 55 59.87	+37 32 10.8	13.91	17.37	M0.5V	M3.5V	80.19	0.24	8626	0	0.73	935000
0900+0643	09 00 52.07	+06 43 31.5	13.53	16.14	M0V	M3.5V	44.65	-0.51	4005	0	0.76	290000

Table 3 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 3 (continued). Binary Stars

Desig.	RA	DEC	V pri.	V sec.	SpT pri.	SpT sec.	$\rho$ ["]	$\Delta(V-M_V)$	E(a) [AU]	$\Delta\mu$ (mas yr <sup>-1</sup> )	$M_{\text{pri}} + M_{\text{sec}}$ [ $M_{\text{sun}}$ ]	Period [yrs]
FMR 84	09 00 26.61	+53 06 57.9	15.83	19.58	M3.5V	M4V	99.27	2.44		61		
0902+0600	09 02 51.27	+06 00 28.0	9.80	14.35	G0V	M0.5V	105.56	-0.42	14068	6	1.67	129000
0906+7226	09 06 56.14	+72 26 09.3	16.03	17.93	M3.5V	M4.5V	24.44	-0.11	1803	0	0.36	128000
FMR 85	09 16 22.75	+25 39 49.8	11.62	17.75	K9V	wd	44.06	-0.70	1660	20		
FMR 86	09 21 18.96	+24 43 32.3	16.36	17.62	M1V	M2V	7.14	0.33	1998	0	0.91	94000
0929+0350	09 29 09.81	+03 50 07.9	16.21	16.65	M3.5V	M4V	37.79	0.16	2844	0	0.36	254000
FMR 87	09 41 15.75	+07 07 43.4	16.09	16.75	M2.5V	M3V	22.74	0.18	2837	0	0.63	190000
CBL 288	09 42 22.64	+64 22 23.3	12.93	18.48	K0/1VI	M2V	14.81		6058	0		
FMR 88	09 47 44.84	+35 08 27.4	14.18	16.54	K3/4VI	M1.5V	138.71		36818	37		
FMR 89	10 01 21.81	+23 52 27.1	16.54	18.05	M3V	M4V	6.27	0.60	777	0	0.43	33000
CBL 304	10 13 59.78	+03 05 56.4	18.03	18.29	wd	wd	26.37	-0.19		0		
FMR 90	10 17 33.63	+26 10 37.1	18.48	18.98	M1VI	M4V	168.44	-2.34		66		
FMR 91	10 18 07.84	+54 22 48.6	13.93	16.66	K9V	M2.5V	72.18	0.36	11360	0	0.99	1220000
FMR 92	10 31 39.65	+43 51 15.4	11.64	15.26	G9V	M2V	129.78	-0.82	20848	12	1.24	2700000
FMR 93	10 34 36.13	+53 23 23.9	16.58	19.61	M3V	M4.5V	49.42	0.65	7703	0	0.43	1000000
FMR 94AC	10 45 21.40	+18 14 29.0	9.58	16.01	G6V	M3.5V	113.40	-0.24	9761	19	1.09	925000
FMR 95	10 46 33.43	+19 06 37.3	13.34	18.40	M1V	M4V	36.33	1.50	3832	0	0.71	280000
FMR 96	10 46 58.66	+24 36 52.4	13.31	14.64	M1V	M2V	9.88	0.75	784	0	0.91	23000
FMR 97	10 51 02.12	+38 57 37.7	18.28	19.49	M4V	M4V	8.71	0.86	1805	0	0.36	130000
GWP1473	10 51 03.61	+14 58 19.8	16.19	17.95	M3.5V	M4.5V	14.04	0.61	1075	0	0.36	59000
CBL 323	10 54 16.16	+00 02 59.5	12.64	17.02	K5V	M3.5V	42.07	-0.75	5128	0	0.77	420000
CRB 87	10 57 30.49	+30 08 29.8	16.64	17.50	M4V	wd	7.33	0.04	485	0		
1102+2353	11 02 01.98	+23 53 08.5	14.15	16.69	K8V	M2.5V	97.78	-0.29	16653	0	1.00	2150000
BVD 216	11 08 21.35	+47 51 38.5	13.97	16.44	M1V	M4V	22.98	-0.83	1764	0	0.71	88000
GWP1557	11 11 59.28	+04 02 42.0	18.15	19.39	M1VI	M1VI	25.59	1.20	17256	0	1.07	2190000
FMR 98	11 19 44.46	+06 11 24.9	9.20	19.48	G6V	M4.5V	147.88	2.05		102		
FMR 99	11 22 27.00	+52 46 46.7	14.99	15.38	M0.5V	M1.5V	15.51	-0.53	2556	0	0.95	130000
FMR 100	11 23 42.68	+65 54 31.7	13.65	18.95	K7V	M0VI	33.89	3.23	15560	0	1.12	1800000
FMR 101	11 31 49.44	+35 13 06.8	15.39	15.54	M0.5V	M1V	7.38	-0.17	1518	0	1.11	55000
1135+3109	11 35 11.94	+31 09 26.7	16.45	18.29	M3.5V	M3V	131.30	2.55	24744	6	0.43	5900000
CBL 346	11 35 40.36	+04 57 29.5	14.73	19.70	M0.5V	M5V	10.16	-0.77	1247	0	0.67	54000
FMR 102	11 39 07.20	+16 34 42.9	15.64	16.33	M2.5V	M3V	8.18	-0.51	923	0	0.63	35000
1147+1640	11 47 16.86	+16 40 07.4	16.57	16.63	M0VI	K8VI	8.38			0		
GWP1677	11 48 06.30	+03 06 20.2	14.93	17.04	M1.5V	M3.5V	22.54	-0.27	2746	0	0.55	190000
1148+0018	11 48 51.56	+00 18 03.8	15.13	18.04	K2VI	M1VI	4.58		2097	0		
BVD 221	12 02 37.52	+44 17 57.8	16.97	19.44	M3.5V	M4.5V	12.89	0.53	1766	0	0.36	125000
1206+1218	12 06 02.12	+12 18 19.0	13.23	16.53	G VI	K8VI	38.06			0		
1209+2818	12 09 41.82	+28 18 08.8	18.85	19.58	M3V	M3.5V	13.44	0.14	4863	0	0.43	515000
FMR 103	12 16 36.93	+40 57 36.2	18.56	18.72	K8VI	M4V	29.54		5998	0		
FMR 104	12 17 05.76	+07 42 30.2	15.25	18.14	K1VI	K8/9VI	11.54			0		
FMR 105	12 23 23.67	+39 20 15.7	18.27	19.32	M1VI	K9VI	9.15		4707	0		
1223+0625	12 23 43.48	+06 25 10.3	13.85	18.33	K4/5VI	M2.5V	23.38		8900	0		

Table 3 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 3 (continued). Binary Stars

Desig.	RA	DEC	V pri.	V sec.	SPT pri.	SPT sec.	$\rho$ ["]	$\Delta(V-M_V)$	E(a) [AU]	$\Delta\mu$ (mas yr <sup>-1</sup> )	$M_{\text{pri}} + M_{\text{sec}}$ [ $M_{\text{sun}}$ ]	Period [yrs]
FMR 106	12 27 45.45	+75 53 57.7	12.16	19.31	K1VI	M4V	35.35		6730	24		
1233+0824	12 33 13.45	+08 24 03.9	18.53	19.09	wd	wd	110.88	-0.18	11037	0		
FMR 107	12 35 52.36	+69 39 27.9	14.29	18.35	M2.5V	M1VI	8.05	4.99	2404	0	0.91	125000
1235+4402	12 35 54.41	+44 02 49.7	13.00	19.55	M0.5V	wd	36.88	0.45	3160	0		
1236+1457	12 36 13.40	+14 57 17.1	15.85	17.83	M2.5V	M4V	80.52	0.47	10121	0	0.55	1400000
FMR 108	12 36 16.09	+21 13 17.4	10.42	19.46	K3V	M5.5V	37.11	0.10	2548	6	0.74	145000
CBL 390	12 40 08.21	+37 21 46.8	14.08	17.31	M2.5V	M4.5V	32.99	0.23	1783	0	0.55	100000
FMR 109	12 43 07.93	+35 53 19.7	10.91	17.37	K2V	M3.5V	89.01	0.43	9569	3	0.87	1000000
FMR 110	12 44 50.98	+77 40 20.7	11.52	15.76	K1V	M1.5V	51.36	0.46	8175	16	1.11	700000
FMR 111	12 52 53.82	+28 35 45.9	14.66	20.31	M2V	M5V	125.87	1.25	16289	34	0.49	2950000
1310+3252	13 10 21.43	+32 52 58.4	14.33	17.30	M3V	M4.5V	66.47	0.64	3734	0	0.43	346000
1311+1106	13 11 41.81	+11 06 24.7	12.84	17.56	F VI	K8/9VI	146.65			9		
FMR 112	13 23 13.02	+36 33 39.1	13.01	17.78	K4V	M4V	27.96	-1.02	4457		0.80	330000
FMR 113	13 43 09.06	+25 53 06.4	12.11	18.20	K2V	M4V	130.83	-0.74	18754	9	0.87	2750000
1352+2806	13 52 02.28	+28 06 48.8	14.01	14.39	M1V	M2.5V	11.54	-0.69	901	0	0.91	28000
1358+3842	13 58 44.94	+38 42 32.8	14.15	18.55	K8V	M3.5V	39.77	0.56	8442	0	0.83	850000
LDS2333	14 00 23.58	+66 37 28.8	11.53	17.80	K1V	M3.5V	51.30	0.53	8474	24	0.91	820000
1424+1804	14 24 36.02	+18 04 14.0	16.53	18.84	M2.5V	M4V	33.33	0.46	5671	0	0.55	575000
CBL 461	14 35 45.90	+04 58 11.6	17.46	17.61	M2V	M2V	51.77	-0.03	17658	0	0.74	2700000
FMR 114	14 42 52.06	+07 23 56.3	9.60	17.23	F8V	M3.5V	111.13	-0.55	16002	31	1.41	1700000
CBL 468	14 46 08.44	+10 59 02.1	12.39	17.17	K1V	M2.5V	20.64	-0.14	4279	0	1.11	265000
FMR 115	14 52 21.74	+12 31 22.3	18.50	19.29	M2.5V	M4.5V	108.98	-1.93	26993	0	0.55	5980000
FMR 116	14 54 55.24	+23 06 47.1	17.72	19.38	M3.5V	M4.5V	6.66	-0.25	1077	0	0.36	59000
CBL 477	15 00 51.87	+13 14 47.4	15.68	15.95	M3.5V	M4V	19.29	0.08	1099	0	0.36	61000
FMR 117	15 11 46.72	+00 04 32.6	14.04	18.39	G VI	M0VI	128.10		72067	39		
CBL 485	15 17 22.83	+09 04 01.6	16.68	18.23	K2/4VI	K9VI	18.12			0		
FMR 118	15 17 36.63	+15 17 13.8	15.69	19.52	M3.5V	M5.5V	12.62	0.23	752	0	0.26	40000
FMR 119	15 19 49.96	+64 15 41.6	18.30	19.06	?	?	6.03			0		
FMR 120	15 42 33.51	+00 52 06.5	9.77	17.08	G5V	M3.5V	85.60	0.20	9167	21	1.12	830000
FMR 121	15 54 53.03	+48 52 28.9	14.09	18.13	G/K VI	M2.5V	31.15		9498	32		
FMR 122	16 01 49.43	+25 18 42.6	15.20	16.42	M3V	M3.5V	8.25	1.04	633	0	0.43	24000
FMR 123	16 12 02.59	+31 58 47.6	14.44	16.64	M3.5V	M4.5V	8.75	0.76	368	0	0.36	11800
FMR 124	16 12 38.93	+23 41 05.3	13.64	17.93	K1VI	M0VI	60.16			0		
FMR 125	16 21 38.86	+02 54 58.3	13.67	16.71	G VI	K9VI	32.10			0		
FMR 126	16 39 35.67	+41 24 55.1	13.52	16.91	M0V	M3.5V	83.43	-0.30	8604	0	0.78	905000
FMR 127	16 41 52.51	+10 34 33.8	13.68	18.50	M2.5V	wd	14.13		643	0		
FMR 128	16 54 42.98	+46 54 33.5	14.64	16.16	M2.5V	M3V	9.16	1.28	785	0	0.63	28000
CBL 511	16 58 09.97	+26 52 27.4	12.63	17.52	G/K VI	M1.5V	18.42		6632	0		
FMR 129	16 58 51.61	+32 11 46.5	17.76	17.92	M0VI	M3V	161.01	-1.44		57		
FMR 130	17 01 43.51	+38 06 58.0	17.73	18.92	M3V	M4V	9.87	-0.56	2054	0	0.43	141000
FMR 131	17 02 22.12	+16 47 32.2	15.70	16.43	M2.5V	M2.5V	9.31	0.80	1152	0	0.74	45000
1712+0132	17 12 43.18	+01 32 04.4	13.50	15.42	M1.5V	M1V	22.52	1.92	2517	0	0.91	135000

Table 3 continues on next page.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

Table 3 (continued). Binary Stars

Desig.	RA	DEC	V pri.	V sec.	SPT pri.	SPT sec.	$\rho$ ["]	$\Delta(V-M_V)$	E(a) [AU]	$\Delta\mu$ (mas yr <sup>-1</sup> )	$M_{\text{pri}} + M_{\text{sec}}$ [ $M_{\text{sun}}$ ]	Period [yrs]
FMR 132	17 22 35.02	+29 31 03.9	14.57	19.29	M2V	M4.5V	31.55	0.83	3925	0	0.55	332000
FMR 133	17 32 51.62	+43 45 08.9	13.99	15.47	K7/8VI	M2.5V	147.02		15654	30		
FMR 134	17 33 10.94	+04 31 55.9	16.43	17.92	M1.5V	M2V	9.91	1.07	2870	0	0.74	180000
1734+4858	17 34 39.68	+48 58 04.9	13.87	13.95	K8V	K9V	55.42	-0.04	9086	0	1.30	760000
FMR 135	17 35 15.19	+81 19 05.8	14.77	14.91	M2V	M0V	162.98	1.50	21297	42	0.95	3190000
1738+3939	17 38 08.57	+39 39 15.4	16.66	19.94	M3.5V	M5V	21.16	0.40	2337	0	0.30	206000
FMR 136	17 38 33.26	+63 32 29.5	12.44	16.12	K8V	M3.5V	14.29	-0.13	1197	0	0.83	45000
FMR 137	17 39 46.45	+05 37 29.3	17.18	17.53	M0VI	K9VI	9.38		4712	0		
FMR 138	17 47 24.95	+40 08 52.2	16.16	16.59	M4V	K3/4VI	63.52		3864	34		
FMR 139	18 09 05.99	+53 13 41.5	18.32	20.30	M4V	M5V	22.23	0.18	3944	0	0.30	450000
BVD 262	18 15 16.20	+40 54 19.5	17.32	17.86	wd	?	21.03			0		
1823+0403	18 23 19.83	+04 03 16.4	16.52	17.57	M2.5V	M3V	78.99	0.57	13285	0	0.63	1900000
1823+2022	18 23 59.62	+20 22 48.7	18.13	18.73	wd	M5.5V	87.71		3984	0	0.09	860000
FMR 140	18 25 54.70	+53 37 43.4	15.28	18.85	M0V	M3.5V	16.13	0.32	3859	0	0.76	275000
FMR 141	18 54 05.07	+39 22 18.5	11.29	15.54	K4V	M3V	31.15	-0.56	2445	0	0.88	130000
FMR 142	19 00 17.37	+64 59 08.0	16.62	17.22	M0VI	M1VI	8.59		2734	0	0.54	195000
FMR 143	19 06 57.51	+21 34 30.7	12.60	18.21	K7V	M4.5V	36.09	-0.52	3128	0	0.85	190000
FMR 144	19 09 19.19	+39 12 03.7	11.21	12.21	M2V	M0V	162.47	0.65	4440	10	0.86	320000
FMR 145	19 14 05.54	+28 25 53.3	16.26	17.32	M0VI	M1VI	9.54		2511	0	0.54	170000
FMR 146	19 15 26.40	+54 24 30.7	10.68	14.74	K4V	K8V	17.21	2.76	2550	4	1.25	115000
FMR 147	19 25 04.23	+22 47 56.4	11.09	15.56	K1VI	K4/5VI	13.95			18		
FMR 148	19 32 56.04	+17 23 56.7	14.86	18.18	M2V	M3.5V	150.58	0.94	19715	14	0.55	3700000
FMR 149	19 32 57.27	+04 57 08.8	13.98	15.47	M2.5V	M3V	53.52	0.85	3193	0	0.63	230000
FMR 150	19 35 39.88	+06 16 42.4	14.22	14.66	K8V	K9V	17.18	0.02	3119	0	1.24	155000
FMR 151	19 38 12.41	+01 40 30.3	13.17	18.10	K9V	M4V	93.39	0.91	11167	0	0.80	1300000
FMR 152	19 42 07.35	+28 40 17.9	12.22	14.29	G VI	K4/5VI	57.01			9		
FMR 153	19 43 19.57	+54 33 45.5	13.63	15.36	M2.5V	M4.5V	36.77	-0.90	1310	0	0.55	64000
FMR 154	19 45 30.41	+46 50 07.5	17.49	17.77	wd	wd	8.65			0		
FMR 155	19 50 56.24	+04 34 55.3	12.82	13.94	G VI	K8V	172.43		27568	9	0.63	5750000
FMR 156	20 03 00.32	+08 03 35.0	11.94	17.46	K7V	?	11.14			0	0.65	
FMR 157	20 04 57.78	+25 25 39.1	12.17	16.93	K5V	M3.5V	24.56	-0.12	2524	0	0.77	145000
FMR 158	20 16 12.36	+19 27 12.0	14.76	16.37	K8V	M3V	22.16	-1.68	3661	0	0.90	235000
FMR 159	20 39 52.60	+42 20 33.5	15.09	17.44	M1.5V	M4V	135.78	-0.68	14670	15	0.55	2400000
FMR 160	20 40 13.46	+29 15 35.4	16.53	18.79	M4.5V	M5V	59.69	1.23	3912	0	0.30	445000
FMR 161	20 41 07.02	+16 30 55.7	13.47	18.42	M0.5V	?	27.95			0		
CRB 13	20 56 51.17	+08 42 09.1	14.32	17.03	M1V	M3V	131.63	0.95	17123	7	0.79	2500000
FMR 162	20 57 45.93	+13 38 47.4	18.62	18.79	M3.5V	M3.5V	13.03	0.07	2758	0	0.36	245000
2106+5924	21 06 18.29	+59 24 01.8	10.91	15.31	K2V	M2.5V	120.27	-0.36	9808	4	1.06	940000
FMR 163	21 25 05.84	+03 29 30.0	18.39	18.51	M2V	M2VI	15.40	-0.43	7236	0	0.74	715000
FMR 164	21 39 28.15	+05 44 06.9	13.59	15.11	K7V	M1V	148.32	-0.20	22779	16	1.21	3100000
2146+1550	21 46 32.30	+15 50 38.9	16.54	16.56	wd	M2.5V	154.99		25912	7		
FMR 165	21 50 51.16	+12 43 21.5	10.67	18.08	K1V	K9VI	38.23		3645	15	0.74	255000

Table 3 continues on next page.



## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

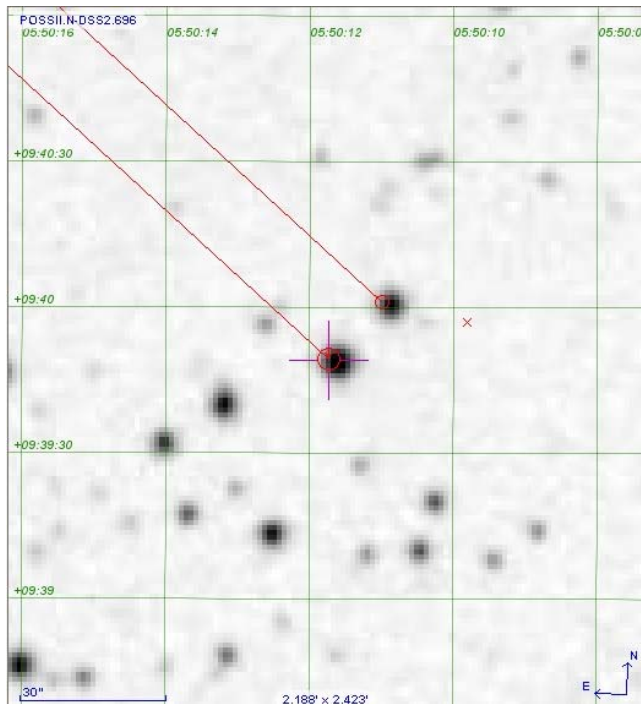
Table 3 (concluded). Binary Stars

Desig.	RA	DEC	V pri.	V sec.	SpT pri.	SpT sec.	$\rho$ ["]	$\Delta(V-M_V)$	E(a) [AU]	$\Delta\mu$ (mas yr <sup>-1</sup> )	$M_{\text{pri}} + M_{\text{sec}}$ [ $M_{\text{sun}}$ ]	Period [yrs]
FMR 166	22 03 11.60	+57 07 39.3	17.80	17.94	M4.5V	M5V	10.31	-0.53	695	0	0.30	33000
FMR 167	22 04 14.78	+10 04 10.5	11.17	15.58	K3V	M1.5V	12.32	1.34	1647	0	1.03	66000
FMR 168	22 05 32.99	+25 23 59.7	16.07	16.77	M3.5V	M4V	75.50	0.02	5844	0	0.36	750000
LDS4945	22 08 32.20	+02 09 37.6	14.23	18.12	K7V	M4V	32.27	-1.40	5319	0	0.85	420000
2211+1819	22 11 43.89	+18 19 14.1	14.12	14.75	K9V	M0.5V	17.32	-0.33	2714	0	1.19	130000
FMR 169	22 16 40.97	+29 10 23.8	6.67	10.55	G8III	K1V	154.79	-1.72	22309	27	1.74	2500000
CBL 540	22 20 25.38	+05 19 57.5	16.95	18.62	M2.5V	M3.5V	31.54	0.49	6506	1	0.55	700000
2222+2309	22 22 33.61	+23 09 49.6	13.91	16.10	M1.5V	M3V	119.00	0.55	10965	19	0.63	1450000
FMR 170	22 29 43.90	+24 23 29.2	9.38	19.05	K0V	?	49.20			9	0.79	
CRB 20	22 35 01.25	+41 03 37.3	12.39	18.02	K7V	M4V	23.44	0.38	2334	0	0.70	135000
FMR 171	22 58 05.84	+28 08 52.3	10.93	15.42	G7V	M1.5V	59.42	0.18	9528	13	1.25	835000
2312+2701	23 12 47.00	+27 01 04.5	11.56	19.30	K1V	M4.5V	53.33	0.56	8579	8	0.91	830000
AZC 129	23 22 49.17	+23 22 28.1	15.87	16.58	M3V	M4V	12.59	-1.19	1043	0	0.43	51000
FMR 172	23 28 13.66	+33 59 45.7	13.56	18.01	K4VI	M2V	163.01		57402	6		
2335+6750	23 35 38.00	+67 50 01.6	10.56	17.89	G3V	M3V	133.84	0.73	21994	4	1.26	2900000
2343+1345	23 43 18.10	+13 45 43.0	17.74	18.22	M5V	M4.5V	160.04	1.12	12894	2	0.30	2700000
2349+1108	23 49 17.66	+11 08 51.4	13.78	18.89	M0V	M4.5V	16.98	0.18	1972	0	0.77	100000
2349+1108	23 52 15.05	+46 25 52.0	16.98	17.58	M2.5V	M3V	56.46	0.48	10889	0	0.63	1400000

Table 4. Spectral Type Comparison

Star	V mag.	SpT.phot	SpT. literature	#ref
FMR 81 B	15.32	wd	DA [wd]	2
FMR 85 B	17.75	wd	DZ [wd]	1
CBL 304 A	18.03	wd	DA [wd]	2
FMR 154 A	18.48	wd	DA9 [wd]	3
FMR 154 B	18.98	wd	DA10 [wd]	3
FMR 42 Aa,Ab	14.70	M4V	M4V, M4.5V+M5V	14, 4
FMR 47 A	10.99	K8V	K5	5
FMR 60 A	10.54	K2V	K4	5
FMR 85 A	11.62	K9V	K6	5
FMR 103 B	18.72	M4V	M4V	6
CBL 390 A	10.91	K2V	G8V	7
FMR 120 A	9.77	G5V	G8V	8
FMR 123 A	14.44	M3.5V	M3.5V	9
FMR 141 A	11.29	K4V	K4	5
FMR 144 A	11.21	M2V	M0, M1	5, 9
FMR 145 A	16.26	M0VI	sdM0.0	10
FMR 145 B	17.32	M1VI	sdM1.5	10
FMR 147 A	11.09	K1VI	K2	11
2106+5924 A	10.91	K2V	K3	12
FMR 169 A	6.67	G8III	G8III, G7II-III, G7III-IV	13
<b>References</b>				
1. Koester et al. (2011); 2. Kilic et al. (2006); 3. Reid (2003); 4. Law, Hodgkin & Mackay (2008); 5. Stephenson (1986); 6. West et al. (2008); 7. Malmquist (1960); 8. Houk & Swift (1999); 9. Reid (2004); 10. Lépine, Rich & Shara (2003); 11. Lee (1984); 12. Alknis (1958); 13. Several references; 14. Reid, Cruz & Allen (2007).				

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

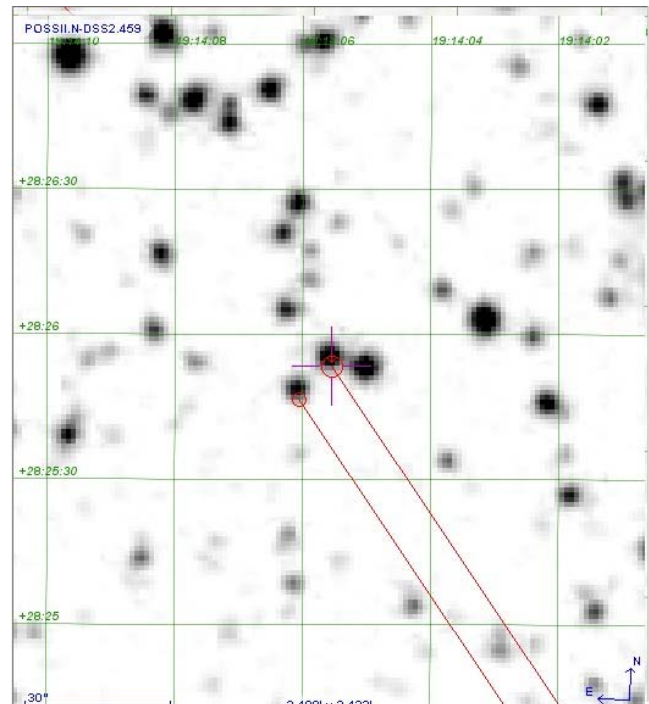


**Figure 4:** The binary 0550+0939 is composed of red stars M4.5V and M6V. The secondary is the coolest star in our sample. The red lines are the proper motions.

(Continued from page 264)

tral type (Figure 4). Sixty stars were classified as K dwarfs. The subdwarf stars are an important stellar population in our sample and about 75 cool subdwarfs (about a 16% of the total sample) were found. All these subdwarfs but two (FMR 145 A and B, see Figure 5) are not reported in literature before this publication.

After searching for spectral types in the literature, we found only 20 stars with known spectral types. Table 4 shows a comparison between our estimates and the data from literature. Column 1 lists the identification of the star and the stellar component, column 2 the V magnitude, in columns 3 and 4, the spectral types determined in this work and from the astronomical literature. In the last column is showed the bibliographic references for the spectral types. For determine the luminosity class several reduced proper motion diagrams (Jones 1972, Salim & Gould 2002, Nelson et al. 2002) were used. Our luminosity classes (giant star, normal dwarf, subdwarf, white dwarf) are in total agreement with those listed in literature. In the 76% of the cases, the difference was less than or equal to 2 subspectral types. For some of the references, especially those for brighter



**Figure 5:** FMR 145 is a binary star composed of two cool subdwarfs of spectral type sdM0.0 and sdM1.5. In our sample, 75 cool subdwarfs were found, all of them but FMR 145 A and B, are new subdwarfs.

stars and older references, the errors in the published spectral type were of 1-2 subspectral types.

Finally this work presents 14 white dwarfs which 9 are new unreported white dwarfs (CBL 304 B, CRB 87 B, 1233+0824 A, 1233+0824 B, 1235+4402 B, FMR 127 B, BVD 262 A, 1823+2022 A, 2146+1550 A, see Figure 6a and 6b). Table 5 lists the SDSS photometry for some white dwarfs.

### 9.2.3 Distance Estimation

Photometric distances for 387 stellar components were estimated. Figure 7 shows a distribution of the distances estimated. The most distant star is GWP1557 B (see Figure 8), a weak ( $V = 19.39$ ) cool subdwarf (M1VI) at a distance of 678 pc. This distance probably is overestimated since its tangential velocity is extremely large ( $637 \text{ km s}^{-1}$ ). The nearest star is a bright ( $V = 11.21$ ) red dwarf (M2V) at 18.5 pc of distance. There are 5 stars nearer than 25 pc. One of them is a close double star (FMR 42 Aa,Ab = LAW 9 AB) studied by Law, Hodgkin & Mackay (2008) that determined a photometric distance of  $18.7^{+9.3}_{-3.6}$  pc, in excellent agreement with our result (see Figure 9). The others are red dwarfs with spectral types that

(Continued on page 296)

145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

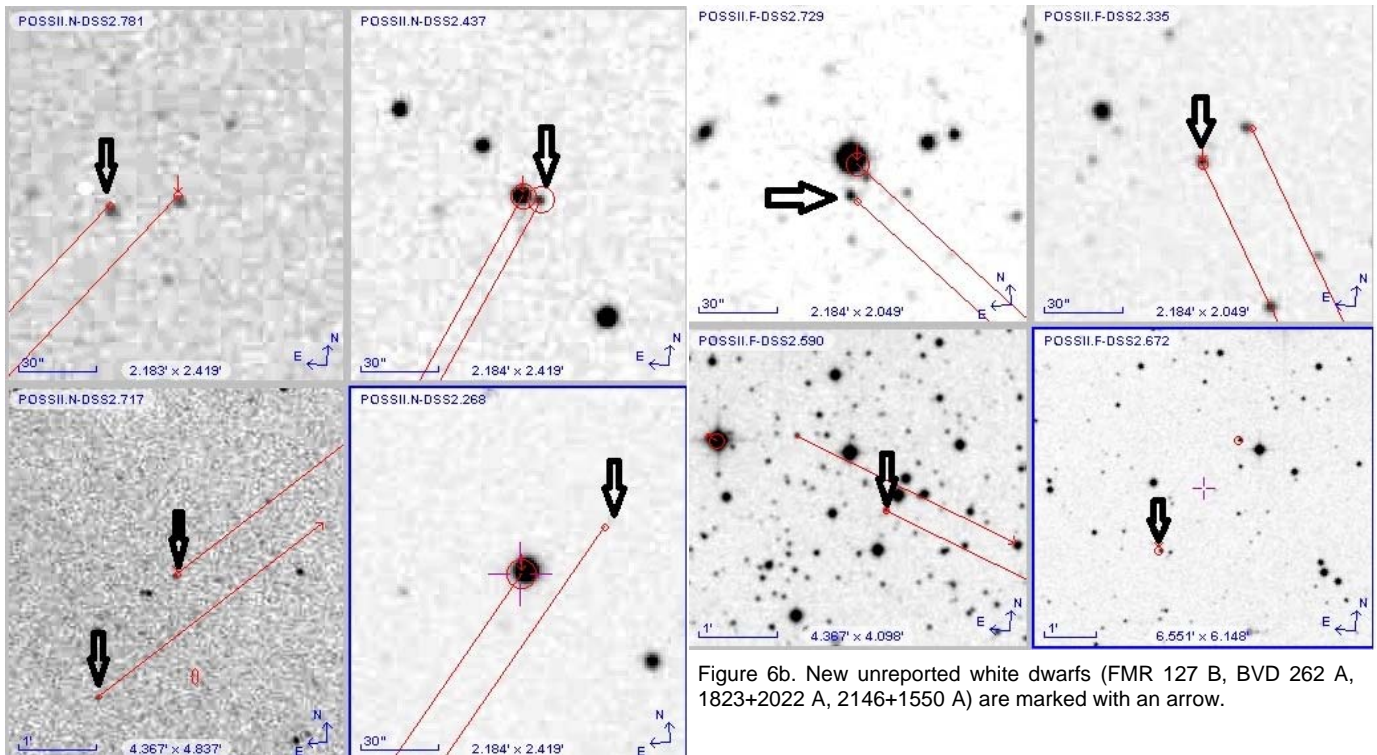


Figure 6b. New unreported white dwarfs (FMR 127 B, BVD 262 A, 1823+2022 A, 2146+1550 A) are marked with an arrow.

Figure 6a. New unreported white dwarfs (CBL 304 B, CRB 87 B, 1233+0824 A, 1233+0824 B, 1235+4402 B) are marked with an arrow.

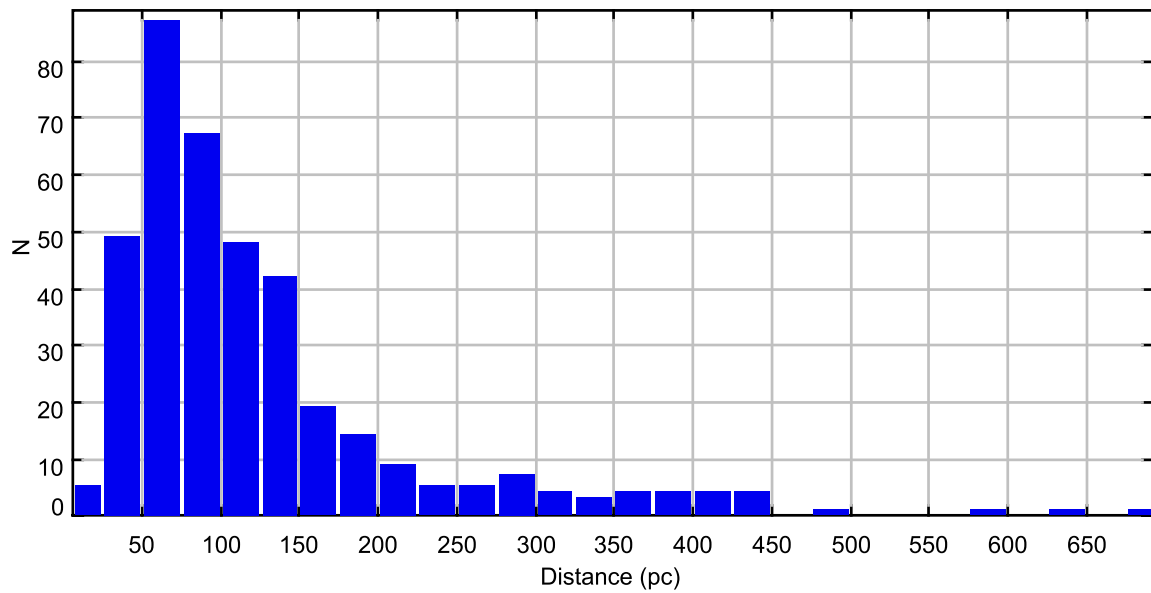
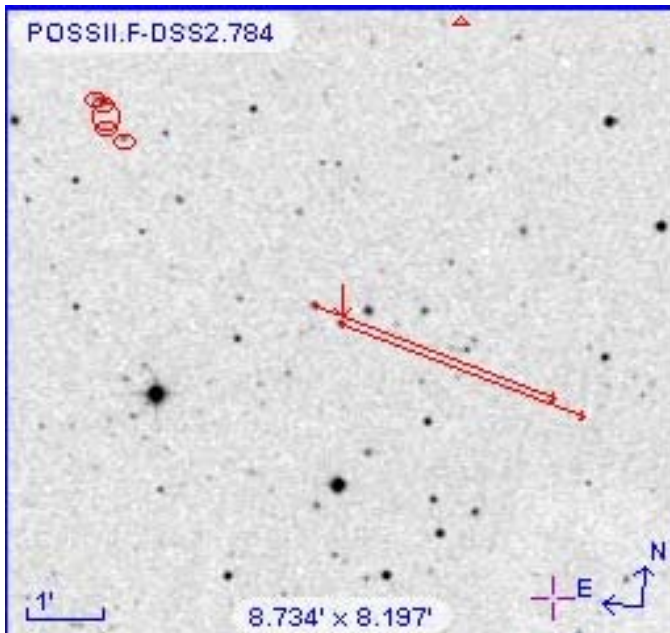
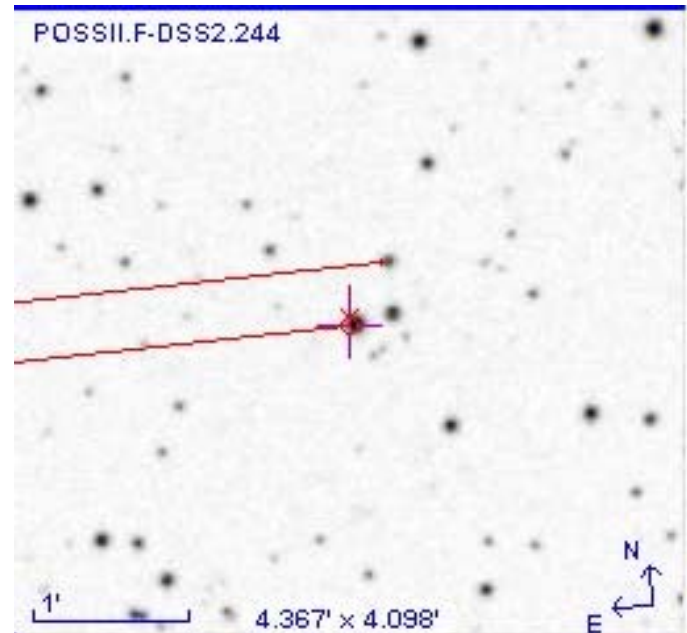


Figure 7. Distribution of the distances calculated.

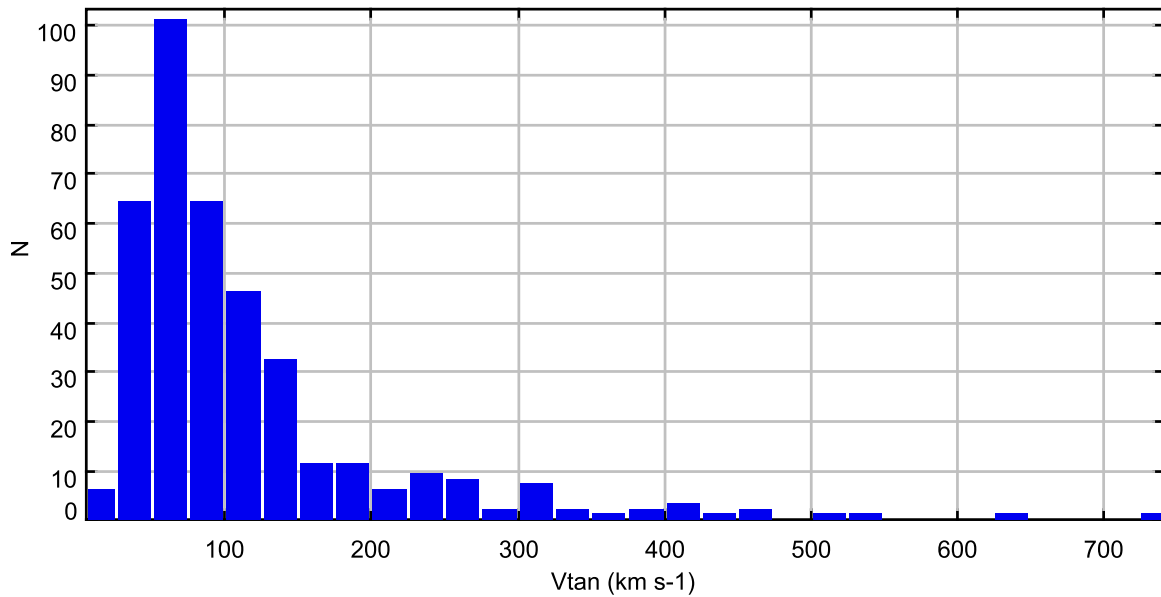
145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog



**Figure 8:** The secondary component of GWP 1557 is the most distant star in our sample. It is a weak ( $V = 19.39$ ) cool subdwarf (M1VI) at a distance of 678 pc.



**Figure 9:** One of the star closer than 25 pc is FMR 42 Aa,Ab (= LAW 9 AB) located at a photometric distance of 18.7 pc.



**Figure 10:** Distribution of the tangential velocities ( $V_{tan}$ ) in  $\text{km s}^{-1}$ .

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

**Table 5.** SDSS Photometry for the New Candidate White Dwarfs

Star	u	g	r	i	z
CBL 304B	20.05	18.65	18.00	17.75	17.62
CRB 87B	18.27	17.63	17.38	17.32	17.32
1233+0824A	19.15	18.68	18.35	18.30	18.36
1233+0824B	20.42	19.37	18.84	18.65	18.65
1233+0824B	21.49	19.99	19.17	18.87	18.77

(Continued from page 293)

range from M0V to M6V and small tangential velocities (from 19 to 31 km s<sup>-1</sup>). For G-K subdwarfs and white dwarfs, the photometric distance was not estimated due to the lack of an accurate color-luminosity relationship.

Table 6 shows a comparison between the estimates of the distances listed in this work and those obtained from the literature. Column 1 lists the identification of the star and the stellar component, column 2, the V magnitude, in columns 3 and 4 the photometric distance determined in this work and the distance from the astronomical literature. Column 5 and 6 list the bibliographic references and the notes.

The difference between my estimates and those from the literature is about 14% and so they are good estimations of distances. The Hipparcos trigonometric values listed in the Table 5 have a mean error of 11.5%.

### 9.3.3 Tangential Velocities

Figure 10 shows the distribution of the tangential velocity ( $V_{\text{tan}}$ ). Forty-six stars have  $V_{\text{tan}} > 200$  km s<sup>-1</sup>. Many of them are normal dwarfs and therefore some of them could be subdwarfs with nearer distances and small  $V_{\text{tan}}$ . Ten stars have  $V_{\text{tan}} > 400$  km s<sup>-1</sup>. An overestimation of these distances is suspected. All of them are cool subdwarfs, therefore some of them could be extreme subdwarfs located at nearer distances. Another possibility is that the optical-infrared colors for some stars, used to determine luminosities and distances, is wrong. The V magnitude often was inferred from photographic catalogs and could be in error s

much as 0.5 magnitude, distorting the optical-infrared colors (V - J, V - H and V - K).

The galactic escape velocity is estimated to be between 450 and 650 km s<sup>-1</sup> (Leonard & Tremaine 1990). The local escape velocity of 522 km s<sup>-1</sup> was derived from the Galactic gravitational potential of Allen & Santillan (1991). Assuming a zero radial velocity, in this work the total galactocentric velocity ( $V_{\text{gal}}$ ) was calculated for those stars with  $V_{\text{tan}} > 400$  km s<sup>-1</sup>. Only three stars have  $V_{\text{gal}} > 400$  km s<sup>-1</sup>. 0840+6144 B has  $V_{\text{gal}} = 543$  km s<sup>-1</sup>, GWP 1557 B has  $V_{\text{gal}} = 473$  km s<sup>-1</sup> and FMR 145 B has  $V_{\text{gal}} = 478$  km s<sup>-1</sup>. Therefore if the distances listed here are accurate then these stars are possibly unbound to the Galaxy. It is important to obtain the radial velocities and the accurate distance for these stars.

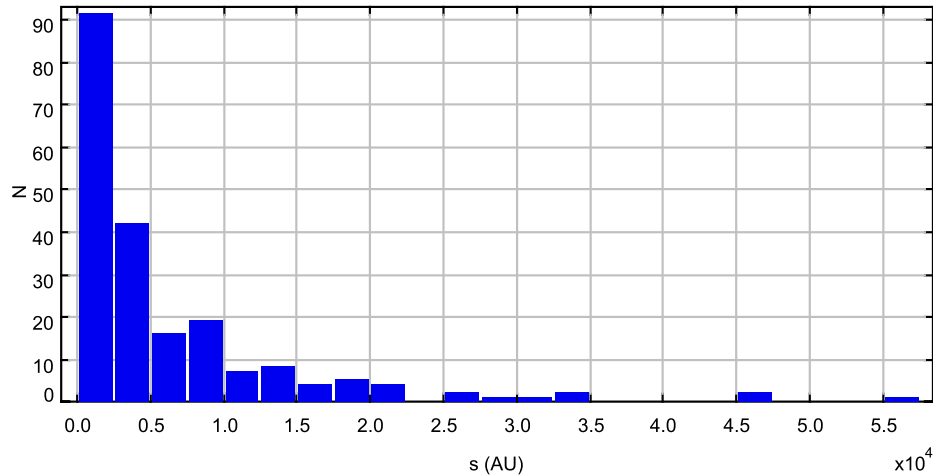
**Table 6.** Distances Comparison

Star	mag. V	Rica's distance (pc)	Distance from literature (pc)	#ref	Notes
FMR 81B	17.18	43.2	42.9	8	
CBL 304A	18.03	49.7	42.0	8	
FMR 98A	9.20	59.1	61.4	Hip-parcos	$\pi = 16.28 \pm 1.56$ mas
FMR 120A	9.77	81.4	69.9	Hip-parcos	$\pi = 14.31 \pm 1.58$ mas
FMR 169A	6.67	156.1	187.0	Hip-parcos	$\pi = 5.35 \pm 0.74$ mas
FMR 38A	10.35	66.3	49+34-18	1	Photometric distance
FMR 42Aa, Ab	14.70	21.5	18.7+9.3-3.6	2	a)
0802+0019A	13.41	94.5	91	3	VRI photometric distance
BVD 216A	13.97	72.3	77	3	VRI photometric distance
FMR 103B	18.72	161.1	144	4	
FMR 111A	14.66	74.0	77	3	VRI photometric distance
FMR 123A	14.44	27.7	30.5	5	Spectrophotometric distances
FMR 128A	14.64	48.7	77	6	b)
FMR 164A	10.67	75.7	81	7	Photometric distance

**References:** (1) Ammons et al. (2006); (2) Law et al (2008); (3) Weis (1987); (4) West et al. (2008); (5) Reid et al. (2004); (6) Riaz, Gizis & Harvin (2006); (7) Ryan (1989); (8) Kilic et al. (2006).

**Notes:** a) Using V - K color-absolute magnitude relations of Leggett (1992). Estimated error of 35%; b) It is the UV Cet named V 781 Her. Molecular index was used to estimate distances. (error of 37%)

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog



**Figure 11.** Distribution of the projected physical separations (in AU).

### 9.3.4 Stars with no 2MASS counterpart

There are 13 stars with no 2MASS counterpart. Five of them have SDSS counterpart and we determined a white dwarf nature for all of them using reduced proper motion diagrams. Likely other white dwarfs exist in this small sample of 8 stars with no 2MASS and SDSS counterpart or maybe are too dim to be listed in these catalogs.

### 9.4 Binaries

Table 3 lists the binaries presented in this work. Column 1 lists the designation name proposed for the stellar system. Columns 2 and 3 give the equatorial coordinate for Equinox 2000. Columns 4-7 list the V magnitudes and spectral types for the two stellar components. Column 8 shows the mean angular separation (in arcsec). Column 9 and 10 show the differential distance module ( $\Delta(V-M_V) = (V-M_V)_B - (V-M_V)_A$ ) and the expected semimajor axis (in AU). The next columns list the relative motion (in arcsec yr<sup>-1</sup>), the sum of the masses and the orbital period.

Twenty-five binaries are composed of two subdwarfs and three binaries are composed of two white dwarfs (CBL 304, 1233+0824, FMR 154).

Twenty-six binaries are composed of a dwarf and a subdwarf. This configuration is not possible and could be caused by several reasons (poor quality of the infrared or optical photometric data, luminosity class determined erroneously, etc.). Others binaries have stars near the limits for dwarf-subdwarf in the re-

duced proper motion diagrams and a different luminosity class could be assigned if small changes in the photometric data are applied, especially in the V magnitudes.

Of these dwarf-subdwarf pairs, there are six binaries that have difference in proper motions,  $\Delta\mu = \mu_B - \mu_A$ , greater than 50 mas yr<sup>-1</sup>. These pairs of stars likely are optical pairs.

One evidence for binarity is that the two stellar components be at the same distance. My analysis of the values for secondary minus primary distance module determined that 12 pair of stars have  $|\Delta(V-M_V)| > 2.0$ . Four of these 12 pairs have  $\Delta\mu > 50$  mas yr<sup>-1</sup> and therefore surely are optical pairs. For the other cases, some of the causes of this situation are:

- V magnitude with large errors: many of the V magnitudes determined in this work were inferred from photographic catalogs so errors of  $\pm 0.5$  magnitude could be possible. The optical-infrared color used here to the distance estimation then could have important errors in some of these pairs.
- The color-luminosity relation used could fail for stars with extreme metallicity.
- The determination of the distance for uncataloged variable stars is difficult.
- Close binary star not cataloged can cause erroneous distance estimation.

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

(Continued from page 297)

- Erroneous luminosity class determination can cause a significant error in distance.

### 9.4.1 Serendipitous discovery of a new common proper motion binary

During the course of this investigation and the editing of this article, the author found a new binary star with high common proper motion. In the same field of view for FMR 36 there is an uncataloged common proper motion pair which stellar members are listed in SIMBAD database. The primary component is located at 00h 53m 02.94s and +31° 43' 54.8" and the secondary component at 00h 53m 08.19s and +31° 44' 50.1". From the astrometric data of 2MASS a value of  $\theta = 50.54$  deg and  $\rho = 86.85''$  for 1997.917 was obtained.

### 9.4.2 Loosely-Bound Common proper motion binaries

Figure 11 shows the physical separation ( $s$ ) distribution for the 220 binary stars. Of the 220 binaries, about 70 of them have projected separation,  $s$ , greater than 5,000 AU and 3 binaries have  $s > 40,000$  AU. In the astronomical literature many works conclude in the real existence of a cutoff at  $s \sim 20,000$  AU ( $\sim 0.1$  pc) in projected physical separation of binaries. But recent works found multiple systems in the solar neighborhood with  $s > 20,000$  AU (e.g. J. Caballero (2009), J. Caballero (2010)). In the sample studied here, 13 binary systems have  $s > 20,000$  AU.

The very wide, low-mass binaries are an important and a rare class of objects. Four binaries with  $M_a + M_b < 0.4$  solar masses and  $s > 5,000$  AU (FMR 82, FMR 83, FMR 84, 2343+1345) were found in this work. Their values of  $s$  range from 7,799 to 10,233 AU.

## Appendix I: Notes for Stellar Components

- FMR 36 B:  $V = 15.02$ ;  $B - V = +1.55 \pm 0.02$  (Humphreys et al. 1991).
- FMR 38 A: Ammons et al. (2006) calculated a photometric distance of  $49^{+34}_{-18}$  pc.
- FMR 42 A: It is listed in the WDS catalog as the double star WDS 01158+4702 = LAW 9 ( $250^\circ$  and  $0.3''$  in 2005). Law et al. (2008) classified the stellar components as M4.5 and M5.0 stars at a distance of  $18.7^{+9.3}_{-3.6}$  pc. Reid, Cruz & Allen (2007) estimated a distance of 23.3 pc. The spectral types and distances

from the literature are in good agreement with my data. ROSAT satellite detected an X-ray emission in 1991. The X-ray luminosity calculated in this work ( $\text{Log } L_x = 28.17$  erg  $\text{s}^{-1}$ ) corresponds to an age of about 1 Gyr which is in agreement with the small tangential velocity ( $18\text{-}28$  km  $\text{s}^{-1}$ ).

FMR 58 B: Luyten (1970-77) classified it as a candidate white dwarf. It is a red dwarf of M4V spectral type.

0550+0939 B: The ROSAT satellite detected in 1990 the X-ray source 1RXS J055009.7+093957 at  $18''$  West to 0550+0939 B. Haakonsen & Rutledge (2009) calculated a probability of unique association of 49.7% and a probability of no association of 33.6%. The X-ray luminosity calculated in this work ( $\text{Log } L_x = 28.53$  erg  $\text{s}^{-1}$ ) corresponds to an age of about 1 Gyr.

0705+4129 B: Weis (1987) determined  $V = 14.07$ ,  $V - R = +0.89$  and  $R - I = +0.67$

0802+0019 A: Weis (1987) determined  $V = 13.41$ ,  $V - R = +0.94$ ,  $R - I = +0.64$  and a photometric parallax  $\pi = 0.011''$  (91 pc) in good agreement with my data.

FMR 81 B: Kilic (2006) classified it as a DA white dwarf with  $T_{\text{eff}} = 6388$  °K,  $M_{\text{bol}} = 13.79$ ,  $M_{\text{abs}}(g) = 14.16$ , photometric distance = 42.91 pc and a  $V_{\text{tan}} = 48.37$  km  $\text{s}^{-1}$ .

FMR 85 B: It is listed in *Luyten's White Dwarf Catalogues* (Luyten 1977). Koester et al. (2011) classified it as a cool and very metal-rich DZ white dwarf.

CBL 304 A: Kilic et al. (2006) classified it as a DA white dwarf with the followed astrophysical data:  $T_{\text{eff}} = 4964$  °K,  $M_{\text{bol}} = 14.90$ ,  $M_{\text{abs}}(g) = 15.60$ , photometric distance = 42.00 pc,  $V_{\text{tan}} = 29.29$  km  $\text{s}^{-1}$ .

FMR 90 B: This stellar component could be a common proper motion companion to 2MASS J10172692+2613343. Using 2MASS catalog the 2MASS star is located at  $313.94''$  in direction  $124.41$  deg (1998.150).

FMR 94 A: It is listed in the WDS catalog as WDS 10454+1814 = TDS 7454 ( $245$  deg and  $0.4''$  in 1991).

FMR 96: The primary and the secondary components are listed in The Hamburg/RASS Catalogue of optical identifications. V3.0 (Zickgraf et al. 2003). ROSAT satellite detected the X-

### 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

- ray source 1RXS J104658.7+243718. The X-ray luminosity calculated in this work ( $\text{Log } L_x = 29.44 \text{ erg s}^{-1}$ ) corresponds to an age of about 0.2-0.3 Gyr. The X-ray activity is similar to those stars of the Pleiades.
- BVD 216 A: Weis (1987) determined  $V = 13.97$ ,  $V - R = 1.02$ ,  $R - I = 0.81$  and a photometric parallax of  $0.013''$ . ROSAT detected an X-ray source at  $1''$  of the primary star. The X-ray luminosity calculated in this work ( $\text{Log } L_x = 29.09 \text{ erg s}^{-1}$ ) corresponds to an age between the Pleiades and Hyades open clusters, of about 0.3 Gyr.
- 1206+1218 A: Marshall (2007) obtained  $V = 13.233$ ,  $B - V = 0.521$  and  $V - I = 0.694$ .
- FMR 103 B: The catalog "*SDSS-DR5 low-mass star spectroscopic sample*" (West et al. 2008) lists a spectral type of M4V, a radial velocity of  $-53.4 \text{ km s}^{-1}$ , photometric distance of 144 pc and a galactocentric velocity  $(U, V, W) = (-59.5, -110.8, -47.9) \text{ km s}^{-1}$ . These data are in very good agreement with my data.
- CBL 390: The primary or the secondary component is listed in the catalog *Variability in the ROSAT All-Sky Survey* (Fuhrmeister & Schmitt 2003)). ROSAT satellite detected the X-ray source at  $10-11''$  from the secondary component and a  $21.5''$  from the primary component. The positional error for the X-ray source is of  $10''$ . Most of optical counterparts of X-ray sources are located at an angular distance less than 2 times the positional error of the ROSAT catalog (Agüeros et al. 2009). At  $40''$  from the X-ray source is only found the primary and secondary component of CBL 390. Numerous studies have shown that there is a typical range of X-ray-to-optical flux ratios for each stellar type. According with the Table 1 in Agüeros et al. (2009) for M stars the mean  $\log f_x/f_j = -3.30$  with a  $2\sigma$  interval of  $-2.22 \leq \log f_x/f_j \leq -1.15$ . For CBL 390 A and B,  $\text{Log } f_x/f_j$  is  $-1.78$  and  $-1.01$ . The secondary is out of the most probable range for  $\text{Log } f_x/f_j$ . The same result is obtained if we use the  $\text{Log } f_x/f_v$ . Therefore, the conclusion is that the X-ray optical counterpart is the primary component of CBL 390. The X-ray luminosity calculated in this work ( $\text{Log } L_x = 29.24 \text{ erg s}^{-1}$ ) corresponds to an age of about 0.2-0.3 Gyr.
- FMR 109 B: ROSAT satellite detected an X-ray source near this star but there are many galaxies in the field that could be the optical counterpart.
- FMR 111 A: Weis (1987) determined  $V = 14.66$ ,  $V - R = +1.11$ ,  $R - I = +0.92$ .
- FMR 121 A: Weis (1987) determined  $V = 13.30$ ,  $V - R = +0.32$ , and  $R - I = +0.30$ . This star has a bluer H - K color that corresponds to a dwarf star.
- FMR 123 A: Reid (2004) classified it as a M3.5V.
- FMR 128: It is the UV Cet variable star V 781 Her. The ROSAT satellite detected an X-ray source at  $1''$  of the primary component. The positional error is  $22''$  and at twice this positional error there are four stars, the two stellar component of FMR 128 and two very weak stars. What is the optical counterpart of the X-ray source? Analyzing the  $\text{Log } f_x/f_v$  and  $\text{Log } f_x/f_j$  values, the two weak stars were rejected and retained the two stellar components of FMR 128. The primary component is more probable to be the optical counterpart of the X-ray source. The X-ray luminosity calculated in this work ( $\text{Log } L_x = 28.85 \text{ erg s}^{-1}$ ) corresponds to an age slightly younger than the Hyades, of about 0.4 Gyr. Riaz, Gizis & Harvin (2006) classified the primary component as a M3V star at a distance of 77 pc and with a tangential velocity of  $108 \text{ km s}^{-1}$ .
- FMR 133 A: *The TASS Mark IV Patches Photometric Catalog* (Droege, Richmond & Sallman (2006)) lists photometric data ( $V = 13.83 \pm 0.09$  and  $I = 12.46 \pm 0.10$ ).
- FMR 141 A: *The TASS Mark IV Patches Photometric Catalog* (Droege, Richmond & Sallman (2006)) lists photometric data ( $V = 11.45 \pm 0.05$  and  $I = 9.92 \pm 0.04$ ).
- FMR 144 A: Reid, Hawley & Gizis (1995) determined a radial velocity of  $-32 \pm 10 \text{ km s}^{-1}$  while Gizis, Reid & Hawley (2002) determined  $V_{\text{rad}} = -24.3 \pm 1.5 \text{ km s}^{-1}$ . The *TASS Mark IV Patches Photometric Catalog* (Droege, Richmond & Sallman (2006)) lists photometric data:  $V = 11.48 \pm 0.07$  and  $I = 9.19 \pm 0.04$ .
- FMR 144 B: This star is listed in the *Kepler Input Catalog* with the followed data:  $T_{\text{eff}} = 3713 \text{ K}$ ,  $\log g = 4.385 \text{ cm/s}^2$ ,  $[\text{Fe}/\text{H}] = +0.528$ ,  $E(B - V) = 0.009$  and a radii =  $0.78 R_{\text{sun}}$ . The *TASS Mark IV Patches Photometric Catalog* (Droege, Richmond & Sallman (2006)) lists



## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

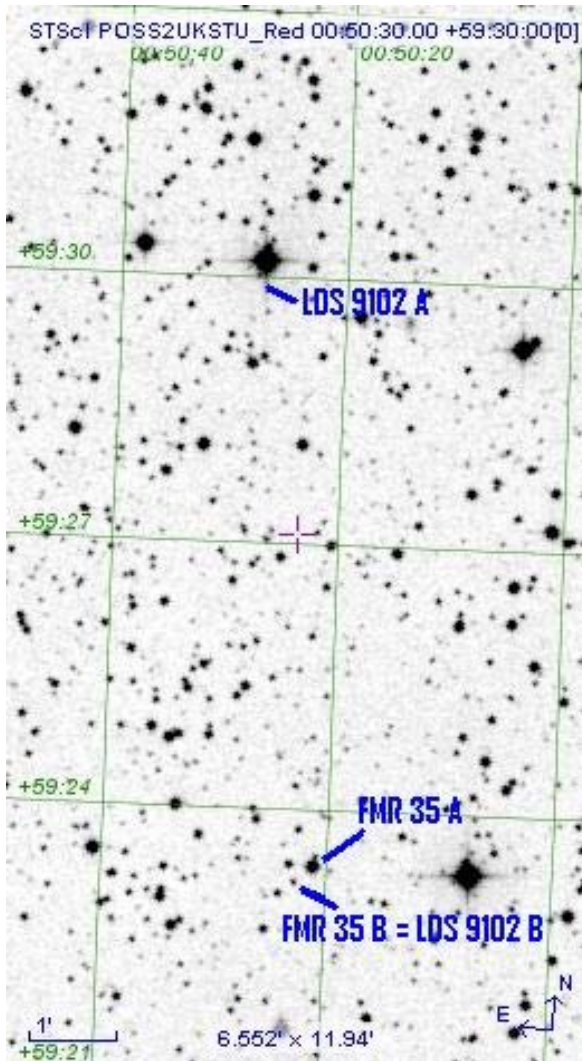


Figure 12. The stellar component FMR 34 B = LDS 9102 B.

photometric data:  $V = 12.44 \pm 0.12$  and  $I = 10.08 \pm 0.04$ .

FMR 145: Lépine, Rich & Shara (2003) determined a radial velocity,  $V_{rad}$ , of  $-80 \pm 40 \text{ km s}^{-1}$  a photometric distance,  $d$ , of  $200 \pm 110 \text{ pc}$  and a galactocentric velocity of  $(U, V, W) = (404 \pm 239, -314 \pm 142, 48 \pm 29) \text{ km s}^{-1}$  for the primary component of this binary. For the secondary star they obtained  $V_{rad} = -120 \pm 40 \text{ km s}^{-1}$ ,  $d = 160 \pm 100 \text{ pc}$ ,  $(U, V, W) = (300 \pm 218, -277 \pm 116, -109 \pm 62)$ . They note the high space velocity for the members of FMR 145. The distance of 209 pc presented here for the secondary star is in good agreement

with the distance of Lépine, Rich & Shara (2003), about 160 and 200 pc for the primary and secondary components. The tangential velocity for this binary is one of the largest of my sample.

FMR 147 A: Lee (1984) classified this star as a K2 star and Ammons et al. (2006) determined a distance of  $15 \pm 6 \text{ pc}$ . *The Mark IV Patches Photometric Catalog* (Droege, Richmond & Sallman (2006)) lists photometric data:  $V = 11.12 \pm 0.04$  and  $I = 10.20 \pm 0.04$ .

FMR 154 A: It was classified as a white dwarf by Reid (2003) in agreement with our result. Lépine, Rich & Shara (2003) classified it as a DA9 white dwarf at a distance of  $30 \pm 15 \text{ pc}$  and with a galactocentric velocity  $(U, V, W) = (89 \pm 39, -14 \pm 9, 36 \pm 14) \text{ km s}^{-1}$ .

FMR 154 B: It was classified as a white dwarf by Reid (2003) in agreement with my result. Lépine, Rich & Shara (2003) classified it as a DA10 white dwarf at a distance of  $60 \pm 30 \text{ pc}$  and with a galactocentric velocity  $(U, V, W) = (168 \pm 79, -33 \pm 19, 66 \pm 29) \text{ km s}^{-1}$ .

FMR 156 B: The *TASS Mark IV Patches Photometric Catalog* (Droege, Richmond & Sallman (2006)) lists photometric data:  $V = 12.15 \pm 0.11$  and  $I = 10.67 \pm 0.05$ . The TASS catalog lists a Welch-Stetson (Welch & Stetson 1993, hereafter WS) of 2.58. The WS index is a normalized measure of the degree of correlation of V-band and I-band variations from their mean values. The variability index will be close to zero for stars with random variations which are independent in each pass-band, or stars which vary by less than the uncertainty of each measurement. It will be a large (greater than 2 or 3) positive value for stars which really do change significantly in brightness. Nothing is listed in *The International Variable Star Index (VSX)* so FMR 185 B could be an uncatalogued variable star.

2106+5924 B: Humphreys et al. (1991) determined  $V = 15.31 \pm 0.03$  and  $B - V = +1.51 \pm 0.04$ .

FMR 164 A: Ryan (1989) determined photometric data ( $V = 10.68$ ,  $B - V = 0.85$ ,  $U - B = 0.51$ ,  $V - I = 0.94$ ) and a photometric distance of 81 pc. His reddening  $E(B-V) = 0.01$  is in good agreement with my result ( $E(B-V) = 0.03$ ). At a 5 arc minutes north, a star (2MASS J21504703+1248415) listed in SIMBAD

## 145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog

seems to show similar proper motion that FMR 195 A. Using the 2MASS catalog in this work a value of  $\theta = 349.31$  deg,  $\rho = 325.65''$  (1997.687) was obtained.

FMR 169 A: The astronomical literature lists spectral types of G8III, G7II-III, G7III-IV and G5IV and radial velocities that ranges from -36.7 to -34.1 km s<sup>-1</sup>. The secondary component must be a subgiant star at the same distance of the primary component.

### Appendix II: Notes for Binaries

FMR 76, FMR 78, FMR 84, FMR 90, FMR 98: incompatible proper motions? Optical pairs?

FMR 34: The primary component of FMR 34 is LDS 9102 B (= WDS 00505+5930 B) and the secondary component of FMR 34 is a new physical component for the system WDS 00505+5930. LDS 9102 A is at 6.7 arcminutes North (AR = 00h 50m 27.49s and DEC = +59° 30' 08.4") to FMR 34 B. This star is listed in the *LSPM-North Catalog* as LSPM J0050+5930. Why was not the common proper motion to FMR 34 detected? The angular separation is wider than our cut of 360" so more ultrawide binaries could exist in the *LSPM-North Catalog*. See Figure 12.

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**145 New Wide Common Proper Motion Binaries in the LSPM-North Catalog**

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