New Wide Common Proper Motion Binaries

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Abstract: In this work we report the discovery of 150 new double stars of which 142 are wide common proper motion stellar systems. In addition to this, we report the study of 23 recently catalogued wide common proper motion binaries discovered by other observers. Spectral types, photometric distances, kinematics and ages were determined from data obtained consulting the literature. Several criteria were used to determine the nature of each double star. Orbital periods and the semimajor axes were calculated.

1. Introduction

For several years double-star amateurs have contributed to the astronomical community with interesting works (see *Introduction* section in Rica (2008)). Recently Rafael Caballero (2009), a spanish amateur, has published in the JDSO an article reporting about 110 new uncataloged and wide common proper motion binaries.

One more example is the work that we present. In this work we report the study of 173 wide, common proper motion stellar systems of which 150 are new double stars. The remaining 23 were discovered by other observers and recently cataloged. The new double stars were discovered by Rafael Benavides inspecting visually the Guide 8.0 software and using the proper motion line showed by this software to detect common proper motion pairs. It was a great surprise to see that many binaries are discovered by this method.

Wide binaries of common proper motion are composed of stars with large separation that results in orbital periods ranging from a few thousand to millions of years. Because of their small binding energies, they are good sensors to detect unknown mass concentrations that they may encounter along their galactic trajectories. So, wide binary star systems have became objects of considerable theoretical and observational interest. They are relevant to the understanding of the processes of formation and dynamical evolution of the Galaxy. Thus, the present-day distribution of wide binaries can provide information about the disruption process as well as binary formation. Study of wide binaries have largely concentrated on the calculation of dissolution times since the main effect of encounters is to cause such weakly bound pairs to break up. Professionals have published many papers studying suc objects: (Retterer & King (1982), Dommanget (1984), Lathan, Tonry, Bahcall & Soniera (1984), Halbwachs (1988), Close & Richer (1990), Lathan, Abt et al. (1991), Poveda & Allen (2004), Sesar, Ivezić & Jurić (2008))

We finally would like cite to Dommanget (1984):

"Wide pairs and wide multiple systems have been too much neglected during many years by visual double star astronomers with the argument that only close visual pairs (short periods) may lead to mass-determination in a relatively short time interval. But mass-determination should

not be considered as the only interest of double star astronomy, even if it is of a fundamental nature.

Today, it appears that researches on the origin and the evolution of the wide systems are urgently wanted, not only for the understanding of the evolution of the stellar medium, but also for a better knowledge of galactic dynamics".

In section 2, we explain how the binaries were found; sections 3-8 describe the astrophysical study (consulting astronomical literature, spectral type estimate, distance estimation, tangential velocity, stellar masses, age and stellar population). In section 9 we comment in detail on the criteria used to classify the double stars as optical or physical. In section 10 we explain how we obtained the semimajor axis and orbital periods; 11 the astrometric measures are analysed. The study for same binaries stars are in section 12.

2. Searching for New Binaries

The search for new wide common proper motion binaries was carried out by Rafael Benavides in 2005, inspecting visually the sky using the Guide 8.0 software of project Pluto. This software allows display the Tycho-2 (Hog et al. 2000) and Hipparcos (ESA 1997) proper motion vector and so the identification of common proper motion binaries is straightforward. Benavides found 141 uncataloged binaries. Literature was consulted carefully to confirm that the binaries are not cataloged. Since the time that these binaries were found to the publish date of this article, some binaries were reported by others double star observers and listed in the Washington Double Star Catalog (Mason, Wycoff & Hartkopf 2003), hereafter WDS.

So finally we report the discoveries of 148 new binaries.

Photometric data, spectral types, photometric distances, kinematical data and ages were determined from data obtained consulting the literature. Several criteria were used to determine the nature of each double star. Values for the orbital periods and the semi-axis major were calculated.

3. Consulting the Astronomical Literature

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

Photometry in B, V and I bands came from Hipparcos (ESA 1997) and Tycho-2 (Hog et al. 2000) catalogs. Infrared J, H and K photometry came from Two Micron All Sky Catalogue (Cutri 2000), hereafter 2MASS. Proper motion came from Tycho-2, UCAC-2 (Zacharias et al. 2004) and USNO-B1.0 (Monet et al. 2003) catalogs. Tycho-2 was chosen because the Hipparcos proper motions could be affected by Keplerian motion due to its smaller baseline. Historical relative astrometric data were kindly supplied by Brian Mason from The United States Naval Observatory (hereafter USNO). Spectral types, radial velocity and other astrophysical data were taken from several sources from CDS web page.

4. Spectral Types and Luminosity Class Estimates

Spectral types and luminosity classes were obtained from photometric and kinematical data. Several tables which relate photometric colours with spectral types were used (Allen 1973, Bessell & Brett 1988).

A computer program was designed to transform BVIJHK photometric data to Jy (1 Jy = 10^{-23} erg * sec^{-1} * cm^2 * Hz^{-1}) which were plotted against wavelength (in Angstroms). This plot shows the spectral energy distribution which is compared automatically with the empirical spectral energy distribution deduced from Bessell & Brett (1988) and Zombeck (1990). The computer program gives the spectral type for the best fit.

The luminosity classes are determined by means of infrared two color diagram (Bessell & Brett 1988) and mainly by means of reduced proper motion diagrams (Jones 1972; Salim 2002; Nelson 2003). Reduced proper motion diagrams were very useful to distinguish dwarf stars from giants, subdwarfs or white dwarfs.

In a preliminary study (Rica 2005) we compared our spectral types and luminosity classes for 19 components (13 dwarf stars and 6 normal giants) with spectral types and luminosity classes obtained by professionals and published in the astronomical literature. These components are listed in Hipparcos, Tycho-2 and 2MASS catalogues so the BVIJHK photometric data and proper motions are known. The mean difference was 0.5 spectral subclasses and the luminosity classes were estimated correctly for the 19 components.

5. Distance Estimation

The absolute magnitudes were calculated using the tables published by Zombeck (1990) and Henry *et al.* (1997) who cite a RMS of 0.43 magnitudes for their absolute magnitudes.

When the object is located on or near the galactic

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plane, it is important to determine the interstellar absorption and correct the astrophysical data. Maps of Burtein & Heiles (1982) and Schlegel, Finkbeiner & Davis (1998) were used. The obtained values were scaled to the initial distance using the cosecant law of van Herk (1965).

If the star is located near the galactic plane (|b| < 10 - 15º) then the interstellar map of Paresce (1984) was used if the star is located nearer than 250 pc. If the star is located at a distance greater than 250 pc then the catalog of Neckel & Klare (1980) is used plotting the stars in a reddening-distance graphic and using a logarithmic fit.

A recursive method was used to obtain unreddening spectral types and distances. It begins by using the photometric data to estimate a preliminary photometric distance. With this preliminary distance, the interstellar reddening can be determined and the photometric data corrected. A new photometric distance is obtained, and the process is repeated until no significant change is produced. Generally in two or three iterations the data converge.

The estimation of photometric distance was calculated from apparent and absolute magnitudes. Against the stellar members studied in this work, 23 of them have trigonometric parallaxes obtained by Hipparcos satellite (mean errors of about 13 %). For those stars we have compared our photometric distances with Hiparcos trigonometric distances. Figure 1 shows both set of distances. The averaged difference was of +3.9 ± 26.0 pc. The mean error of our photometric distance was of 20 % (in excellent agreement with the 18 % error estimate of Herny et al. (1997)). For BVD 148 we obtained the larger error. See discussion for BVD 148 in section 13.

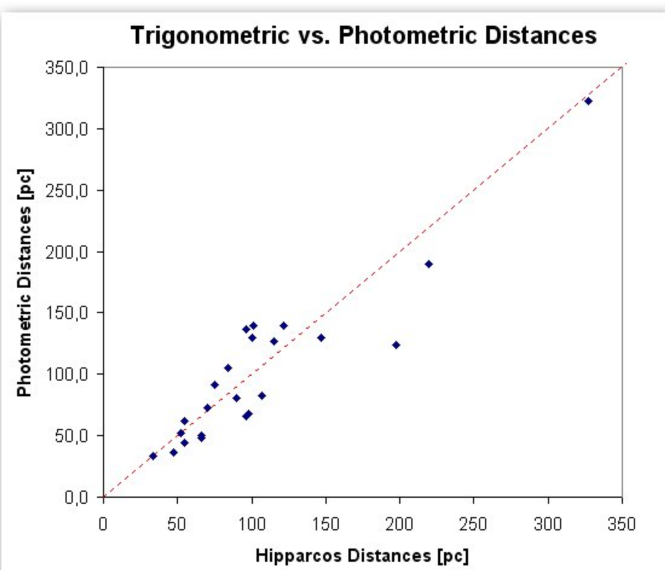

Figure 1: Comparison of spectral distances and trigonometric distances.

6. Tangential Velocities

From the proper motion and the distance of a star, the calculation of the tangential velocity is straightforward. This is the projected motion of the star over the plane of the sky in km*s^{-1} and was calculated using the followed expression:

$$V_{\tan} = 4.74 * dist * \mu \tag{1}$$

where *dist* is the distance in parsecs and μ is the total proper motion in arcsec*yr^{-1}. We estimated an error of 20% for our photometric distance so the error in tangential velocity must be greater than this value because we must to add the error in μ.

7. Stellar Masses

In our list, the latest spectral type was M0V. We used the luminosity-mass relation of Henry et al. (1993) if the star has a K absolute magnitude between 3.07 and 9.81. This relation use the K absolute magnitude which is obtained from Mv and V-K colors.

When the star is evolved then the mass is inaccurate. The theoretical studies indicate small masses for giant stars of about 1 $M_\odot$ (Scalo, Dominy & Pumphrey 1978) while empirical studies indicate larger masses for late-G giants between 2.7 $M_\odot$ and 3.1 $M_\odot$ (Russell & Moore (1940); Beer (1956), Stephenson & Sanwal (1969)). In this work we used a table of data from http://isthe.com/chongo/tech/astro/HR-temp-mass-table-byhrclass.html to obtain values of the masses for evolved stars. In this table, the masses were derived from many sources including *Astrophysical Formulae : Radiation, Gas Processes, and High Energy Physics* by Kenneth R. Lang. Many rows are heavily interpolated from known data on star mass. We can no access to this reference and we didn't determine the possible errors in the masses listed.

The mass errors when we use Henry et al. (1993) are 21 % for 0.08-0.50 $M_\odot$ and 15 % for 0.50-1.0 $M_\odot$. For evolved stars we fix an arbitrary error of 25% for stellar masses.

8. Age and Stellar Population

The galactic heliocentric velocity (U,V,W) for the members of stellar systems were calculated according to the work of van Herk (1965). Using the Eggen's diagrams (1969a, 1969b) and the Grenon (1987) kinematic age parameter, fG, the components were classified in the different stellar populations (old/young disk, thin/ thick disk and halo population) .

9. Studying the Nature of the Visual Stellar Systems

Several criteria were used to determine if components of the pairs are optical, common origin binaries or physical binaries. A pair of stars could be located apparently nearby in the sky due to projection effects as they are seen from the Earth. These stars are not bound by the gravitational force and they are at different distances. We call this double stars, optical double stars. But same pairs of stars really form a real object and so they are located at the same distance of us travelling together in the space. They are called binary stars. Most of them are composed by coeval stars, that is, they born together, have the same metallicity, etc; the kinematic of both stars are (nearly) the same in direction and magnitude. If both stars orbit around the center of mass then we call them physical binary stars. But if both stars only have the same kinematical data and they are not orbiting around the center of mass, then we call these pairs, common origin binaries or comoving binaries. These criteria make use of photometric, astrometric, kinematical and spectroscopic data.

Relative proper motion is the projected angular velocity of the secondary with respect to the primary star. This data must be equal to the difference between individual proper motions of the components. It was calculated plotting rectangular coordinates $x = \rho * \sin\theta$ and $y = \rho * \cos\theta$ (prior to correction of θ by precession and proper motion) against time. The scope of the weighted linear fit gave the value of the relative proper motion in arcsec*yr^{-1}.

9.1 Criteria to Determine the Nature of a Visual Stellar System

The Double Star Section of LIADA used several criteria to determine if the components describe a Keplerian motion.

Criterion of Jean Dommanget (1955, 1956):

Starting with the expression for the energy integral (in the two body problem) and employing the mass -luminosity relationship, Dommanget establish a criterion for the non-periodicity of the relative motion of the components of a double star for which the apparent relative velocity is known. In a number of cases of visual binaries, this criterion permits the classification of the motion as non-periodic (i.e. parabolic, hyperbolic, or rectilinear) and therefore the classification as a true optical double star.

The expression used was

$$2.44 * \log \pi_i = -1.90 * 2 * \log V_a + \log \rho + 0.11 * m_a ' - \log \mu$$

where π_i is the minimum parallax and indicate the maximum distance where the binary can be located to consider the motion as periodic; *Va* is the apparent velocity of B with respect to A (in as/yr), ρ is the angular separation (in arcseconds), m_a is the bolometric magnitude of A; and μ is 1+ΣM (ΣM is the sum of masses).

If the distance of a binary is greater than that determined in the expression, then the binary is consider an a optical pair, otherwise it is consider a physical binary star.

Criterion of Peter van de Kamp (1961):

This criterion starts with the equation of energy. The condition for a parabolic orbit is the critical value to determine if the relative velocity of the system is periodic or non-periodic. The condition for a parabolic orbit is the critical value

$$V^2 r = 8\pi^2 \left(M_a + M_b\right)$$

where M_a and M_b are the masses of the components (in solar mass units), π = 3.14159…; r is the distance between the components and V is the orbital velocity (in AU/yr). The orbit will be periodic (that is, the pair will be consider a physical binary star) if

$$V^2 r < 8\pi^2 \left(M_a + M_b\right)$$

The problem is in the calculation of V and r because we need to know the distance, the proper motion and the radial velocity. In most of the cases the radial velocity is unknown. At best, we can obtain a projected value of $V^2 r$, which will always be smaller than the true value. If the projected value is smaller than the critical value then the orbit may be elliptical. When the projected value of $V^2 r$ is calculated, then r is the projected separation calculated as ρπ (where π is the parallax). V is calculated as Δθr where Δθ is the annual variation of θ corrected by precession and proper motion. In this work we calculate Δθ by a linear fit.

Criterion of Halbwachs (1986)

The selection of physical systems is based in the ratio between the angular separation (in arcsec.) and the proper motion (in as/yr)

Criteria that relate stellar masses of the components with projected separations

We used several of these criteria: Abt (1988), and

Close et al. (2003). In this work this criterion was calculated for all the pairs, but the influence in the final conclusion to determine the nature of the pair, was negligible.

Criterion of Sinachopoulos & Mouzourakis (1992)

This criterion studies the compatibility of the observed relative proper motion with that dynamically allowed. The tangential velocity, i.e. the observed relative proper motion, is compared with the maximum orbital velocity that follows from Kepler's third law.

The relative tangential velocity (in km/s) is calculated with the followed expression:

$$V_{\tan} = 4.74 d \Delta\mu$$

where d is the distance of the stellar system in parsecs (calculated averaging the distances for the stellar components), and $\Delta\mu$ is the relative proper motion of the stellar system in mas/yr.

If the pair that we are studing is indeed bound, then $V_{\tan}$ should be less than or equal to the maximum orbital velocity, $V_{\max}$. Using Kepler's third law:

$$V_{\max} = 29.78\sqrt{\frac{\Sigma M}{s}}$$

where s is the projected separation in Astronomical Units (AU) and ΣM is the sum of the stellar masses for the members of the stellar system (expressed in solar units). If a double star obeys Vtan > 3Vmax, then it will be consider an optical pair. For a double star to be considered a physical binary star, that is, a double star with bound components, it must obey Vtan < Vmax.

Criteria based on probability theory

There are several criteria which are based in probability theory. These were initially used by John Michell (1768) to determine the physical relation of some visual double stars and later used by others astronomers. The method of Grocheva & Kiselev (1998) which use the proper motion values for the components, was used by us.

When a double star has the same proper motion and their components are located at the same distance (within the error margins) but do not obey the celestial mechanics criteria (Dommanget, van de Kamp and Sinachopoulos criteria) then the double star is considered a common proper motion pair.

In spite of the large amount of tests, often it is not possible to clearly determine the nature due to (1) astrophysical data of poor quality or (2) not enough astrophysical data. The distribution of the nature of the double stars studied in this paper is shown in Figure 2. About 57% are binaries of common origin (the components of these binaries do not orbit each other), 36% are physical pairs, 3% are optical double stars and 1% are common proper motion pairs (pairs with no nature determined but with the same proper motion, within the errors, for both components).

10. Semimajor Axis and Orbital Periods

For these wide binaries it is not possible calculate orbital parameters, but the semimajor axis of such binaries can be determined from the angular separation. Fischer & Marcy (1992, hereafter FM) determined a statistical relation between the angular separation and semimajor axe. Unlike Abt & Levy (1976), who determined this relation assuming circular and face on orbits, FM calculated the expected semimajor axis, E(a), using a Monte Carlo simulation of a visual binary having all possible combination of orbital parameters. They obtained the relation

$$E(a) = 1.26\,\rho$$

where ρ is the angular separation in arcseconds. This relation gives $E(a)$ in arcseconds. To calculate E(a) in AU, the followed expression must be used:

$$E(a) = \frac{1.26\rho}{\pi}$$

or

$$E(a) = (distance)\,(1.26\rho)$$

where π is the trigonometric (or photometric) parallax for the stellar system and *distance* is the distance calculated averaging the distance of A and B components. This is statistically valid. FM didn't cite any error estimate and I assumed a random 10 % error.

We estimate the orbital periods using the Kepler's third law and assuming circular (eccentricity = 0) and face-on orbits (inclination = 0), stellar masses and E(a).

The error in the estimation of P (in percentage) are calculate using the following formula

$$\varepsilon P = 100\sqrt{\left(\frac{3}{2}\varepsilon a\right)^2 + \left(\frac{1}{2}\varepsilon M\right)^2 + \left(\frac{3}{2}\varepsilon\pi\right)^2}$$

where εa, εM and εp are the errors in semimajor axis, the sum of masses, and parallax, respectively. Both

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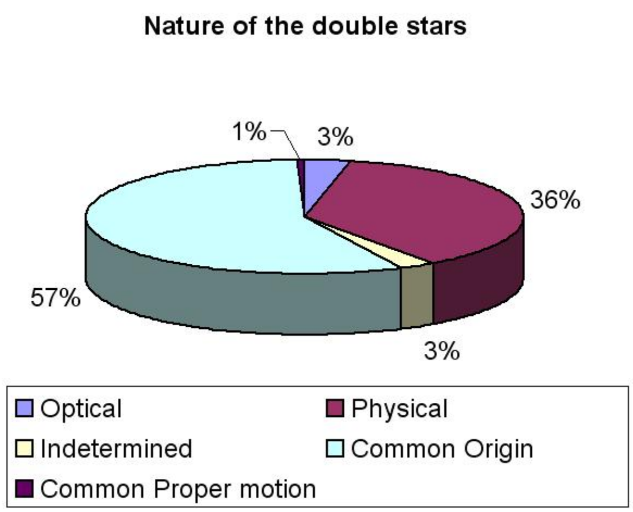

Figure 2: Distribution of the nature of the double stars.

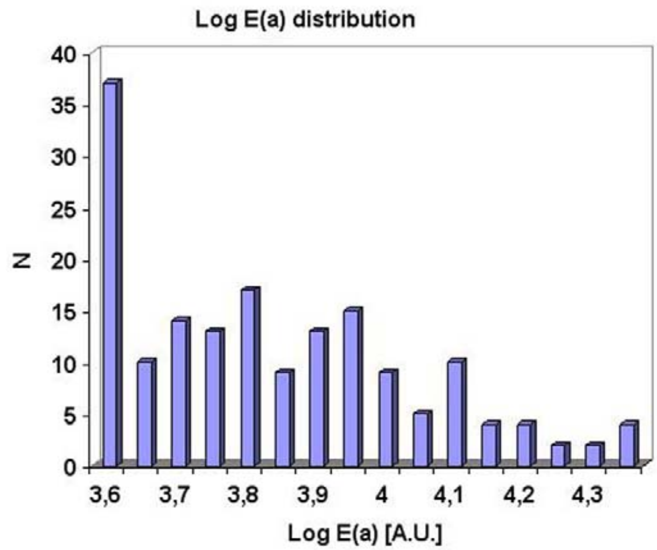

Figure 3: Distribution of the expected semimajor axes.

errors are expressed as percent/100. The error in sum of mass is 21% (0.21 when we used the formulae) for low mass stars and 15% for stars with stellar masses of 0.50-1.0. In photometric parallax are of 20 % (13 % if it is a Hipparcos trigonometric parallax). So the error in P (assuming circular and face-on) calculated ranges between 25-35 %.

Figure 3 shows the distribution of the expected semimajor axes. The plot shows the E(a) in Log E(a) and so log E(a) = 4.0 corresponds to a E(a) = 10,000 AU. Against the stellar systems studied in this work, 22 percent of them have E(a) of about 6,000 AU and is, with difference, the most numerous group of stellar systems. The widest stellar systems have E(a) > 30,000-35,000 AU.

11. CCD Measurements

In this work we made 1,538 measurements averaged into 636 measures. Against them 170 were CCD measures taken by 5 observers (in total 1,071 CCD images). 437 measures were obtained from AC2000, Tycho-2 and 2MASS catalogs, and we use Digitized Sky Survery plates for 29 measures.

Table 1 lists the observers that collaborated with CCD measurements. All of them are amateurs from Spain. The name of the observer and his affiliation are listed in column 1. The observatory in column 2 and the instruments used in column 3. This last column lists the telescopes used (model, diameters in meters and focal ratio), the CCD camera, the resolution used (in arcsecond per pixel) and the pretreat used. All the observers used Astrometrica to reduce the images. Rafael Benavides used REDUC for several double stars. The home-made software called DOBLES was designed by Julio Castellano to measure double stars in a great amount of CCD images. This software read the log file of Astrometrica and detect the coordinates for the components of the double stars, measuring theta and rho automatically. Finally, is shown the results and the sigmas for the measures.

Table 2 presents the main information for the double stars studied in this work. In column (1), the stellar system is identified by the designation name. Columns (2) and (3) list the equatorial coordinate for equinox 2000. Column (4) lists differential photometry. Magnitudes in V band and spectral types for primary and secondary components are listed in columns (5)-(8). The V magnitudes came from Tycho-2 catalog but for BVD 149 AB where came from Hipparcos catalog (Tycho-2 value for V is in error). So V magnitudes greater than 11th could have a low quality due to the larger errors in the weak end of the V magnitude. Column (9) lists the distance modulus from Tycho-2 V magnitude and Mv calculated in this work. Since the rms in Mv estimate is of 0.43, the error in V-Mv must be slightly greater because we must take into account the error in V magnitude. The expected semi-major axis (in AU) and the period (in years) are in columns (10) and (11). The last column shows the type of double star. The nature of the double star is coded as follows: PHY: Physical; OPT: Optical; CO: Common Origin; CPM: Common Proper Motion; “¿?”: = unknown; “--“: nature not studied. A “?”character at the end means that the nature listed is the most probable, but could not be of this type. Often a combination the two types

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Table 1: Observers that collaborated with the CCD measures.

Observer	Observatory	Instrument
Rafael Benavides (Astronomical Society of Córdoba)	Observatory of Posadas, MPC-IAU Code J53	Telescope: C11, 0.28-m, f/10 CCD: Atik 16HR Resolution: 0.50"/pixel and 0.99"/pixel. Using darks.
Julio Castellano	MPC-IAU Code 939	Telescope: S/C LX200 0.20-m, f/3.3 CCD: Sbig ST-7 ME Resolution: 2.7"/pixel Using darks y flats
Ramón Naves	Observatory of Montcabrer, MPC-IAU Code 213	Telescope: S/C LX200, 0.30-m, f/10 CCD: ST9 Resolution: 1.4"/pixel Using darks and flats
Esteban Reina	Observatory of Masquefa, MPC-IAU Code 232	Telecope: S/C LX200 0.25-m, f/3.3 CCD: ST7 Resolution: 2.17 "/pixel. Using darks and flats
Luis Lahuerta and Salvador Lahuerta	G.E.O.D.A., Observatory of Manises, MPC-IAU Code J98	Telescope: S/C Meade LX200 0.25-m, f/3.3 CCD: Starlight Xpress MX516 Resolution: 1.86x2.39 "/pixel. Using darks and flats

of double star are indicated separate by a "/" or "=" character. When a double star has approximately the same possibility to be, for example PHY and CO, then is indicated as "PHY=CO". Other example: when a double star is surely PHY but we can not reject the CO nature, then is indicated as "PHY/CO".

Table 3 presents the information for components of the double stars studied in this work. In columns (1) and (2) is the stellar system by the designation name. Column 3 lists the GSC identification; Columns 4 - 7 show V and B-V photometry and proper motion (in mas/yr) from Tycho-2. K magnitudes, J-K, and V-K colors from 2MASS are listed in columns (8) through (10). Columns (11) through (14) list the spectral type, V absolute magnitude, distance (in pc) and tangential velocities (in km/s) calculated in this work.

Table 4 lists the measures for the double stars studied in this work. In column 1 is the stellar system by the designation name. Columns 2 and 3 list the equatorial coordinate for equinox 2000. The besselian epoch, theta and rho are listed in columns 4 -6. Column 5 shows the number of measures. The observer and method code are given in columns 8 and 9. The observers are coded as follow: BVD (Rafael Benavides); FMR (Francisco Rica); JCA (Julio Castellano); OMG (Luis Lahuerta and Salvador Lahuerta); ERE (Esteban Reina); RNA (Ramón Naves). The method code: CCD: measure using CCD camera; DSS: measure using Digitalized Sky Survey plates; AC2000, TYCHO-2 and 2MASS: measures using AC-2000, Tycho-2 and 2MASS astrometric catalogs. The epoch of measures included in WDS catalog are flagged with an asterisk.

We analyzed statistically the internal errors of CCD measures for those double stars with at least 3 CCD measures. The sigma in θ and ρ were calculated for these double stars. Table 5 shows the mean and median for the sigma.

As we can see in Table 5, the accuracy of the CCD measures is very good with averaged σ of 0.045" (0.08º) in θ and 0.047" in ρ. As we can expect for CCD measures of wide pairs, the tangential internal errors (that is in θ) and the radial internal errors (in ρ) are very similar. So ρ measures are not affected by the proximity effect that use to made smaller the ρ measures.

Figures 4-6 show the sigma distribution in θ (in degrees and arcseconds) and ρ for the binaries with three of more CCD measures.

Table 5: Mean and Median for sigmas in θ and ρ.

	Mean	Median
σ(θ) [°]	0.08°	0.06°
σ(θ) ["]	0.045"	0.040"
σ(ρ) ["]	0.047"	0.040"

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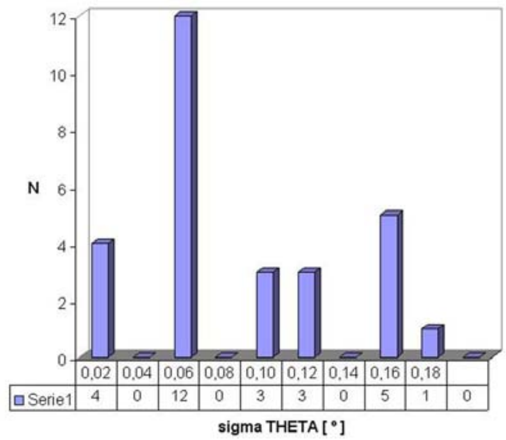

Figure 4: Sigma values for the theta (degrees) CCD measures.

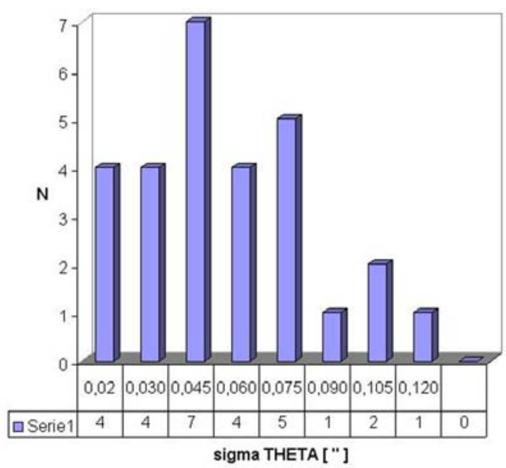

Figure 5: Sigma values for the theta (arcseconds) CCD measures.

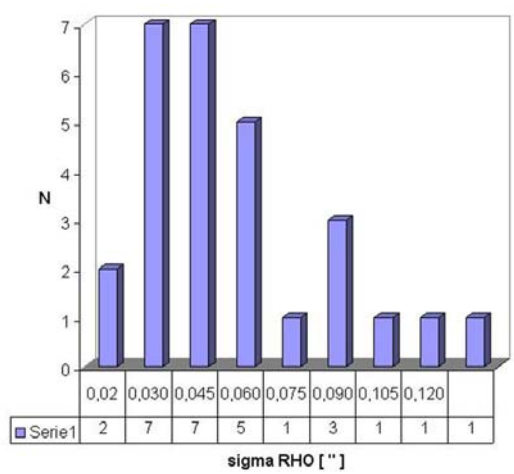

Figure 6: Sigma values for rho (arcseconds) CCD measures.

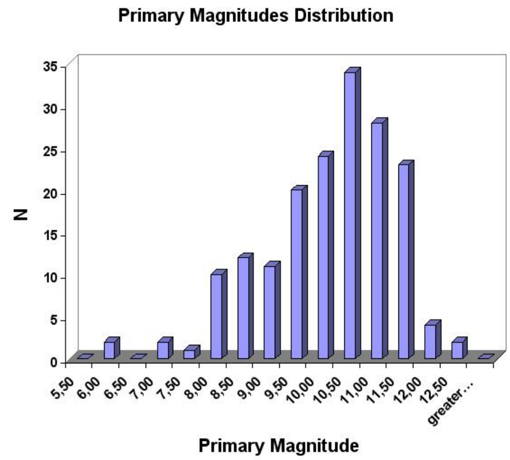

Figure 7: Distribution of the primary magnitudes.

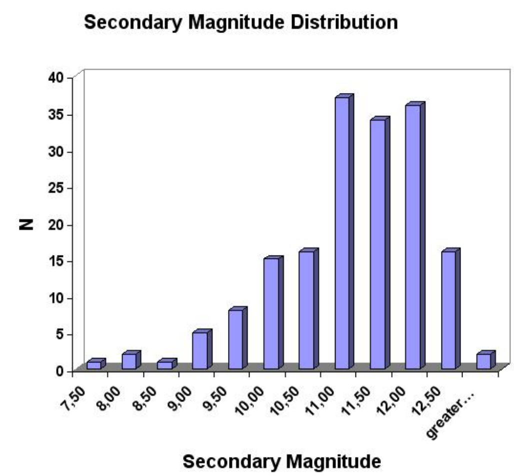

Figure 8: Distribution of the secondary magnitudes.

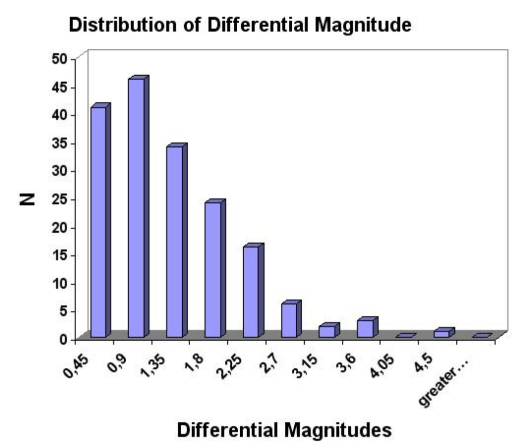

Figure 9: Distribution of the magnitude differences.

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12. The Binary Stars

Plotted in Figures 7 and 8 are the distribution of primary and secondary magnitudes in addition to the distribution of differential magnitude. In Figure 7 it can be seen that the most common primary magnitude is 10.5. The mean value is 9.85 and the median value is 10.09. Figure 8 shows the same for the secondary components. The most common values are from 11 to 12 magnitudes. The mean value is 10.90 and the median value is 11.05. The Figure 9 shows the differential magnitude with mean of 1.05 and median of 0.73.

Figure 10 shows the distribution of proper motion for components of the double stars that have proper motion from 4.4 to 306.2 mas/yr. We must to take into account that the optical pairs have been plotted too. The most common proper motion ranges from 25 to 75 mas/yr.

Figure 11 shows the relative motion of B with respect to A for those stellar systems with a significant possibility of being physical. This relative motion corresponds to the relative orbital motion for these systems.

In the next paragraphs we comment in detail same binaries.

BVD 30 AB-C

A common proper motion binary composed of stars with G9V and G9V spectral types separated by more than 37 arcsec. The differential distance moduli of +0.87 magnitudes is caused by the binary nature of primary component which is listed in WDS (Mason et al. 2003) as WDS 00029-7436 = TDS 3 discovered. It was discovered by Tycho-2 instrument in 1991 (48 degrees and 1.4 arcsec with magnitudes of 10.64 and 11.26). According to our study, the wide components are likely be a physical pair although a common origin must not be rejected.

If the components of the close binary are bounded then it will be a triple stellar system.

HJL 1 = WDS 00119+6621

Discovered by Halbwachs (1986) who measured 350º and 31". Roeser & Bastian (1988) obtained spectral type F8 for the primary. The astrophysical data were corrected for reddening. In this work we determined a E(B-V) of 0.16 and 0.19 for primary and secondary respectively.

LDS 5 = WDS 00137-2818

Common high proper motion binary composed of stars with 10.96 and 11.31 magnitudes and spectral types K2V and K5V separated by more than 44 arcsec. It was discovered by Luyten in 1954. Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 11.12 ± 2.34 mas (91 +23/-16 pc). The photometric distance determined by LIADA is in agreement with Hipparcos within the error margins. According to our study the wide components are likely a common origin binary, although a physical nature must

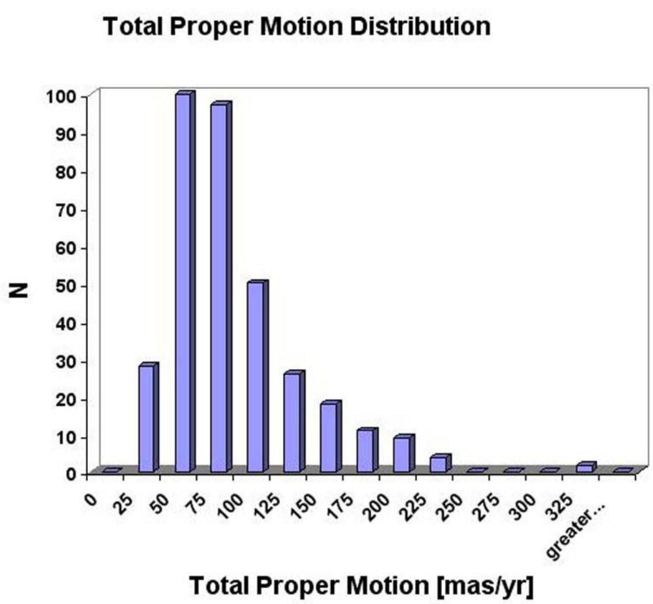

Figure 10: Distribution of the total proper motion of the observed double stars.

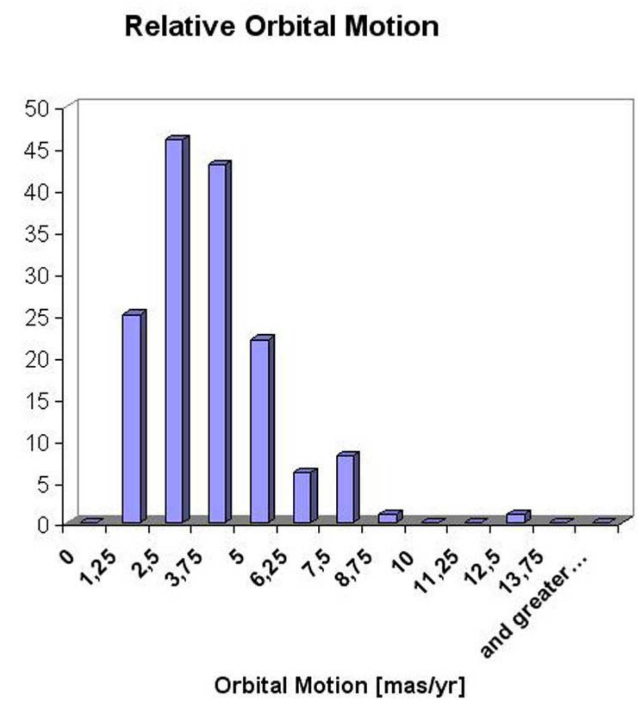

Figure 11: Distribution of the relative orbital motion.

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not be rejected.

BVD 12

Common high proper motion binary composed of stars with 7.5 and 11.1 magnitudes with F6IV (evolutionary isochrona were used) and K0V spectral types separated by more than 143 arcsec. See Figure 12. We calculated a Mv = 1.8 for the primary which corresponds to about 140 pc of distance. Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 9.9 ± 1.0 mas (101 pc).

Houk & Smith-Moore (1988) classified it as a F5V star but this result is not in agreement with Hipparcos results.

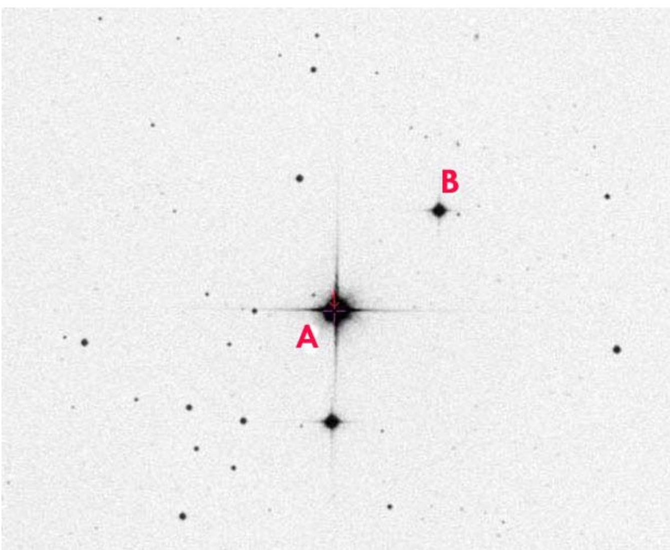

Figure 12: Binary BVD 12 (DSS image).

Barbier-Brossat, Petit & Figon (1994) determined a radial velocity of –4.3 km*s^{-1}.

Nordstrom et al. (2004) determined a metallicity [Fe/H] = -0.24 and a galactocentric velocity (U,V,W) = (-76, -49, -0) km/s^{-1}. According to Eggen diagrams (1969a, 1969b) it is an old disc star. A fG = 0.36 corresponds to a thick disk star of 10 Gyr old.

According to our study it is a common origin pair.

BVD 66

The differential distance moduli of –0.68 magnitudes could be caused by the binary nature of B.

BVD 13

Secondary is slightly brighter than the primary component and if it is a subgiant then the photometric parallaxes of the components will be nearly the same.

BVD 14

Roeser & Bastian (1988) classified the primary star as a G0 star (LIADA estimated a spectral type of F6V). It is composed by small proper motion stars with differential distance moduli of –2.67 magnitudes so this pair could be an optical pair.

BVD 15

Roeser & Bastian (1988) listed the primary star as a spectral type of F8.

BVD 16

Cannon & Pickering (1918-1924) listed the primary star as an F8 star. Houk (1978) determined a spectral type of G3V.

BVD 18

Cannon & Pickering (1918-1924) listed the primary star as a K0 star. Miskin (1973) listed the secondary component with spectral type of G5III. We estimated a spectral type of G7V for secondary. If it was a giant star its tangential velocity would be greater than 400 km*s^{-1}. This high velocity is very improbable and so surely Miskin made an error.

HJL 20 = WDS 01350+6047

Common high proper motion binary composed of stars with 8.5 and 9.1 magnitudes, both with F6V spectral types and separated by more than 44 arcsec. It was discovered by Halbwachs (1986).

Farnsworth & Alice (1955) and Jaschek, Conde & de Sierra (1964) classified the components as stars of F8V (LIADA determined spectral types of F6V).

Duflot, Figon & Meyssonnier (1995) determined radial velocity of –12 and –15 km*s^{-1} for components A and B.

The differential distance moduli of +0.54 magnitudes could be caused by the binary nature of the primary.

BVD 21

Common proper motion binary composed of stars with 7.9 and 10.8 magnitudes with G6V and K7V spectral types separated by more than 59 arcsec. Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 30.0±0.9 mas which corresponds to a distance of 33 pc (exactly the same value that LIADA obtained).

Cannon & Pickering (1918-1924) classified the primary as a G5 star (LIADA obtained G6V).

Nordstrom et al. (2004) determined a metallicity [Fe/H] = +0.02, a galactocentric velocity (U,V,W) = (+10, +7, -6) km*s^{-1} and a age of about 4 Gyr. According to Eggen diagrams (1969a, 1969b) it is a young disc star. In this work we calculated a fG = 0.06 that corresponds to a young-medium age thin disk star of about 3-4 Gyr old.

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According to our study, it is surely a physical double.

BVD 25

A common proper motion binary composed of stars with 9.1 and 9.4 magnitudes separated by more than 40 arcsec. Houk & Cowley (1975) classified the primary as an F6V star. LIADA determined a spectral type of F5V for both components.

BVD 26

According to the individual proper motions, this visual double star is likely an optical pair. The primary is the variable star V 405 Cep, a suspected eclipsing binary and the luminosity ranges from 8.75 to 8.95 (Samus et al. 2004). See Figure 13.

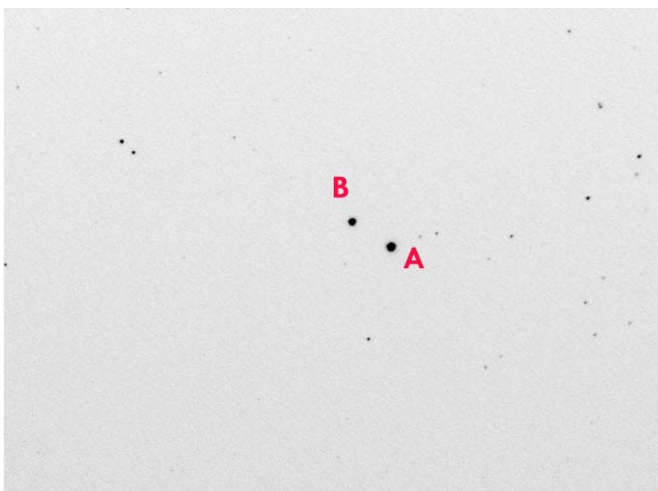

Figure 13: BVD 26 observed in 2009.255 by Benavides using a C11 telescope with CCD Atik in binning 2x2.

Hipparcos (ESA 1997) observed the primary component and obtained a distance of 229 pc and an absolute magnitude of 1.92 (typical for a star A4/5V). Literature classified it as a A2 star. In this work a photometric distance of 211 pc and a spectral type of A6V were determined.

More astrometric measures are needed to confirm the nature of this pair.

BVD 27

A low common proper motion double star, whose nature is not clear. Surely it is a common origin binary. But the difference in distance moduli of -0.78 magnitudes could be caused by the binary nature of secondary component. More astrometrical data are needed to confirm the nature of this pair.

BVD 28

A high common proper motion binary composed of stars with 9.9 and 10.3 magnitudes separated by more than 105 arcsec. Cannon & Pickering (1918-1924) classified the primary as a K2 star (LIADA obtained K4V). The secondary is a K5V (this work). According to our photometric distance this pair could be a nearby physical system located at 39 pc, but we can not reject the common origin nature.

BVD 29

Common proper motion binary composed of stars with 10.7 and 11.1 magnitudes with K1 IV and F6 V spectral types separated by more than 51 arcsec. The spectral type for the primary was determined to obtain the same photometric distance for both components. It is a common origin system.

BVD 71

Common proper motion binary composed of stars with 9.0 and 10.5 magnitudes separated by more than 60 arcsec. Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 18.2±0.9 mas which corresponds to a distance of 55.5 pc (LIADA determined a photometric distance of 61 pc).

Cannon & Pickering (1918-1924) classified the primary as a K0 star. Houk & Cowley (1975) obtained a spectral type of G6V. In this work the primary was classified as a G5V star. Our estimate of photometric distance showed that this system is located at 50-60 pc.

According to our study surely it is a physical pair, although a common origin must not be rejected.

BVD 31

According to the individual proper motions this visual double star is an optical pair.

Hipparcos (ESA 1997) observed the primary component and obtained a distance of 138 pc and an absolute magnitude typical for a A7/8V star. In this work a photometric distance of 133 pc and a spectral type of A8V were determined in good agreement with Hipparcos results.

BVD 32

Roeser & Bastian (1988) classified the primary as a F5 star.

BVD 34

More astrometric data are needed to determine the nature for this pair. Roeser & Bastian (1988) classified the primary as a K0 star. LIADA determined a spectral type of G8III. The astrophysical data were corrected by reddening. In this work we determined a E(B-V) of 0.21 and 0.26 for primary and secondary respectively.

BVD 37

The astrophysical data were corrected for reddening. In this work we determined a E(B-V) of 0.17 and

0.12 for primary and secondary respectively.

FEL 1

Common high proper motion binary composed of bright stars with 7.41 and 7.56 magnitudes separated by nearly 76 arcsec. Inicially catalogued by us as BVD 38. But in num. 4, vol. 5 of JDSO, Laurent Ferrero (2009), a French amateur, published the discovery of this binary which had not yet been listed in WDS catalog. In this paper we name it FEL 1.

Hipparcos (ESA 1997) observed the primary component and obtained parallaxes of 18.2 ± 0.6 and 19.2 ± 0.6 mas which correspond to distances of 55 and 52 pc. LIADA calculated photometric distances of 44 and 52 pc.

Cannon & Pickering (1918-1924) classified the components as G0 stars. Houk & Cowley (1975) obtained spectral types of G0V for both components. LIADA determined spectral types of F9V and F8V.

Nordstrom et al. (2004) determined galactocentric velocities (U,V,W) of (+29, -22, -8) and (+28, -22, -8) km*s^{-1} and radial velocities of +27.1 ± 0.1 and +27.3 ± 0.2 km*s^{-1} for the components. According to Eggen diagrams (1969a, 1969b) they are old disc stars. A value of 0.16 for fG was obtained in this work corresponding to a young-medium age thin disk star of 3-4 Gyr old. Nordstrom et al. (2004) calculated an age of about 6.9 Gyr.

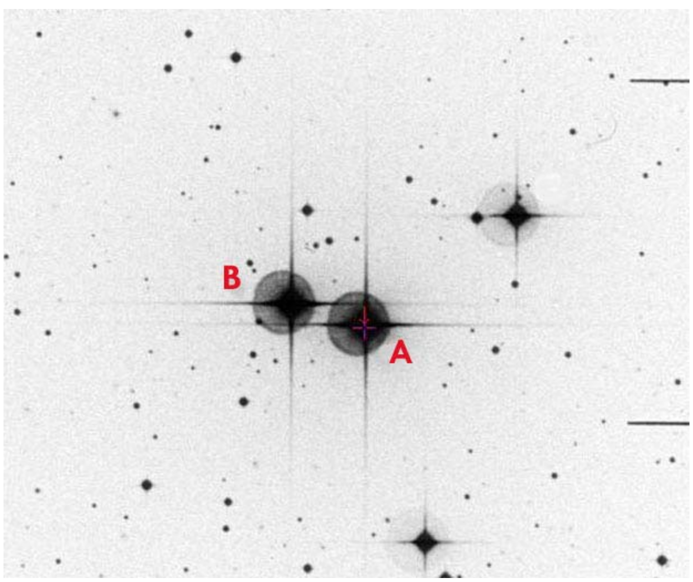

Figure 14: Binary FEL 1 (DSS image).

According to our study this double star is surely a physical pair.

HJL 54 = WDS 03597+8215

Common proper motion binary composed of stars with 9.7 and 10.2 magnitudes, separated by 24 arcsec, and discovered by Halbwachs (1986).

Roeser & Bastian (1988) classified it as a system of F5 and F8 stars. Our estimate determined spectral types of F6V and F8V.

According to our study this pair could be physical or a common origin binary.

BVD 40 AB-C

Common high proper motion binary composed of stars with 10.3 and 10.4 magnitudes, separated by 11.6 arcsec.

The primary component is listed in WDS catalog as WDS 04001-2902 = TDS 2713, discovered by Tycho-2 instrument in 1991 (276 degrees and 0.5 arcsec with magnitudes of 11.13 and 11.29).

LIADA determined photometric distances of 33 and 42 pc so this is a nearby stellar system.

Cannon & Pickering (1918-1924) classified the components as K0 stars. LIADA determined spectral types of K6V and K5V.

According to our study this is a clear physical pair.

BVD 41

Common proper motion binary composed of stars with 10.8 and 11.9 magnitudes, separated by 47 arcsec.

Roeser & Bastian (1988) classified the primary as a K0 star. Our work determined spectral types of G4V and K2V.

According to our study this pair could be physical or a common origin double star.

BVD 43

Common high proper motion binary composed of bright stars with 9.2 and 11.4 magnitudes separated by nearly 30 arcsec. Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 3.06 ± 0.98 mas which corresponds to a distance of 327 +154/-79 pc. The calculated absolute magnitude using trigonometric parallax and apparent magnitude of Hipparcos was of 1.7 +0.5/-0.9. Taking into account the photometric information this value corresponds to a K2 IV-III star. In this work we calculated a Mv = 1.6 which correspond to a distance of 322 pc.

Cannon & Pickering (1918-1924) classified the primary as K0 stars while Houk (1978) obtained a spectral type of K0III.

According to our study this double star is surely a common origin pair.

BVD 44

Common proper motion binary composed of bright stars with 8.8 and 9.5 magnitudes, separated by about

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26 arcsec.

Cannon & Pickering (1918-1924) classified the primary as a G0 star while Houk & Cowley (1975) obtained a spectral type of F7V. LIADA determined spectral types of F9V and G2V.

According to our study this double star is surely a physical pair.

HJL 2.- GSC 4069 1243 (AR: 04 25 40 DEC: +63 40 29)

Common proper motion binary composed of stars with 8.3 and 10.0 magnitudes and discovered by Halbwachs (1986), but it is not cataloged in WDS (Mason et al. 2003). We propose provisionally that this binary be named HJL 2

Hipparcos (ESA 1997) observed the primary component and obtained a parallax which corresponds to a distance of 66 pc. The calculated absolute magnitude, using trigonometric parallax and apparent magnitude from Hipparcos, corresponds to spectral types of F9V and K0V stars. LIADA determined a later spectral type of G7V for the primary.

According to our study this double star is surely a common origin pair.

BVD 47

delta(V-Mv)=-0.75; B is an unresolved double star?

SRT 2 = WDS 04116-2021

Common proper motion binary composed of bright stars with 5.2 and 7.7 magnitudes, separated by nearly 62 arcsec.

The main component is a spectroscopic binary known as GW Eri composed by star with spectral types of A1V and F/G (Houk & Smith-Moore 1988) which orbit in 3.659 days. The main component have a radial velocity of +32.8 km*s^{-1} (Abt & Levy 1977).

Secondary component is an F0 star (Houk & Smith -Moore 1988). LIADA estimated a spectral type of A9V. Nordstrom et al. (2004) obtained a metallicity of [Fe/H] = -0.26 and a distance of 91 pc in agreement with our result (109 pc) within error margins.

According to our study this double star is surely a common origin pair but we can not reject a physical nature.

BVD 48

This stellar system is composed of three stars with common proper motions and with spectral types of F6IV, G2V and G5V.

Hipparcos (ESA 1997) observed the components A (HD 31141) and C (HD 31130) and obtained parallaxes of 16.0 ± 0.6 mas and 16.1 ± 0.9 (about 62 pc).

From Hipparcos data the absolute magnitude for the primary is in agreement with the spectral type F6IV/V determined by Houk (1982).

Nordstrom et al. (2004) determined for the primary a metallicity [Fe/H] = -0.18, a stellar mass of 1.42 solar masses and an age of about 2.4 ± 0.2 Gyr old.

The B component is a G5 star (Bastian & Roeser 1993). We determined a spectral type of F7V, but using different photometric colors we obtained a G5V spectral type (colors J-H and H-K), G0V (B-V color) and F7V (color V-K).

The AB pair is composed of bright stars with 6.8 and 8.7 magnitude and with spectral types F6IV/V and G2V separated by 52.3 arcsec. According to our study it is surely a physical pair. The hypothetical parallax (Russell 1928) calculated in this work was π_{hyp} = 16.1 m.a.s. in excellent agreement with Hipparcos data for the primary (π_{trig} = 16.0 m.a.s.).

The component C is a G5V star (Houk 1982) of 8.9 magnitude. It is located at 99.6 arcsec of the primary. Hipparcos obtained a parallax of 16.2 ± 0.9 m.a.s. (62 pc). Nordstrom et al. (2004) determined a metallicity of [Fe/H] = -0.08 and a radial velocity of +45.9 ± 0.7 km/s. In this work we obtained a galactocentric velocity (U,V,W) of (-22, -44, -13) km*s^{-1}. According to Eggen diagrams (1969a, 1969b) they are old disc stars. In this work we calculated a fG = 0.26 that corresponds to an old age thin disk star of 3-10 Gyr old. Nordstrom et al. (2004) calculated an age of about 6.9 Gyr.

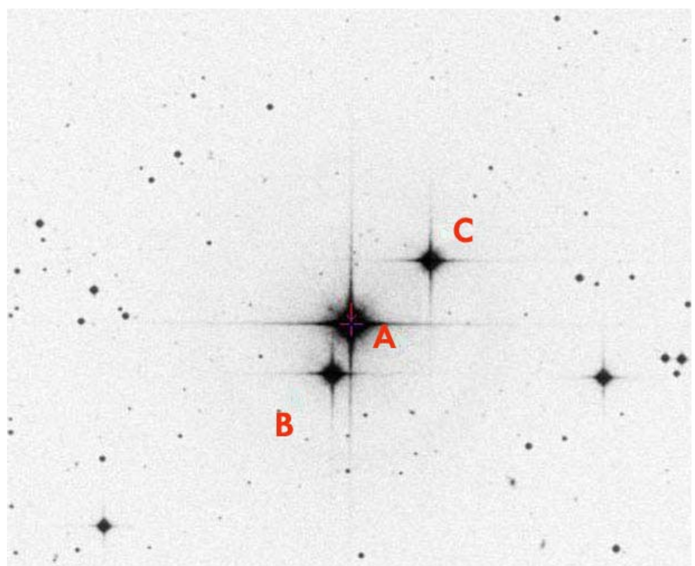

Figure 15: DSS image of BVD 48.

According to our study AC pair is likely a physical pair but we can not reject a common origin nature.

Is BVD 48 a Trapezium-like multiple system?

Trapezium systems named after the Trapezium in the Orion Nebula, are groups of three or more stars whose separations are roughly equal. As such, they are dynamically unstable and must evolve either into hierarchical systems or into hard binaries with outer components lost to the systems. The maximum age for trapezium systems seems to be 30-70 x 10^7 yr (Abt & Corbally 2000).

An arbitrary working rule (Ambartsumian 1954) is that the largest angular separation in a trapezium system is greater than 1/3 but less than 3 times the smallest angular separation.

In BVD 48 the smallest angular separation is 52.25 arcsec for AB components and the greatest angular separation (146.45 arcsec for BC components) is 2.8 time greater, so the apparent configuration of this system meets the Ambartsumian criterion.

The ages for the members obtained by Nordstrom et al. (2004) suggest that this system is much older that the maximum age of trapezia systems. Typically, a hierarchical system will consist of a close pair and a distant third star, or a close pair and distant close pair. We see the multiple-star systems only in projection against the plane of the sky. Therefore a hierarchical system could, if they lay nearly along our line of sight, simulate a Trapezium system. Ambartsumian (1954) called those "pseudo-Trapezium systems" and estimated in a statistical analysis that about 9% of a sample of hierarchical systems would appear to be such pseudo-Trapezium systems. So we can conclude that BVD 48 surely is a hierarchical system simulating a Trapezium system.

BVD 49

Common proper motion binary composed of stars with 9.7 and 11.0 magnitudes, separated by 48.5 arcsec.

Cannon & Pickering (1918-1924) classified the primary as a G0 star while Houk (1982) obtained a spectral type of F7/G0(V). LIADA determined spectral types of F8V and G8V.

According to our study this double star is surely a common origin pair but we can not reject a physical nature.

BVD 50

Common proper motion binary composed of stars with 8.3 and 8.5 magnitudes, separated for 31.0 arcsec.

Hipparcos (ESA 1997) observed both components and obtained parallaxes which correspond to 92 ± 10 and 130 ± 21 pc. The absolute magnitudes calculated were 3.5 ± 0.2 and 2.9 ± 0.4. According to this, the secondary could be a subgiant of F7IV spectral type (LIADA determined spectral types of F3V and F3V).

Nordstrom et al. (2004) obtained spectral types of F0 for both components, determined metallicities [Fe/H] of -0.40 and -0.30 and ages of 1.8 - 1.9 Gyr.

Olsen (1994b) suspected a variable nature. Nowadays it is classified as NSV 16253.

According to our study this pair could be a common origin or a physical pair.

BVD 51

Common proper motion binary composed of stars with 7.7 and 9.5 magnitudes, separated by 44.6 arcsec.

Houk & Swift (1999) classified the primary as a F7V star in agreement with our results (F7V and G1V).

The difference in distance modulus of the components is 1.0 magnitude. The primary could be a IV-V star or maybe an unresolved double star. Nordstrom *et al.* (2004) obtained an absolute magnitude of +2.9 which is typical for a F IV-V star.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = +0.03 for the primary. The galactocentric velocity (U,V,W) = (-17, +3, -24) km*s^{-1}. The radial velocity was of 22.5±0.4 km*s^{-1}. According to Eggen diagrams (1969a, 1969b) it is a young disc star. In this work we calculated a fG = 0.16 that corresponds to a young-medium age thin disk stars of 3-4 Gyr old.

According to our study it is surely a common origin pair.

BVD 52

Common high proper motion binary composed of stars with 7.6 and 9.0 magnitudes, separated by more than 90.1 arcsec. Hipparcos (ESA 1997) observed the primary component and obtained a parallax which corresponds to a distance of 57.4 ± 4.7 pc.

Houk and Smith-Moore (1988) classified them as K0IV and G5V stars.

Moore and Paddock (1950) calculated a radial velocity of +24 ± 5 km*s^{-1} and a spectral type of G9III for the primary star.

This binary is included in a catalog of red giant stars of the old disk population (Eggen 1976).

We obtained a galactocentric velocity (U,V,W) = (-20, +11, -34) km/s^{-1}. In this work we calculated a fG = 0.23 that corresponds to an old age thin disk star.

According to our study this pair could be a physical or a common origin pair.

BVD 89

Common proper motion binary composed of stars with 11.0 and 11.9 magnitudes, separated by 22.6 arcsec.

Cannon & Pickering (1918-1924) classified the primary as a G5 star (LIADA determined spectral types of G2V and K1V).

According to our study this pair could be a physical or a common origin pair.

BVD 20 AC

Common proper motion binary composed of stars with 9.2 and 10.8 magnitudes, separated by 72.4 arcsec. The AB components compose the double star RSS 85 = WDS 05285-3922, separated at 8.12" in direction 136.1° (in 1999.18).

Hipparcos (ESA 1997) observed the primary component and obtained a parallax which corresponds to a distance of 39.4 ± 1.5 pc in agreement with our result (about 36 pc).

Upgren *et al.* (1972) classified the primary as a K3IV subgiant. Houk (1982) classified it as a K2V star. Olsen (1994a) classified it as a dwarf. We obtained spectral types of K2V and K7V.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = -0.19 and a radial velocity of +27 ± 0.4 km/s. From data found in literature, we calculated the galactocentric velocity (U,V,W) = (-14, -28, -2) km/s^{-1}. According to Eggen diagrams (1969a, 1969b) it is a young disc star. In this work we calculated a fG = 0.16 that corresponds to a young-medium age thin disk star.

According to our study it is likely a physical pair.

BVD 55

Pair of stars with 9.4 and 10.7 magnitudes, separated by 21.0 arcsec. The relative motion of the system is about 8 mas*yr^{-1} and the common proper motion probability is about 30 percent.

Bastian & Roeser (1993) classified primary as an F8 star (LIADA determined spectral types of F5V for both components).

According to our study its nature is undetermined and we can not reject the optical nature.

BVD 56

Common proper motion binary composed of stars with 9.0 and 10.8 magnitudes, separated by 72.0 arcsec.

Houk & Smith-Moore (1988) classified the primary as an F7V star (LIADA determined spectral types of F9V and K0V).

According to our study this pair likely is a common origin pair but we can not reject the physical nature.

BVD 57 AB-C

Common proper motion binary composed of stars with 8.4 and 10.2 magnitudes, separated by 51.5 arcsec.

Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 15.13 ± 0.77 mas (66 pc). LIADA determined a distance of 48 and 57 pc. The absolute magnitude using Hipparcos data is +4.25.

Houk & Cowley (1975) classified the primary as a G5V star but this result is not in agree with Hipparcos. LIADA determined a G4V spectral type for primary. The brighter absolute magnitude of Hipparcos is caused by a unresolved duplicity of the primary star. The primary component is listed in WDS catalog as WDS 05536-5640 = FIN 93 discovered by Finsen (1932) in 1929 using a micrometers attached to a refractor of 26 inches (308.6 degrees and 0.30 arcsec).

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = -0.20 and a radial velocity of -6.6 ± 0.1 km*s^{-1} and a galactocentric velocity (U,V,W) = (+16, +9, -6). According to Eggen diagrams (1969a, 1969b) it is a young disc star. In this work we calculated a fG = 0.08 that corresponds to a young age thin disk star of 3 -4 Gyr old.

According to our study this double star could be a physical or a common proper motion pair.

BVD 91

Common proper motion binary composed of stars with 9.2 and 10.5 magnitudes, separated by 46.2 arcsec.

Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 8.82 ± 0.90 mas (147 pc). LIADA determined photometric distances of 130 and 97 pc for primary and secondary component.

Houk (1982) classified the primary as an F5V (in this work we determined spectral types of F6V and G8V).

According to our study this pair likely is a common origin pair but we can not reject the physical nature.

BVD 93

Common high proper motion binary composed of stars with 10.5 and 12.3 magnitudes, separated by 20.1 arcsec.

Hipparcos (ESA 1997) observed the primary component and obtained a parallax of 11.85 ± 4.21 mas (84 pc). LIADA determined photometric distances of 105 pc.

According to our study this double star could be a physical pair or a common origin pair.

BVD 59

The difference in distance moduli of +1.5 magnitude surely is caused by an error in our luminosity classes and likely primary is an evolved star.

BVD 60

A pair composed of stars with 10.3 and 13.0 magnitudes, separated by 52.6 arcsec. Cannon & Pickering (1918-1924) classified the components as K0 and G0 stars. LIADA determined spectral types of K3V and

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G1V.

The Tycho-2 catalog lists a secondary proper motion very similar to that for the primary. But UCAC-2 lists a very different proper motion. 2MASS and GSC-I (Morrison et al. 2001) show an astrometry in more agreement with UCAC-2 catalog. GSC-II shows for B a similar motion than that of Tycho-2. Finally we performed a blink of several photographic plates from Digitized Sky Survey and a CCD images from 2MASS and no common proper motion could be seen for this system.

Due to very different proper motion for the components, this pair is optical.

BGH 22 = WDS 06386-0946

Common high proper motion binary composed of stars with 9.4 and 9.8 magnitudes, separated by 40.1 arcsec.

LIADA determined photometric distances of 50 and 47 pc.

Cannon & Pickering (1918-1924) classified the primary as a G5 star. Houk and Swift (1999) obtained an spectral type of K1/2. In this work we determined spectral types of K0V and K2V.

The WDS identification for BGH 22 is WDS 06386-0946. It was discovered by van den Bergh in 1946 (Bergh 1958) at a angular distance of 39.9 arcsec in direction 151.2 degrees. Since then, 10 measures have been performed, the last one in 1998 (151 degrees and 40.1 arcsec).

According to our study this is surely a physical pair.

BVD 61

Common proper motion binary composed of stars with 9.4 and 11.1 magnitudes, separated by 45.8 arcsec.

LIADA determined photometric distances of 100 and 85 pc.

Roeser & Bastian (1988) classified the primary as a G0 star. In this work we determined spectral types of G0V and K2V.

According to our study this pair could be a physical pair or a common origin pair.

BVD 120

Common proper motion binary composed of stars with 9.4 and 9.8 magnitudes, separated by 71.5 arcsec.

Cannon and Pickering (1918-1924) classified the primary as a F8 star while Houk and Smith-Moore (1988) classified it as a F5/6V star. In this work we determined spectral types of F6V and F6V.

According to our study this double star likely is a common origin pair but we can not reject the physical nature.

BVD 64

Common proper motion binary composed of stars with 10.6 and 11.5 magnitudes, separated by 149.5 arcsec.

Our spectral types were K0V and K7V. The difference in distance moduli of -0.85 magnitudes could be caused by an error in our luminosity classes or by the duplicity of the secondary star.

According to our study this double star likely is a common origin pair.

BVD 65

The relative motion infered from Tycho-2 and UCAC-2 catalog is very different. More astrometric data are needed to confirm the relative motion for this system.

BVD 67

Common proper motion binary composed of stars with 10.0 and 10.4 magnitudes, separated by 34.4 arcsec.

Stoy (1968) classified them as F8 and G0 stars. Our spectral types were G5V and G5V.

According to our study this double star likely is a physical pair but we can not reject the common origin nature.

BVD 69

Common proper motion binary composed of stars with 8.9 and 9.6 magnitudes separated by 20.5 arcsec.

In literature the primary is classified as a F3/5V star. In this work we determined spectral types of F4V and F5V.

The difference in distance moduli of +0.55 magnitudes could be caused by an error in our luminosity classes or by the binary nature of the primary.

According to our study this double star could be a common origin or a physical pair.

LEP 30 = WDS 08156+1126

Common high proper motion binary composed of stars with 7.7 and 9.6 magnitudes separated by more than 31.9 arcsec.

WDS catalog lists a double star separated by 31.9 arcsec in direction 239 degrees in 2000 (237 degrees and 31.7 arcsec in 1918).

Hipparcos (ESA 1997) observed the primary component (HD 69056) and obtained a distance of 38±2 pc. It was classified as NLTT 11-1796 with spectral type of G5. We obtained a spectral type of G6V for the primary and photometric distances of 31 and 38 pc for the components.

Nordstrom et al. (2004) determined a metallicity

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[Fe/H] = +0.10 and a galactocentric velocity (U,V,W) = (-21, -40, -37) km/s^{-1} for the primary. According to Eggen diagrams (1969a, 1969b) it is an old disc star. In this work we calculated a fG = 0.32 that corresponds to an old age thin disk star of 3-10 Gyr old.

According to our study it likely is a physical pair.

BVD 161 AC

Common high proper motion binary composed of stars with 8.5 and 11.7 magnitudes, separated by more than 72.8 arcsec. UCAC-2 proper motions for the secondary is in error. Using AC2000, Tycho-2 and 2MASS astrometric data the relative motion of the system is 17 mas*yr^{-1}. The AB pair is catalogued in WDS as LEP 31 = WDS 08213+3419. See Figure 17.

According to Lepine *et al.* (2005), the weak B component has V = 17.5 and (J, H, K) = (14.94, 14.60, 14.55) and a proper motion of 0.160 mas*yr^{-1}. In 2MASS images it is nearly invisible and in optical plates of DSS it is a very weak object. SDSS photometry in bands u, g, r, i and z for epoch 2001.8902 and 2002.0243 match with a M4V star of Mv = +12.75 at a distance of 215 pc. This weak star is slightly shown in optical photographic plates and the USNO-B1.0 proper motion is inaccurate. The large distance determined in this work suggests that this star is a background star. A blink using DSS plates in ALADIN software confirm that B component is not a high common proper motion star.

Hipparcos observed the primary component (HD 70088) and obtained a distance of 43 ± 2 pc. The infered absolute magnitude is 5.30 ± 0.11, which corresponds to a star of G6V spectral type. Our results are in agreement with Hipparcos data.

Montes et al. (2001) determined a radial velocity of +32.2 ± 0.5 km*s^{-1} and a spectral type of G5V for the primary.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = -0.21 and a galactocentric velocity (U,V,W) = (-41, -23, -6) km*s^{-1} for the primary. This system is a supercluster Hyades member. According to Eggen diagrams (1969a, 1969b) it is a young disc star. Montes *et al.* (2000) diagrams showed that this stellar system is a member of this supercluster.

If the membership to the supercluster Hyades is confirmed then the age for this system could be about 600 Myr.

According to our study it is likely a common origin pair but more astrometric data are needed to confirm the system motion.

In this work we detected that the primary component is composed of two stars. Following the rules of component designation of the Washington Multiplicity Catalog (Hartkopf and Mason 2004) we named the components of this unreported close pair Aa and Ab. We use the astrometry of 2MASS to obtain an angular separation of 4.59" in direction 40.4° (Figure 17) for

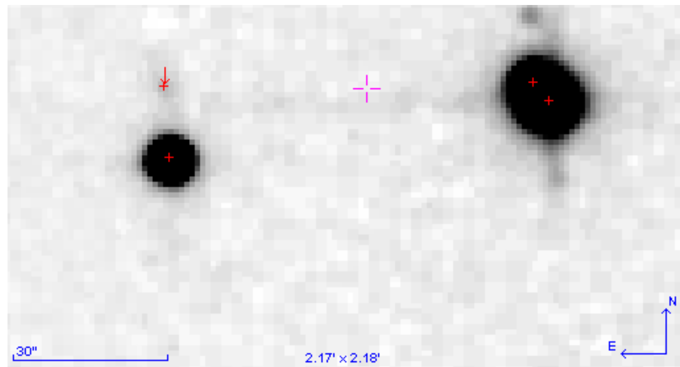

Figure 17: BVD 161 AC stellar system. CCD image from 2MASS. The primary component is a new, unreported double star. The red "plus" are positions from 2MASS catalog. The primary component is clearly elongated. The angular separation is 4.52".

epoch 1998.217. The flux ratio in JHK bands for the components range from 0.8 to 1.1 magnitudes. Optical individual photometry was not found in the literature.

Only the proper motion for Aa is known so more astrometric measures are needed to determine the common proper motion nature.

BVD 73

The difference in distance moduli of +1.84 magnitude surely is caused by an error in our luminosity classes and the primary component could be a subgiant star of spectral type G6-8.

BVD 75

The difference in distance moduli of +2.4 magnitude surely is caused by an error in our luminosity classes and the primary component could be an evolved star of K2V/IV spectral type.

BVD 76

Common proper motion binary composed of stars with 9.6 and 10.5 magnitudes, separated by 42.0 arcsec.

Houk (1982) classified the primary as a F5-6 IV/V star. We obtained a F6V spectral type.

According to our study this double star likely is a common proper motion pair, although a physical nature can not be rejected.

BVD 129

Common high proper motion binary composed of stars with 8.2 and 9.0 magnitudes, separated by 46.5

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arcsecs.

Houk and Smith-Moore (1988) classified the components as F3V and F5-6V stars. We obtained spectral types of F5V and F7V.

According to our study this double star could be a common proper motion or a physical pair.

BVD 81

Common high proper motion binary composed of stars with 5.9 and 10.1 magnitudes, separated by 79.4 arcsecs. See Figure 18.

Hipparcos observed the primary component and obtained a parallax of 10.4 ± 0.9 mas (97 pc). The calculated absolute magnitude is +1.0.

Cannon and Pickering (1918-1924) classified the primary as a K0 star. SIMBAD (Wenger *et al.* 2003) classified it as a K2III star in complete agreement with our result. The absolute magnitude for a K2III is about 0.2, but it is not in agreement with Hipparcos results.

Barbier-Brossat, Petit and Figon (1994) determined a radial velocity of +34.2 km*s^{-1}. Duflot, Figon and Meyssonnier (1995) obtained a value of +33.9 km*s^{-1}.

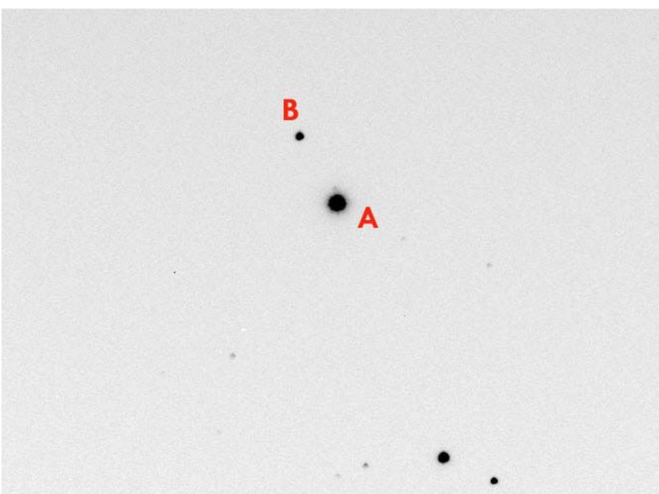

Figure 18: BVD 81 observed in 2009.197 by Benavides using a C11 telescope with CCD Atik in binning 2x2.

Our calculated galactocentric velocity was (U,V,W) = (-84, -21, -17) km*s^{-1}. According to Eggen diagrams (1969a, 1969b) it is an old disc star. In this work, we calculated a fG = 0.32 that corresponds to an old age thin disk star of 3 - 10 Gyr old.

According to our study it is likely a physical pair, but a common origin nature can not be rejected.

BVD 146

Common proper motion binary composed of stars with 8.7 and 10.5 magnitudes, separated by 50.1 arcsecs.

Cannon and Pickering (1918-1924) and Houk and Cowley (1975) classified the primary star as a G5 star.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = -0.38 and a galactocentric velocity (U,V,W) = (-22, -47, -3) km*s^{-1} with an age of about 8.2 +2.3/-1.9 Gyr and a radial velocity of 35.5 ± 1.1 km*s^{-1}. According to Eggen diagrams (1969a, 1969b), it is an old disc star. In this work we calculated a fG = 0.26 that cor-res-ponds to an old age thin disk star of 3 - 10 Gyr old.

According to our study this double star is likely a physical pair but a common origin nature can not be rejected.

BVD 147

Common proper motion binary composed of stars with 9.9 and 11.0 magnitudes, separated by 62.8 arcsecs.

Roeser & Bastian (1988) classified it as an F8 star. Our result was of G1 IV.

According to our study it likely is a common origin pair.

BVD 87

Common high proper motion binary composed of stars with 9.2 and 9.6 magnitudes, separated by 15.2 arcsecs.

Cannon and Pickering (1918-1924) classified the components as G0 stars. Houk (1978) classified them as stars with F7/G2 and F/G spectral types. In this work the components were classified as F7V and G1V stars.

According to our study this double could be a physical or a common origin pair.

BVD 88

Common high proper motion binary composed of stars with 9.9 and 10.9 magnitudes, separated by 48.3 arcsecs.

Cannon and Pickering (1918-1924) classified the primary as a G0 star. Houk and Smith-Moore (1988) classified it as G1V star. In this work the components were classified as G0V and G1V stars. The difference in distance moduli of +0.8 magnitudes is surely caused by an error in our luminosity classes for the primary star and the primary could be a G0V/IV evolved star. But other possibility could be the unresolved binarity for the primary.

According to our study this double star is likely a physical pair but a common origin nature must not be rejected.

HJL 141 = WDS 11153+0204

Common high proper motion binary composed of

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stars with 8.4 and 10.2 magnitudes, separated by 64.2 arcsecs and discovered by Halbwachs (1986).

Hipparcos observed the primary component and obtained a parallax of 4.56 ± 1.02 mas (~219 pc). In this work a photometric distance of 190 pc was calculated.

Houk & Swift (1999) classified the primary as a K0 -1 III star. The Hipparcos absolute magnitude corresponds to a subgiant/giant star of K1 IV/III. Our spectral type was determined using Hipparcos data. Roeser and Bastian (1988) classified the secondary component as a F8 star. Our result was a F7V spectral type.

According to our study this double star could be a physical or a common origin pair.

BVD 148

Common proper motion binary composed of stars with 8.7 and 10.9 magnitudes, separated by 54.0 arcsecs.

Hipparcos observed the primary component and obtained a parallax of 5.06 ± 1.23 mas (189 +63/-39 pc). In this work we obtained a photometric distance of 123.6 pc (assuming the dwarf nature). The absolute magnitude calculated from Hipparcos data (+2.23) is 1.0 magnitude brighter than that calculated in this work. So, the primary component could be an evolved star or an unresolved pair.

Houk (1982) classified the primary as an F5V star in agreement with our result (F4V). The Hipparcos absolute magnitude could correspond to an F4-5 giant star.

According to our study, this double star is likely a common origin pair but a physical nature must not be rejected.

GRV 840 = WDS 11374+2853

Common proper motion binary composed of stars with 11.4 and 12.4 magnitudes, separated by 27 arcsecs. The binary was discovered by the British amateur John Greaves.

WDS catalog lists 6 measures from 1901 (296 degrees and 27.3 arcseconds) to 2006 (296 degrees and 27.0 arcseconds).

Schwassmann and Van Rhijn (1947) classified the components as G3 and G2 stars. In this work the components were classified as G7V and K1V stars.

According to our study this double likely is a physical pair.

GRV 841 = WDS 11424+3934

Common high proper motion binary composed of stars with 10.0 and 10.6 magnitudes, separated by 64.6 arcsecs. The binary was discovered by the British amateur John Greaves.

WDS catalog list 6 measures from 1895 (203 degrees and 64.5 arcseconds) to 2000 (203 degrees and 64.5 arcseconds).

Upgren (1962) classified the primary as a G6III stars. In this work the components were classified as G7V and K3V stars.

According to our study this double star likely is a physical pair. The giant nature of the primary star must be in error, because then the tangential velocity would be of 490 km*s^{-1}, something very improbable.

According to our study this double star is surely a physical or a common origin pair.

The difference in distance moduli is -0.6 magnitud and the secondary could be an unresolved pair.

BVD 96

Tycho-2 lists spectral types G0V and G6V. We obtain spectral types F7V and G6V. The proper motion for the secondary was discovered by Wroblewski and Torres (1997) who include the note "probably companion of Perth 10627". The secondary was cataloged as WT1905.

According to our study this double star is likely a common origin pair, but a physical nature can not be rejected.

BVD 98

The difference in distance moduli of +4.0 magnitude is surely caused by an error in our luminosity classes and the primary likely is a K1 III/IV.

BVD 99

Common proper motion binary composed of stars with 9.5 and 11.7 magnitudes, separated by 25.7 arcsecs.

Houk (1978) classified the primary as an A2V star. We obtained a spectral type A7V.

More astrometric measures are needed to confirm the relative motion for this system and determine its nature.

BVD 149 AB-C

Common high proper motion binary composed of stars with 8.5 and 11.0 magnitudes, separated by 88.5 arcsecs.

Hipparcos observed the primary component and obtained a parallax of 10.35 ± 3.00 mas (97 +39/-22 pc).

The difference of +2.22 in distance moduli must be corrected by the duplicity of the bright component. We estimated that AB is composed of F9V and G1V stars with absolute magnitude of +4.2 and +4.54 and distance moduli of +4.94 and +4.90. The distance modulo of C is +5.43 so the corrected difference in distance moduli is only of about +0.5.

Houk (1978) classified the primary as a F8V star.

The Hipparcos absolute magnitude corresponds to a F6-7V dwarf star.

According to our study this double star could be a physical or a common origin pair.

BVD 101

Common proper motion binary composed of stars with 8.2 and 11.1 magnitudes, separated by 66.5 arcsecs. See Figure 19.

Hipparcos observed the primary component and obtained a parallax which corresponds to a distance of 172 pc. In this work a photometric distance of 135 and 162 pc was obtained.

Cannon and Pickering (1918-1924) classified the primary as an F0 star. LIADA determined a spectral type of A9V. Hill, Barnes *et al.* (1982) calculated a distance of 189 pc and the reddening observed was negligible (E(b-y) = -0.001).

Oja (1985) obtained photometric results of V = 8.16, B-V = +0.27 and U-B = +0.06. Barbier-Brossat, Petit & Figon (1994) calculated a radial velocity of -13.7 ± 3.5 km*s^{-1}.

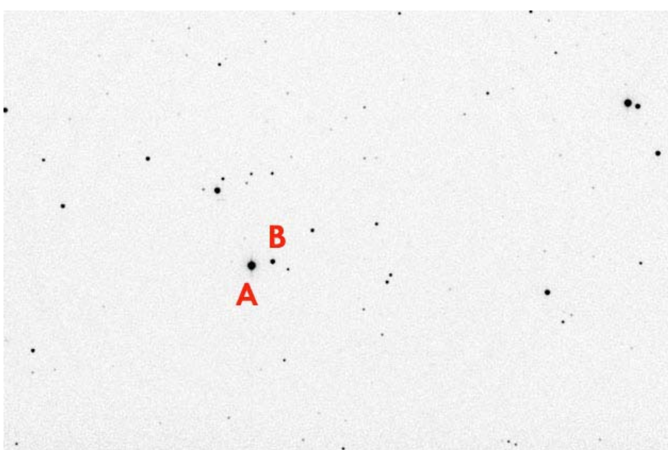

Figure 19: BVD 101. CCD image taken by Julio Castellanos using a S/C LX200 telescope of 0.2 meters. The CCD used was a SBIG ST-7 ME.

Our galactocentric velocity was (U,V,W) = (-15, -21, -11) km*s^{-1}. According to Eggen diagrams (1969a, 1969b) it is a young disc system. A value of 0.14 for fG was obtained in this work corresponding to a young-medium age thin disk system of 3-4 Gyr old.

According to our study this pair could be a physical or a common origin double star.

BVD 102

The difference in distance moduli of +1.8 magnitude surely is caused by an error in our luminosity classes and the primary could be a K2 IV/V star.

BVD 150

Common proper motion binary composed of stars with 10.1 and 11.6 magnitudes separated by 38.1 arcsecs.

Bastian and Roeser (1993) classified the primary as a G5 star. We obtained a spectral type of G5V.

According to our study this double star likely is a physical pair but a common proper motion nature must not be rejected.

BVD 103

More astrometric measures are needed to determine the relative velocity of this system and determine the nature of this pair.

HJL 193 = WDS 13401+6844

Common proper motion binary composed of stars with 9.2 and 9.3 magnitudes, separated by 34.3 arcsecs and discovered by Halbwachs (1986).

WDS catalog list 9 measures from 1896 (111 degrees and 34.7 arcseconds) to 2006 (110 degrees and 34.4 arcseconds).

Roeser & Bastian (1988) classified the components as stars G0 and G5. We obtained spectral types of G3V and G3V.

According to our study this double star could be a common origin pair or a physical pair.

HJL 195 = WDS 13535+0338.

Common proper motion binary composed of stars with 8.6 and 10.1 magnitudes, separated by 36.1 arcsecs and discovered by Halbwachs (1986).

WDS catalog lists 7 measures from 1907 (225 degrees and 36.0 arcseconds) to 2000 (225 degrees and 36.1 arcseconds).

Hipparcos observed the primary component and obtained a parallax of 8.24±1.17 mas (121 +20/-15 pc) in agreement with our photometric distance.

Houk (1999) classified the primary as an F0V star and Roeser & Bastian (1988) classified the secondary as a G0 star. LIADA determined spectral types of F2V and F7V. According to Hipparcos data, the absolute magnitude is consistent with a F4V star.

According to our study, this pair could be a physical or a common origin double star.

BVD 104

Common proper motion binary composed of stars with 10.0 and 12.1 magnitudes, separated by 48.3 arcsecs.

Roeser and Bastian (1988) classified the primary as a F8 star. We obtained a spectral type of G2V.

The difference in distance moduli of +1.3 magnitude surely is caused by an error in our luminosity classes and likely the primary is a G2 IV/V star.

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According to our study this double star is likely a common origin pair, but a physical nature must not be rejected.

BVD 105

Common proper motion binary composed of stars with 10.0 and 10.2 magnitudes, separated by 45.8 arcsecs.

The common proper motion shows that at least this pair is a common origin double star. The difference in distance moduli of +1.8 magnitude is surely caused by an error in our luminosity classes.

Roeser and Bastian (1988) classified them as K0 and F8 stars. LIADA determined spectral types of K2 and G4 if both components are on the dwarf main sequence.

Different environments, which could show similar distance moduli for the components, were studied. Both components would be at similar distances if the primary were a V/IV star. Another possibility could be that both components are subgiants.

BVD 108

Common low proper motion binary composed of stars with 7.7 and 10.1 magnitudes, separated by 46.2 arcsecs.

Hipparcos observed the primary component and obtained a parallax which corresponds to a distance of 750 ± 500 pc and an absolute magnitude of –1.7 ± 1.5. We determined a spectral type of M1III and an absolute magnitude of –0.5.

Houk & Swift (1999) classified the primary as a M0III star.

According to our study this pair could be optical.

BVD 109

Common proper motion binary composed of stars with 8.3 and 9.0 magnitudes, separated by 59.1 arcsecs.

Houk and Smith-Moore (1988) classified the components as F5V and G1V stars. We determined spectral types of F5V and F8V.

According to our study this double star is likely a common origin pair, but a physical nature must not be rejected.

BVD 151

Common high proper motion binary composed of stars with 9.6 and 9.8 magnitudes, separated by 23.3 arcsecs.

Houk and Cowley (1975) classified the primary as a G0 star. We determined spectral types of G3V and G3V.

According to our study this double star surely is a common origin pair, but a physical nature must not be rejected.

GRV 903 = WDS 15211+2534

Common high proper motion binary composed of stars with 9.0 and 11.0 magnitudes, separated by 66.6 arcsecs. The binary was discovered by the British amateur John Greaves.

WDS catalog lists 6 measures from 1900 (244 degrees and 69.3 arcseconds) to 2000 (243 degrees and 69.0 arcseconds).

Hipparcos observed both components and obtained parallaxes which correspond to distances of 40 ± 2 and 45 ± 5 pc. The calculated absolute magnitudes using Hipparcos trigonometric parallaxes and apparent magnitudes correspond to spectral types of K0.5V and K6V.

Jenkins (1963) classified the primary as a K0V star while the secondary was classified as a K7 star (Stephenson 1986). LIADA determined spectral types of K2V and K8V.

Hypothetical parallax (Russell 1928) corresponds to a distance of 39 pc in good agreement with Hipparcos data.

Upgren and Caruso (1988) determined radial velocities of –32.5 and –36.1 km*s^{-1} and a galactocentric velocity (U,V,W) = (-5, -41, -22) km*s^{-1}. According to Eggen diagrams (1969a, 1969b) they are old disc stars.

This pair is surely a physical double star.

BVD 118

Common proper motion binary composed of stars with 10.4 and 10.6 magnitudes, separated by 21.9 arcsecs.

Roeser & Bastian (1988) classified the primary as a K0 star. We determined spectral types of K2V and K2V.

According to our study this double surely is a physical pair but a common origin nature must not be rejected.

BVD 119 AB-C

Common proper motion binary composed of stars with 9.2 and 11.6 magnitudes, separated by 27.0 arcsecs.

AB components are listed in WDS catalog as WDS 16556-5434 = RST3056. It has 2 measures performed in 1934 (66 degrees and 2.1 arcseconds) to 1966 (69 degrees and 2.1 arcseconds).

Houk & Cowley (1975) classified the primary as a F3V star. We determined spectral types of F7 and G9V.

According to our study this double star surely is a common origin pair, but a physical nature can not be rejected. More astrometric data are needed to confirm

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the relative motion of this system.

GRV 959 = WDS 17302+2901

Common high proper motion binary composed of stars with 10.2 and 10.8 magnitudes, separated by 24.3 arcsecs. The binary was discovered by the British amateur John Greaves.

WDS catalog list 7 measures from 1901 (356 degrees and 24.0 arcseconds) to 2000 (356 degrees and 24.3 arcseconds).

The differential distance moduli is significant and could be caused by the evolved nature of same component.

According to our study this pair is surely a common proper motion pair.

BVD 121

Common high proper motion binary composed of stars with 9.1 and 10.0 magnitudes, separated by 39.6 arcsecs.

Hipparcos observed the primary component and obtained a parallax of 8.68 ± 1.35 mas., which corresponds to a distance of 115 +21/-15 pc and an absolute magnitude which corresponds to a F7V star.

Houk & Cowley (1975) classified the primary as a F6-7V star. We determined spectral types of F6V and F7V.

According to our study this pair could be an optical pair.

BVD 122

The difference in distance moduli is +1.1 magnitude. Primary could be an evolved star or an unresolved pair.

According to our study this double could be a common origin or a physical pair.

BVD 124

The difference in distance moduli is +0.9 magnitude. Primary could be an evolved star or an unresolved pair.

According to our study this double star surely is a common origin pair but a physical nature must not be rejected.

BVD 125

Common high proper motion binary composed of stars with 8.2 and 9.9 magnitudes, separated by 48.3 arcsecs.

Hipparcos observed the primary component and obtained a parallax of 9.35 ± 0.89 mas (107 +11/-9 pc).

Cannon and Pickering (1918-1924) classified the primary as a F8 star. We determined spectral types of F6V and G7V. From Hipparcos data, the absolute magnitude for the primary (+3.1) suggest that maybe it is an evolved star or an unresolved double star.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = -0.08, a radial velocity of 22.2 ± 0.3 km*s^{-1} and a galactocentric velocity (U,V,W) = (+62, -22, +9) km*s^{-1}. According to Eggen diagrams (1969a, 1969b) it is an old disc star. In this work we calculated a fG = 0.24 that corresponds to an old age thin disk star of 3-10 Gyr old.

According to our study it is a common origin pair.

BVD 152

Common proper motion binary composed of stars with 9.2 and 11.3 magnitudes, separated by 50.5 arcsecs. See Figure 20.

Hipparcos observed the primary component and obtained a parallax of 10.00 ± 1.48 mas (100 +17/-13 pc). We obtained a photometric distance of 130 pc.

Houk (1982) classified the primary as a F6/7V star. We determined spectral types of F6V and G9V. From Hipparcos data the absolute magnitude for the primary (+4.15) suggest that maybe it is a cooler star.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] = -0.26, a radial velocity of -8.4 ± 0.2 km*s^{-1}., a distance of 142 pc and a galactocentric velocity (U,V,W) = (-13, -44, +9) km*s^{-1}. According to Eggen diagrams (1969a, 1969b) it is an old disc star. In this work we calculated a fG = 0.24 corresponding to an old age thin disk star of 3-10 Gyr old. Nordstrom et al. (2004) determined an age of 3.5 +2.2/-0.8 Gyr.

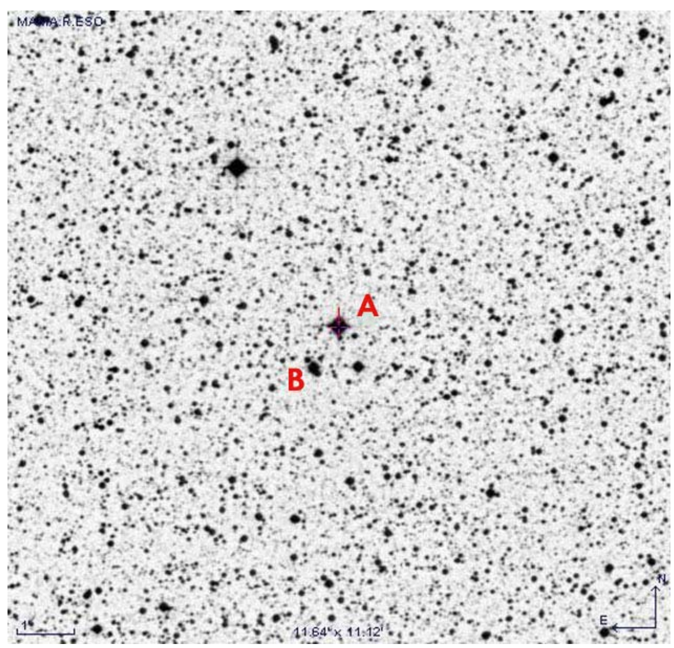

Figure 20: DSS image of binary BVD 152.

According to our study this double star could be a

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common origin pair but a physical nature can not be rejected.

BVD 127

Common high proper motion binary composed of stars with 9.6 and 11.4 magnitudes, separated by 20.0 arcsecs.

Roeser and Bastian (1988) classified the primary as an F8 star. We determined a spectral type of F6 and G8V.

According to our study this double star is surely a common origin pair but a physical nature can not be rejected.

SRT 1 = WDS 18501-1317

A is HD 174226 with G5V spectral type (Houk and Swift 1999) in excellent agreement with our result. According to our study it is a physical pair.

WDS catalog lists 10 measures from 1906 (251 degrees and 29.0 arcseconds) to 1998 (251 degrees and 28.9 arcseconds).

BVD 130

Common proper motion binary composed of stars with 10.3 and 10.9 magnitudes, separated by 30.1 arcsecs.

Roeser and Bastian (1988) classified the primary as a G0 star. We determined spectral types of G0V and G6V.

According to our study this double star is surely a common origin pair but a physical nature can not be rejected.

ARY 48 = WDS20378+3224

Common high proper motion binary composed of stars with 8.2 and 8.7 magnitudes, separated by 53.1 arcsecs. and discovered by Argyle.

WDS catalog list 11 measures from 1893 (42 degrees and 53.3 arcseconds) to 2004 (41 degrees and 53.1 arcseconds).

Roeser & Bastian (1988) classified the primary as a G0/2V star. We determined a spectral types of F9V and G6V.

According to our study this double star is surely a physical pair.

BVD 132 AB-C

Common high proper motion binary composed of stars with 9.1 and 10.0 magnitudes, separated by 70.7 arcsecs.

AB components are listed in WDS catalog as WDS 03408+7946 = TDT2624. It has been measured only in its discovery in 1991 (51 degrees and 0.5 arcseconds) and it is composed by stars of 11.52 and 11.61 magnitudes.

Houk and Cowley (1975) classified the components as F8 and G0 stars. We determined spectral types of F6V and F9V.

According to our study this double star could be a common origin pair but a physical nature can not be rejected. More astrometric measures are needed to confirm the relative motion of the secondary.

BVD 133

Common proper motion binary composed of stars with 10.4 and 10.5 magnitudes, separated by 21.2 arcsecs.

The differential distance moduli of –0.72 magnitudes could be caused by the duplicity of B.

According to our study this double could be a common origin pair but a physical nature can not be rejected. More astrometric measures is needed to confirm the relative motion of the secondary.

BVD 153

Common proper motion binary composed of stars with 10.3 and 11.2 magnitudes, separated by 44.0 arcsecs.

Cannon and Pickering (1918-1924) classified the primary as an F5 star and Houk (1978) as an F3/5 (IV). We determined spectral types of F5V and F6V.

The difference in distance modulus of the components is 0.7 magnitude. The primary star could be a V-IV star or maybe an unresolved double star.

According to our study this double star could be a physical or a common origin pair.

BVD 134

Common proper motion binary composed of stars with 10.4 and 11.2 magnitudes, separated by 22.8 arcsecs.

We determined spectral types of K3 IV/V and F6V. The spectral type for the primary was determined in order to obtain the same photometric distance that the secondary component.

According to our study this double could be a common origin pair but a physical nature must not be rejected.

BVD 135

Common proper motion binary composed of stars with 7.9 and 9.4 magnitudes, separated by 24.8 arcsecs. See Figure 21.

Hipparcos observed the primary component and obtained a parallax of 13.31 ± 0.67 mas (75 ± 4 pc). In this work we determined a photometric distance of 92 pc.

Roeser and Bastian (1988) classified the components as F0V and G5 stars. In this work we determined spectral types of F3V and F9V. The Hipparcos

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absolute magnitude for the primary corresponds to a F5/6V star.

Nordstrom et al. (2004) determined a metallicities [Fe/H] of -0.24 and –0.32 and ages of 2.3 +1.5/-0.9 and 9 Gyr for both components. For the primary he determined a galactocentric velocity (U,V,W) = (10, 1, -15) km*s^{-1} and a radial velocity of –5.2 ± 9.5 km*s^{-1}.

According to Eggen diagrams (1969a, 1969b), it is surely a young disc star. In this work we calculated a fG = 0.10 that corresponds to a young-medium age thin disk star of 3-4 Gyr old.

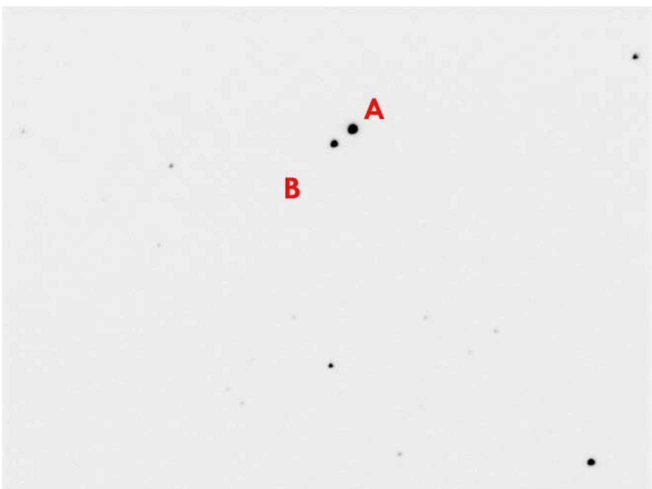

Figure 21: BVD 135 observed in 2009.255 by Benavides using a C11 telescope with CCD Atik in binning 2x2.

According to our study this double star could be a common origin pair but a physical nature must not be rejected.

BVD 137

Common proper motion binary composed of stars with 7.6 and 9.8 magnitudes, separated by 40.2 arcsecs. This system has a very high proper motion: μ (α) = +201 arcsec*yr^{-1} and μ(δ) = -64 arcsec*yr^{-1} for the primary component.

Hipparcos observed the primary component and obtained a parallax of 21.19 ± 0.95 mas (45.6 +3.8/-0.4 pc). In this work we determined a photometric distance of 36 pc.

Jaschek, Conde and de Sierra (1964) classified the primary as a G2V star and Houk (1982) as a G2/3V star. In this work we determined spectral types of G3V and K1V. The Hipparcos absolute magnitude for the primary is 4.3 (about 0.5 magnitudes brighter than a G2/3V star). Our differential distance moduli of +0.76 magnitudes could be caused by the double star nature or by a slightly evolved nature of the primary.

Barbier-Brossat & Figon (2000) determined a radial velocity of –26.6 ± 1.2 km*s^{-1}.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] of +0.02 and a age of 9.2 +3.0/-3.4 Gyr for the primary. The galactocentric velocity (U,V,W) has a value of (-49, -24, -11) km*s^{-1} and a radial velocity of –29.6 ± 0.1 km*s^{-1}.

According to Eggen diagrams (1969a, 1969b) it is surely an old/young disc star. In this work we calculated a fG = 0.22 that corresponds to an old age thin disk star of 3-10 Gyr old.

According to our study this double star could be a common origin pair but a physical nature can not be rejected.

BVD 139 AB-C

Common high proper motion binary composed of stars with 8.4 and 10.9 magnitudes, separated by 128.0 arcsecs. This system has a very high proper motion: μ (α) = +135 arcsec*yr^{-1} and μ(δ) = +36 arcsec*yr^{-1} for the primary component. See Figure 22.

AB components are listed in WDS catalog as WDS 21397-1237 = RST4090. It has 3 measures from 1938 (326 degrees and 1.2 arcseconds) to 1950 (325 degrees and 1.3 arcseconds).

Hipparcos observed the primary component and obtained a parallax of 15.21 ± 1.28 mas (66 +6/-5 pc). In this work we determined a photometric distance of 50 pc.

Houk and Smith-Moore (1988) classified the primary as a G2V star. In this work we determined spectral types of G4V and G8V. The Hipparcos absolute magnitude for the primary is 4.39 (corresponding to a G0V star). Our differential distance moduli is of +1.8 magni-tudes.

Nordstrom *et al.* (2004) determined a metallicity [Fe/H] of -0.25 and an age of 11.7 +2.9/-3.1 Gyr for the primary. The galactocentric velocity (U,V,W) has a value of (-69, -24, +17) km/s^{-1} and a radial velocity of –60.9 ± 0.3 km*s^{-1}.

According to Eggen diagrams (1969a, 1969b), it is surely an old disc star. In this work we calculated a fG = 0.28 that corresponds to an old age thin disk stars of 3-10 Gyr old.

According to our study this double star could be a common origin pair but a physical nature must not be rejected.

BVD 155

Common high proper motion binary composed of stars with 9.6 and 10.2 magnitudes, separated by 47.5 arcsecs. This system has a very high proper motion: μ

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(α) = +70 arcsec*yr^{-1} and $\mu(\delta)$ = -140 arcsec*yr^{-1} for the primary component.

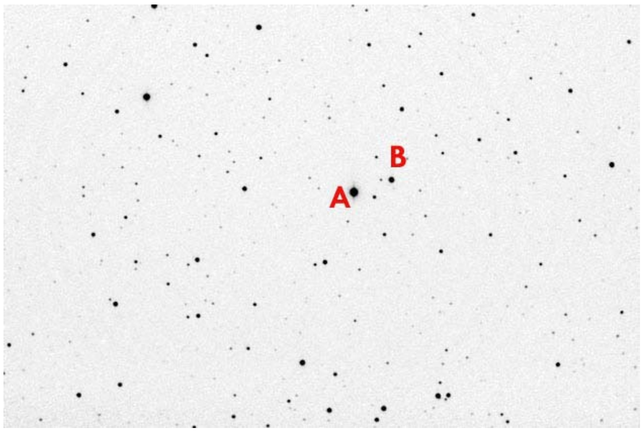

Figure 22: Binary BVD 139. CCD image taken by J. Castellanos using a S/C LX200 telescope of 0.2 meters. The CCD used was a SBIG ST-7 ME.

Houk and Smith-Moore (1988) classified the components as G3V and G6V stars. In this work we determined spectral types of G0V and G4V.

According to our study this double star could be a common origin or a physical nature pair.

BVD 141

Common high proper motion binary composed of stars with 9.3 and 10.6 magnitudes separated by 11.6 arcsecs. This system has a very high proper motion: $\mu(\alpha)$= +117 arcsec*yr^{-1} and $\mu(\delta)$=- +44 arcsec*yr^{-1} for the primary component.

Houk (1978) classified the primary as a G0-2 IV star. In this work we determined spectral types of G0V and G9V.

According to our study, this double star could be a common origin pair but a physical nature must not be rejected. More astrometric measures are needed to confirm the relative motion of this system.

BVD 156

Common proper motion binary composed of stars with 9.9 and 11.4 magnitudes, separated by 18.3 arcsecs.

Cannon and Pickering (1918-1924) classified the primary as an F8 star while Houk (1978) classified it as a G0/1V star. In this work we determined spectral types of F8V and G6V.

According to our study, this double star could be a common origin or a physical nature pair.

BVD 142 AB-C

Common high proper motion binary composed of stars with 7.7 and 10.2 magnitudes separated by 79.6 arcsecs. This is a system with a very high proper motion: $\mu(\alpha)$= -98 arcsec*yr^{-1} and $\mu(\delta)$= -84 arcsec*yr^{-1} for the primary component.

AB components are listed in WDS catalog as WDS 23105+4118 = TDT3916. It has been measured in its discovery in 1991 (89 degrees and 0.6 arcseconds) with magnitudes 10.69 and 11.41.

Hipparcos observed the primary component and obtained a parallax of 14.26 ± 0.93 mas (70 +5/-4 pc). In this work we determined a photometric distance of 73 pc in excellent agreement with Hipparcos data.

Cannon and Pickering (1918-1924) classified the primary as a F5 star in excellent agreement with our result.

Nordstrom et al. (2004) determined a metallicity [Fe/H] of -0.33 and an age of 3.4 +0.7/-0.6 Gyr for the primary. The galactocentric velocity (U,V,W) has a value of (41, 4, -11) km*s^{-1} and a radial velocity of –1.9 ± 0.3 km*s^{-1}.

According to Eggen diagrams (1969a, 1969b) it is surely an old disc star. In this work we calculated a fG = 0.15 that corresponds to a young-medium age thin disk star of 3-4 Gyr old in good agreement with results of Nordstron.

According to our study this double star is surely a physical pair.

BVD 158

Common proper motion binary composed of stars with 9.1 and 10.1 magnitudes, separated by 37.9 arcsecs.

Hipparcos observed the primary component and obtained a parallax of 10.25 ± 1.42 mas (98 +15/-12 pc). In this work we determined a photometric distance of 68 and 75 pc.

Cannon and Pickering (1918-1924) classified the primary as a G5 star while Houk (1978) determined a G2V spectral type. In this work we obtained spectral types of G4V and G9V.

Nordstrom et al. (2004) determined a metallicity [Fe/H] of +0.02 and an age of 10.7 +3.4/-3.1 Gyr for the primary. The galactocentric velocity (U,V,W) has a value of (10, -31, 8) km*s^{-1} and a radial velocity of +4.3 ± 0.2 km*s^{-1}.

According to Eggen diagrams (1969a, 1969b), it is an old disc star. In this work we calculated a fG = 0.17 corresponding to a young-medium age thin disk star of 3-4 Gyr old in good agreement with result of Nordstron.

According to our study, this double star surely is a

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physical pair.

BVD 143

Common proper motion binary composed of stars with 9.9 and 10.6 magnitudes, separated by 47.9 arcsecs.

The differential distance moduli of –0.62 magnitudes could be caused by a duplicity of B.

According to our study this double star could be a common origin pair but a physical nature can not be rejected. More astrometric measures are needed to confirm the relative motion of the secondary.

12. Conclusions

In this work we reported on the study of 173 double stars (most of then binaries). About 149 are new wide common proper motion stellar systems first published in this work and discovered by Rafael Benavides.

Photometric, kinematical and spectroscopic data were obtained from astronomical literature. These data were analysed to determine other astrophysical properties (absolute magnitudes, spectral types and luminosity classes, galactocentric velocities, etc). Several tests and criteria were used to determine the nature of each double star classifying them as physical, common origin or optical pairs. Orbital periods and the semimajor axes were estimated.

1,538 astrometric measurements were made using CCDs and astrometric catalogs. The internal errors for the CCDs measures have a median of 0.06 degrees (0.040 arcseconds) in θ and 0.040 arcsecond in ρ.

In the study of the nature of the pairs we calculated that 57 % are common origin pairs and 36 % are physical pairs. Only 3 % are optical pairs.

We studied some distributions of data. The mean magnitudes for the components are 10.09 and 10.90 magnitudes. The median differential magnitude are 0.73. Many stellar components have proper motion that ranges from 25 to 75 mas/yr although the most rapid star has a proper motion of 306.2 mas/yr. Many binaries have relative orbital motion witch range from 1.25 to 3.75 mas/yr.

Some of the binaries are triple systems and there is one suspected trapezium system.

Acknowledgements

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The Guide Star Catalog-I was produced at the Space Telescope Science Institute under a U.S. Government grant. These data are based on photographic data obtained using the Oschin Schmidt Telescope on Palomar Mountain and the UK Schmidt Telescope. The Guide Star Catalogue-II is a joint project of the Space Telescope Science Institute and the Osservatorio Astronomico di Torino. Space Telescope Science Institute and is operated by the Association of Universities for Research in Astronomy, for the National Aeronautics and Space Administration under contract NAS5-26555. The participation of the *Osservatorio Astronomico di Torino* is supported by the Italian Council for Research in Astronomy. Additional support is provided by European Southern Observatory, Space Telescope European Coordinating Facility,

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The Digitized Sky Survey was produced at the Space Telescope Science Institute under U.S. Government grant NAG W-2166. The images of these surveys are based on photographic data obtained using the Oschin Schmidt Telescope on Palomar Mountain and the UK Schmidt Telescope. The plates were processed into the present compressed digital form with the permission of these institutions.

This publication has made use of the Washington

(Continued on page 86)

Table 2: Visual Double Stars Studied in This Work.

Double	AR_2000	DEC_2000	ΔV	V_A	V_B	SP_A	SP_B	Δ(V-Mv)	E(a) [A.U.]	P [yr]	Type
BVD 30 AB-C	00 02 51	-74 35 52	0.74	10.58	11.32	G9V	G9V	0.64	4,897	268,593	PHY/CO
BVD 46	00 08 01	-31 38 42	0.72	10.84	11.56	F6V	F6V	0.90	9,036	519,818	CO/PHY
BVD 11	00 09 35	+53 24 56	1.07	11.55	12.62	G0V	G5V	-0.59	4,998	246,226	CO?
BVD 63	00 11 25	-40 48 39	0.12	10.54	10.66	G5V	G7V	-0.20	10,569	805,862	CO/PHY
HJL 1	00 11 55	+66 21 10	0.91	10.05	10.96	F1V	F4V	-0.03	7,401	407,184	CO/PHY

Table 2 continues on next page.

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Table 2 (continued): Visual Double Stars Studied in This Work.

Double	AR_2000	DEC_2000	ΔV	V_A	V_B	SP_A	SP_B	Δ(V-Mv)	E(a) [A.U.]	P [yr]	Type
LDS 5	00 13 39	-28 18 03	0.23	10.97	11.20	K2V	K5V	-0.61	3,946	218,867	CO/PHY
BVD 12	00 30 38	-18 37 15	3.50	7.55	11.05	F6IV-III	K0V	1.20	18,922	1,374,629	CO
BVD 13	00 36 49	-38 48 26	0.18	10.78	10.96	F5V	G0V	-0.82	7,313	391,298	PHY=CO
BVD 66	00 50 16	-02 27 00	0.88	10.06	10.94	F6V	G6V	-0.69	8,104	483,305	PHY/CO
BVD 14	00 52 46	+27 13 32	0.49	10.50	10.99	F6V	K3V	-2.65			¿?
BVD 15	01 20 21	+09 36 44	1.83	9.62	11.45	F6V	K1V	0.47	9,035	592,462	CO/PHY
BVD 16	01 23 40	-41 48 14	1.31	10.06	11.37	F7V	K0V	-0.15	4,361	199,470	CO/PHY
BVD 17	01 30 06	-40 24 08	0.06	11.95	12.01	G6V	G6V	-0.08	5,990	343,749	CO/PHY
BVD 18	01 32 19	+45 59 27	0.36	10.25	10.61	G8V	G7V	0.52	10,540	825,279	PHY=CO
BVD 19	01 34 04	+82 25 38	0.35	11.23	11.58	G6V	G1V	1.03	4,338	202,613	CO=PHY
HJL 20	01 35 02	+60 46 45	0.52	8.56	9.08	F6V	F6V	0.52	6,268	300,320	PHY=CO
BVD 21	01 56 47	+23 03 04	3.01	7.86	10.87	G6V	K7V	0.29	2,632	107,726	PHY?
BVD 22	02 05 16	+23 52 16	0.37	11.56	11.93	G6V	G7V	0.16	11,413	912,803	CO
BVD 23	02 05 38	+00 31 10	0.95	10.77	11.72	F8V	G7V	-0.31	8,382	528,264	CO?
BVD 24	02 19 52	-31 54 05	0.09	11.13	11.22	G4V	G3V	0.23	26,002	2,977,986	CO
BVD 25	02 33 03	-77 37 44	0.20	9.13	9.33	F5V	F5V	0.20	7,568	388,364	CO/PHY
BVD 65	02 43 23	-42 32 02	1.34	10.52	11.86	G6V	K3V	0.06	4,590	248,605	PHY=CO
BVD 26	02 44 34	+79 11 56	0.88	8.71	9.59	A6V	F4V	-0.24	12,159	711,481	¿?
BVD 27	02 50 27	+29 58 21	0.49	11.48	11.97	G4V	K1V	-0.78	5,734	331,909	CO?
BVD 28	02 53 28	-03 29 39	0.48	9.83	10.31	K4V	K5V	0.20	5,140	334,349	PHY=CO
BVD 29	02 59 15	-05 15 42	0.46	10.64	11.10	K1IV	F6V	3.04	20,967	1,763,138	CO
BVD 71	03 07 31	-74 30 27	1.49	9.02	10.51	G5V	K4V		4,259	222,364	PHY/CO
POP 223	03 11 24	+44 29 57	1.20	9.79	10.99	F0V	F5V	0.40	5,716	240,776	CO/PHY
BVD 31	03 17 06	+67 05 27	1.59	7.99	9.58	A8V	K2V	-2.51			OPT
BVD 32	03 17 43	+58 46 58	3.19	8.14	11.33	F6V	K6V	-0.23	7,741	491,733	CO/PHY
BVD 33	03 18 24	-27 34 12	0.88	10.27	11.15	F5V	F6V	0.68	8,675	482,634	CO/PHY
BVD 34	03 20 07	+36 10 51	1.55	9.53	11.08	G8III	F2III:	0.27	10,497	403,609	¿?
BVD 35	03 22 03	-33 49 07	0.15	11.42	11.57	G4V	G2V	0.36	5,091	255,810	CO/PHY
BVD 36	03 35 28	+42 18 03	0.33	9.93	10.26	G3V	G2V	0.47	5,778	306,765	PHY/CO
BVD 37	03 44 43	+49 39 38	0.16	11.30	11.46	G0V	G4V	-0.55	3,100	119,325	CO/PHY
FEL 1	03 44 47	-70 01 35	0.16	7.41	7.57	F9V	F8V	0.36	4,561	198,486	PHY?
BVD 39	03 48 56	-28 06 34	0.60	11.33	11.93	G8V	K1V	-0.10	9,601	748,415	CO/PHY
HJL 54	03 59 43	+82 15 28	0.50	9.72	10.22	F6V	F8V	0.10	5,194	232,137	PHY=CO
BVD 40AB-C	04 00 04	-29 02 17	0.02	10.38	10.40	K6V	K5V	0.36	550	12,056	PHY
BVD 41	04 07 02	-11 46 10	1.55	10.51	12.06	G1V	G7V	0.46	4,067	185,479	CO/PHY
BVD 42	04 07 51	+02 16 00	1.03	10.64	11.67	G4V	K2V	-0.23	7,971	551,477	PHY=CO
BVD 43	04 08 21	-48 12 39	2.41	9.19	11.60	K2 IV-III	G0V	-0.54	10,821	632,510	CO?
BVD 44	04 10 04	-67 19 34	0.65	8.83	9.48	F9V	G2V	0.17	2,928	106,445	PHY?

Table 2 continues on next page.

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Table 2 (continued): Visual Double Stars Studied in This Work.

Double	AR_2000	DEC_2000	ΔV	V_A	V_B	SP_A	SP_B	Δ(V-Mv)	E(a) [A.U.]	P [yr]	Type
SRT 2	04 11 36	-20 21 24	1.84	5.81	7.65	A4III:	A9V	1.11	7,960	325,985	CO/PHY
BVD 45	04 18 01	-00 30 36	0.28	11.23	11.51	K2V:	F9V:	2.94	9,553	684,039	CO?
HJL 2	04 25 40	+63 40 29	1.56	8.31	9.87	G7V	K2V	0.52	11,610	999,691	CO?
BVD 144	04 26 27	+78 47 26	0.94	10.92	11.86	F9V	G8V	-0.41	3,342	136,059	CO/PHY
BVD 72	04 39 48	-10 09 34	1.40	9.92	11.32	K0V	K3V	0.46	2,231	87,771	PHY/CO
BVD 47	04 45 25	+29 55 28	0.33	11.34	11.67	G7V	K2V	-0.75	13,363	1,236,602	CO?
BVD 38	04 46 36	-29 31 16	0.61	11.24	11.85	K4V	K8V	-0.26	1,381	45,297	PHY=CO
BVD 48AB	04 51 54	-34 14 19	1.91	6.70	8.61	F6III:	F7V	1.91	7,061	252,984	PHY?
BVD 48AC	04 51 54	-34 14 19	2.16	6.70	8.86	F6III:	G4V	1.00	11,343	531,101	CO?
BVD 49	04 56 26	-38 39 05	1.36	9.69	11.05	F8V	G8V	-0.22	7,969	493,375	CO/PHY
BVD 50	05 09 13	+11 29 43	0.15	8.31	8.46	F3V	F3V	0.15	4,394	164,425	PHY=CO
BVD 51	05 15 24	-03 21 58	1.79	7.70	9.49	F7V	G1V	1.05	4,537	198,054	CO/PHY
BVD 52	05 18 09	-16 11 14	1.35	7.62	8.97	G/K IV	G3V	-0.05	7,856	431,161	PHY=CO
BVD 53	05 20 45	-23 08 33	0.73	10.55	11.28	F6V	F9V	0.53	6,093	298,534	PHY/CO
BVD 89	05 27 04	-65 33 26	1.13	11.00	12.13	G2V	K1V	-0.63	4,580	232,402	PHY=CO
BVD 20AC	05 28 28	-39 22 16	1.56	9.22	10.78	K2V	K7V	0.04	3,296	162,705	PHY?
BVD 54	05 28 35	-50 53 48	0.43	12.21	12.64	F8V	G1V	-0.14	14,838	1,187,901	CO
BVD 55	05 45 00	-30 30 24	1.31	9.40	10.71	F5V	F5V	1.31			OPT?
BVD 56	05 45 56	-15 47 38	2.58	9.05	11.63	F9V	K4V	-0.09	8,294	563,638	CO?
BVD 57AB-C	05 53 36	-56 40 13	1.91	8.40	10.31	G4V	K2V	0.41	3,406	154,074	PHY=CO
BVD 58	06 00 20	+78 33 46	0.64	11.41	12.05	G4V	K1V	-0.16	3,765	176,631	PHY=CO
BVD 91	06 03 13	-37 57 46	1.47	9.15	10.62	F6V	G8V	-0.51	6,596	360,438	CO/PHY
BVD 93	06 14 35	-33 37 14	1.47	10.48	11.95	G7V	K5V	-0.04	2,608	109,981	PHY=CO
BVD 59	06 24 26	-64 29 57	0.01	11.36	11.37	G6V	F6V	1.49	6,872	377,825	MPC
BVD 60	06 35 31	+32 41 50	1.91	10.32	12.23	K3V	G1V	5.0			OPT
BGH 22	06 38 34	-09 45 41	0.35	9.44	9.79	K0V	K2V	-0.21	2,455	100,105	PHY?
BVD 112	06 39 36	-43 21 48	1.10	9.00	10.10	F4V	F9V	0.14	3,773	141,732	CO/PHY
BVD 61	06 52 27	+59 39 08	1.67	9.43	11.10	G0V	K2V	-0.39	5,346	290,782	PHY=CO
BVD 120	06 58 28	-20 05 52	0.66	9.16	9.82	F6V	F6V	0.66	13,761	976,986	CO/PHY
BVD 62	06 59 40	+55 08 25	0.15	11.23	11.38	G4V	G7V	-0.13	6,406	376,964	CO?
ARN 94	07 06 04	+52 59 16	0.41	10.51	10.92	F6V	G1V	-0.53	4,523	194,509	PHY/CO
BVD 129	07 07 17	-11 26 13	0.35	10.24	10.59	G7V	G9V	0.03	8,237	575,110	PHY=CO
BVD 64	07 09 46	-13 59 37	0.93	10.58	11.51	K0V	K7V	-0.81	13,030	1,236,229	CO?
XMI 63	07 31 41	-13 00 09	0.21	10.30	10.51	F9V	G0V	0.01	3,988	166,445	PHY/CO
GRV 737	07 32 49	+17 57 55	1.09	9.57	10.66	G3 IV	F9 V	-0.10	6,030	284,986	CO?
BVD 67	07 43 41	-81 42 09	0.32	10.09	10.41	G5V	G5V	0.32	4,584	226,027	PHY/CO
BVD 68	07 48 07	+50 13 02	0.05	11.20	11.25	G9V	G9V	0.05	4,894	268,286	PHY/CO
BVD 69	07 57 09	-13 23 40	0.72	8.87	9.59	F4V	F5V	0.56	3,927	143,551	PHY=CO

Table 2 continues on next page.

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Table 2 (continued): Visual Double Stars Studied in This Work.

Double	AR_2000	DEC_2000	ΔV	V_A	V_B	SP_A	SP_B	Δ(V-Mv)	E(a) [A.U.]	P [yr]	Type
BVD 70	08 08 20	-38 55 42	1.01	10.34	11.35	F5V	G0V	0.08	9,088	542,102	CO/PHY
LEP 30	08 15 33	+11 25 51	2.04	7.71	9.75	G6V	K3V	0.56	1,388	41,364	PHY?
BVD 161AC	08 21 21	+34 18 36	3.18	8.52	11.70	G6V	M0V	0.12	3,977	205,379	CO?
BVD 73	08 53 18	+28 11 06	1.08	10.63	11.71	G7V	G0V	1.84	6,841	400,849	CO/PHY
BVD 74	09 12 33	-56 31 50	0.83	10.83	11.66	F7V	F8V	0.61			¿?
BVD 75	09 15 50	-31 22 38	0.43	11.81	12.24	K3V	G0V	2.40	8,604	599,424	CO?
BVD 76	09 21 23	-36 45 38	0.87	9.63	10.5	F6V	F9V	0.27	9,012	536,981	CO/PHY
BVD 145	09 21 32	-17 45 27	0.81	8.16	8.97	F5V	F7V	0.41	5,852	270,566	PHY=CO
BVD 77	09 31 25	-00 12 11	1.03	10.52	11.55	F7V	G0V	0.33	12,488	897,627	CO/PHY
BVD 78	09 35 16	+34 57 43	0.66	10.88	11.54	G1V	G6V	-0.54	9,128	618,404	CO?
BVD 79	10 06 05	-35 00 47	1.65	10.45	12.10	K0 IV	G2V	0.00	11,365	745,359	CO/PHY
BVD 80	10 07 07	+56 13 00	0.75	11.47	12.22	F6V	G1V	-0.14	11,516	790,284	CO
BVD 81	10 16 42	+25 22 14	4.17	5.84	10.01	K2III	G6V	-0.87	11,402	659,486	PHY/CO
BVD 82	10 34 01	-13 54 14	0.70	10.69	11.39	G6V	K4V	-0.53	2,502	101,151	CO/PHY
BVD 83	10 34 10	-51 03 11	0.95	11.01	11.96	F3V	F9V	-0.12	7,419	385,968	CO?
BVD 84	10 39 51	-66 02 44	1.65	10.22	11.87	K1III	F4V	-1.22	19,011	1,327,056	CO/OPT
BVD 146	10 42 54	-71 44 52	1.78	8.73	10.51	G1V	G9V	0.58	5,182	271,053	PHY/CO
BVD 147	10 49 07	-00 57 40	1.01	9.94	10.95	G1 IV:	F7V	---	20,560	1,794,148	CO/PHY
BVD 85	10 52 14	-45 10 55	0.28	10.33	10.61	G0V	G4V	-0.28	8,034	497,900	CO/PHY
BVD 86	10 52 50	+78 38 43	1.19	11.13	12.32	G6V	K1V	0.12	4,227	214,303	CO
BVD 87	10 53 20	-43 16 01	0.51	9.20	9.71	F7V	G1V	-0.23	2,151	64,685	PHY=CO
BVD 88	11 06 34	-25 13 51	0.75	9.98	10.73	G0V	G1V	0.61	9,453	620,081	PHY/CO
GRV 829	11 09 15	+00 44 22	0.14	12.04	12.18	G9V	G8V	0.30	7,114	466,043	CO/PHY
HJL 141	11 15 18	+02 03 48	1.89	8.33	10.22	K1 IV-III	F7V	-0.28	16,510	1,167,844	CO=PHY
BVD 148	11 26 26	-27 35 06	2.21	8.71	10.92	F4V	G8V	-0.13	8,216	486,331	CO/PHY
BVD 90	11 30 44	-21 26 09	0.75	9.87	10.62	F6V	F2V	1.43			OPT
GRV 840	11 37 25	+28 53 14	0.98	11.43	12.41	G7V	K1V	0.10	5,328	306,295	PHY/CO
BVD 92	11 38 43	+32 37 33	0.12	9.89	10.01	F6V	F6V	0.12	26,566	2,620,602	CO/PHY
GRV 841	11 42 26	+39 34 52	0.63	10.00	10.63	G7V	K3V	-0.69	5,917	367,812	PHY?
BVD 94	11 44 17	-59 54 43	0.55	10.35	10.9	G1V	G4V	0.13	4,882	237,944	PHY/CO
BVD 95	11 47 23	+54 58 00	1.92	9.82	11.74	F7V	G9V	0.46	6,227	337,953	CO/PHY
BVD 96	11 53 06	-27 18 29	1.01	8.83	9.84	F7V	G6V	-0.45	15,727	1,327,118	CO/PHY
BVD 97	11 54 25	-20 45 46	1.15	10.37	11.52	G5V	G8V	0.99	5,370	294,427	OPT
BVD 98	12 11 42	-49 57 26	1.74	10.15	11.89	K1V	F9V	3.93	5,922	329,848	CO?
BVD 99	12 21 59	-47 01 01	2.14	9.48	11.62	A7V	G0V	0.01			¿?
BVD 149AB-C	13 07 52	-52 42 29	2.51	8.50	11.01	G0V	G8V	2.22	10,489	737,100	PHY=CO
BVD 100	13 10 44	+70 46 06	0.19	11.05	11.24	G9V	G7V	0.51	14,360	1,323,933	CO?
BVD 101	13 18 45	+32 10 12	2.89	8.16	11.05	A9V	G8V	0.37	12,452	847,855	CO=PHY

Table 2 continues on next page.

New Wide Common Proper Motion Binaries

Table 2 (continued): Visual Double Stars Studied in This Work.

Double	AR_2000	DEC_2000	ΔV	V_A	V_B	SP_A	SP_B	Δ(V-Mv)	E(a) [A.U.]	P [yr]	Type
BVD 102	13 28 57	+40 40 33	1.03	11.15	12.18	K2V	G8V	1.85	8,350	616,127	CO/PHY
BVD 150	13 29 41	-16 33 55	1.55	10.14	11.69	G5V	K5V	-0.70	4,206	220,204	PHY/CO
BVD 103	13 30 08	-04 12 58	0.50	10.35	10.85	G1V	G3V	0.22	7,383	439,028	PHY=CO
HJL 193	13 40 09	+68 44 28	0.05	9.22	9.27	G3V	G3V	0.05	3,327	135,169	CO=PHY
HJL 195	13 53 30	+03 37 37	1.33	8.66	9.99	F2V	F7V	0.45	7,316	365,337	PHY=CO
BVD 104	13 56 40	+78 02 00	1.79	10.08	11.87	G2V	G8V	1.18	9,843	711,147	CO/PHY
BVD 105	13 59 46	+64 41 30	0.21	9.95	10.16	K2V:	G4V:	1.72	4,729	231,441	CO/PHY
BVD 106	14 16 43	+79 35 49	0.14	10.45	10.59	F9V	F8V	0.34	6,167	312,143	CO/PHY
BVD 107	14 22 21	+66 16 26	1.13	10.51	11.64	K0IV	F6V	3.26	16,427	1,222,676	CO
BVD 108	14 38 04	-09 44 16	2.38	7.68	10.06	M1III					OPT?
BVD 109	14 51 32	-18 30 59	0.71	8.31	9.02	F5V	F8V	0.11	7,343	384,940	CO/PHY
BVD 151	15 14 35	-58 01 06	0.13	9.61	9.74	G3V	G3V	0.13	2,778	103,142	CO/PHY
BVD 110	15 14 36	+59 17 05	0.26	10.73	10.99	K3V	K3V	0.26	1,911	72,919	PHY/CO
BVD 111	15 16 41	-70 13 26	0.24	10.4	10.64	G6V	G6V	0.24	4,319	210,548	PHY?
GRV 903	15 21 09	+25 34 02	1.97	9.02	10.99	K2V	K8V	0.11	2,938	138,305	PHY?
BVD 113	15 21 27	-34 57 45	1.26	10.66	11.92	G7V	K2V	0.04	3,854	191,203	PHY=CO
BVD 114	15 21 40	-20 40 05	0.93	10.62	11.55	G8V	G9V	0.56	3,168	138,457	PHY=CO
BVD 115	15 30 48	-69 23 45	0.89	10.28	11.17	F7V	F8V	0.69	7,550	412,031	CO/PHY
BVD 116	15 39 37	-30 10 48	0.23	11.42	11.65	G1V	F8V	0.47	5,310	254,280	CO/PHY
BVD 117	16 15 27	-40 22 16	1.07	10.41	11.48	G1V	G9V	-0.23	4,369	209,853	CO/PHY
BVD 118	16 26 29	-00 42 21	0.18	10.47	10.65	K2V	K2V	0.18	1,783	64,073	PHY?
BVD 119AB-C	16 55 38	-54 34 11	2.16	9.24	11.40	F7V	G9V	0.40	4,575	212,838	CO/PHY
GRV 959	17 30 13	+29 01 13	0.59	10.17	10.76	K2IV:	G2V	-0.58	5,682	263,492	CO?
BVD 121	17 38 40	-54 28 10	0.86	9.14	10.00	F6V	F7V	0.66	7,463	394,952	CO/PHY
BVD 122	17 41 19	-34 40 37	0.81	10.61	11.42	G7V	G6V	1.05	6,674	408,170	PHY=CO
BVD 123	17 42 27	-13 53 15	0.52	10.79	11.31	G7V	G9V	0.35	2,979	125,073	CO/PHY
BVD 124	17 47 15	+08 50 51	0.88	11.30	12.18	G4V	G5V	0.89	5,807	319,616	CO/PHY
BVD 125	17 54 05	+27 20 34	1.77	8.15	9.92	F6V	G7V	-0.05	4,930	231,276	CO?
BVD 152	17 55 13	-39 34 03	2.24	9.13	11.37	F6V	G9V	-0.02	8,158	499,144	CO/PHY
BVD 126	18 23 21	-11 37 01	0.63	11.21	11.84	G9V	K2V	-0.27	2,818	121,938	CO?
BVD 127	18 24 04	+72 20 07	1.73	9.63	11.36	F6V	G8V	-0.18	3,861	161,420	CO/PHY
BVD 128	18 25 15	+80 27 44	0.90	9.99	10.89	F7V	G3V	-0.12	5,213	247,730	CO/PHY
SRT 1	18 50 04	-13 16 30	0.49	8.96	9.45	G5V	G7V	0.17	2,205	76,814	PHY
BVD 130	19 22 05	-00 36 37	0.57	10.26	10.83	G0V	G6V	-0.29	5,357	275,505	CO/PHY
ARY 48	20 37 45	+32 23 43	0.52	8.18	8.7	F6V	F9V	-0.08	5,402	249,215	PHY?
BVD 131	20 39 02	-00 34 42	0.81	10.34	11.15	G0V	G3V	0.39	6,308	343,724	CO/PHY
BVD 132AB-C	20 54 30	-60 59 34	0.90	9.08	9.98	F9V	G6V	-0.16	8,074	502,864	CO/PHY
BVD 133	21 08 05	-45 04 35	0.22	10.29	10.51	F7V	G2V	-0.66	4,763	214,780	CO/PHY

Table 2 continues on next page.

New Wide Common Proper Motion Binaries

Table 2 (continued): Visual Double Stars Studied in This Work.

Double	AR_2000	DEC_2000	ΔV	V_A	V_B	SP_A	SP_B	Δ(V-Mv)	E(a) [A.U.]	P [yr]	Type
BVD 153	21 12 09	-41 27 50	0.82	10.31	11.13	F5V	F6V	0.62	15,799	1,186,321	PHY=CO
BVD 134	21 15 13	+53 50 34	1.16	10.51	11.67	K3 IV-V	G5V		2,420	122,652	CO/PHY
BVD 135	21 15 43	+68 21 08	1.37	7.92	9.29	F3V	F9V	0.25	3,104	104,472	CO/PHY
BVD 136	21 16 47	-51 23 23	2.07	9.96	12.03	F7V	K0V	-0.09	6,953	401,508	CO/PHY
BVD 137	21 33 31	-27 53 24	2.13	7.65	9.78	G3V	K1V	0.77	2,239	80,217	PHY/CO
BVD 138	21 34 16	-23 53 31	0.57	11.45	12.02	K0V	K3V	-0.37	3,616	181,128	CO=PHY
BVD 139AB-C	21 39 39	-12 37 20	2.38	8.47	10.85	G4V	G8V	1.76	13,242	1,129,988	PHY/CO
BVD 154	21 41 54	-37 09 47	0.95	10.25	11.2	G0V	G9V	-0.39	5,496	293,181	CO=PHY
BVD 140	21 54 19	-20 20 10	0.43	10.63	11.06	G8V	G8V	0.43	5,073	278,135	CO/PHY
BVD 155	22 09 53	-25 13 38	0.73	9.60	10.33	G0V	G4V	0.17	6,551	366,624	PHY=CO
BVD 141	22 24 50	-66 51 33	1.30	9.30	10.60	G0V	G9V	-0.04	1,364	36,251	CO/PHY
BVD 156	23 04 48	-40 22 39	1.50	9.97	11.47	F8V	G6V	0.16	3,716	154,729	PHY=CO
BVD 157	23 10 18	-50 16 07	1.75	10.46	12.21	F9V	K2V	-0.87	10,178	752,255	CO?
BVD 142AB-C	23 10 29	+41 19 19	2.43	7.75	10.18	F5V	K0V	-0.07	7,295	417,962	PHY?
BVD 158	23 12 51	-51 41 09	0.99	9.11	10.10	G4V	G9V	0.21	3,402	148,398	PHY?
BVD 143	23 33 41	-64 13 52	0.72	9.86	10.58	F7V	G5V	-0.58	8,794	550,698	CO?

Table 3: Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
BVD 30	**AB**	9140 1577	10.58	0.51	26.9	-50.3	8.43	0.32	1.92	G9V	5.74	83.7	22.6	0.81
	C	9140 1881	11.32	0.50	25.9	-50.7	9.30	0.48	1.92	G9V	5.74	125.0	33.7	0.81
BVD 46	**A**	6989 184	10.84	0.54	20.7	-8.8	9.62	0.32	1.25	F6V	3.60	285.0	30.4	1.37
	B	6989 130	11.56	0.30	21.2	-6.0	10.49	0.29	1.25	F6V	3.60	425.4	44.4	1.37
BVD 11	**A**	3652 1330	11.55	0.38	2.1	-5.2	10.34	0.33	1.45	G0V	4.40	301.2	8.0	1.12
	B	3652 1378	12.62	0.45	0.2	-4.4	10.92	0.39	1.62	G5V	5.10	308.2	6.4	0.94
BVD 63	**A**	7526 405	10.54	0.73	74.5	32.0	8.99	0.41	1.62	G5V	5.10	126.7	48.7	0.94
	B	7526 447	10.66	0.86	76.7	30.6	9.01	0.45	1.76	G7V	5.42	117.7	46.1	0.88
HJL 1	**A**	4026 488	10.05	0.45	71.1	-11.7	8.83	0.29	1.25	F1V	2.76	223.9	71.0	1.687
	B	4026 536	10.96	0.49	68.3	-13.0	9.36	0.35	1.48	F4V	3.24	274.2	59.9	1.08
LDS 5	**A**	6419 998	10.97	0.99	213.4	1.8	8.72	0.58	2.26	K2V	6.46	80.3	81.2	0.69
00137-2818	**B**	6419 991	11.20	1.00	220.7	2.6	8.38	0.74	2.89	K5V	7.30	62.3	65.2	0.59
BVD 12	**A**	5843 674	7.55	0.46	187.6	-5.8	6.28	0.30	1.25	F6IV	2.50	101.5	90.0	2.80
	B	5843 167	11.05	0.71	193.5	-8.5	9.05	0.56	2.00	K0V	5.90	107.3	98.6	0.79

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
BVD 13	**A**	7525 403	10.78	0.58	-31.6	-16.6	9.79	0.31	1.14	F5V	3.40	321.2	54.3	1.44
	B	7525 244	10.96	0.43	-30.9	-16.7	9.39	0.37	1.45	G0V	4.40	194.4	32.4	1.12
BVD 66	**A**	4674 269	10.06	0.39	-63.4	-65.2	8.72	0.31	1.25	F6V	3.60	188.0	81.0	1.37
	B	4674 49	10.94	0.61	-62.3	-64.7	9.27	0.39	1.68	G6V	5.26	137.7	58.6	0.91
BVD 14	**A**	1742 549	10.50	0.48	10.4	-11.8	9.27	0.28	1.25	F6V	3.60	242.5	18.1	1.37
	B	1742 555	10.99	0.78	10.9	-14.6	8.58	0.67	2.47	K3V	6.74	72.7	6.3	0.66
BVD 15	**A**	613 251	9.62	0.46	0.1	-71.4	8.39	0.23	1.25	F6V	3.60	161.7	54.7	1.37
	B	613 223	11.45	1.26	1.2	-73	9.88	0.54	2.13	K1V	6.18	146.8	50.8	0.74
BVD 16	**A**	7544 441	10.06	0.46	52.6	25.2	8.74	0.30	1.36	F7V	3.80	182.3	50.4	1.30
	B	7544 366	11.37	0.89	49	25.5	9.68	0.50	2.00	K0V	5.90	143.5	37.6	0.79
BVD 17	**A**	7544 932	11.95	0.80	88.5	-26.6	10.47	0.38	1.62	G6V	5.26	233.0	102.0	0.91
	B	7544 992	12.01	0.57	90.6	-18.5	10.36	0.41	1.68	G6V	5.26	227.4	99.7	0.91
BVD 18	**A**	3278 1981	10.25	0.84	79.5	-57	8.41	0.43	1.84	G8V	5.58	86.1	39.9	0.84
	B	3278 2009	10.61	0.66	81.5	-56.8	8.87	0.41	1.76	G7V	5.42	110.4	52.0	0.88
BVD 19	**A**	4506 558	11.23	0.48	0.9	-36.9	9.51	0.31	1.68	G6V	5.26	153.7	26.9	0.91
	B	4506 572	11.58	0.40	1.5	-34.7	10.06	0.34	1.48	G1V	4.54	251.1	41.3	1.08
HJL 20	**A**	4031 574	8.56	0.48	111.4	-22.9	7.31	0.26	1.25	F6V	3.60	98.4	53.0	1.37
	B	4031 552	9.08	0.48	113.2	-21.3	7.85	0.27	1.25	F6V	3.60	126.1	68.9	1.37
BVD 21	**A**	1757 372	7.86	0.66	-83.8	-18.1	6.19	0.38	1.68	G6V	5.26	33.3	13.5	0.91
	B	1757 1489	10.87	0.97	-82.3	-14.8	7.62	0.84	3.20	K7V	7.98	37.1	14.7	0.66
BVD 22	**A**	1758 388	11.56	0.74	76.4	-1.8	10.03	0.41	1.68	G6V	5.26	195.3	70.8	0.91
	B	1758 236	11.93	0.82	80.5	0.3	10.27	0.43	1.76	G7V	5.42	210.3	80.2	0.88
BVD 23	**A**	37 1046	10.77	0.69	33.7	-0.3	9.54	0.38	1.39	F8V	4.00	243.7	38.9	1.23
	B	37 1139	11.72	0.65	36.6	1	10.04	0.44	1.76	G7V	5.42	189.1	32.8	0.88
BVD 24	**A**	7007 526	11.13	0.67	107.4	40.5	9.54	0.37	1.57	G4V	4.96	170.1	92.6	0.97
	B	7007 1165	11.22	0.56	109.2	39.4	9.69	0.40	1.54	G3V	4.82	191.3	105.3	1.01
BVD 25	**A**	9353 563	9.13	0.41	38.9	28.3	7.99	0.29	1.14	F5V	3.40	140.2	32.0	1.44
	B	9353 104	9.33	0.46	40.7	31.3	8.21	0.29	1.14	F5V	3.40	155.2	37.8	1.44
BVD 65	**A**	7565 72	10.52	0.64	67.5	30.0	8.79	0.43	1.68	G6V	5.26	110.4	38.6	0.91
	B	7565 60	11.86	1.79	69.2	29.9	9.59	0.63	2.47	K3V	6.74	115.8	41.4	0.66
BVD 26	**A**	4516 1246	8.71	0.26	36.1	-24.4	8.26	0.08	0.48	A6V	2.12	211.3	43.6	2.05
	B	4516 540	9.59	0.41	39.2	-34	8.54	0.16	1.05	F4V	3.24	186.3	45.8	1.50
BVD 27	**A**	1793 120	11.48	1.13	-11.2	-21.8	10.04	0.37	1.57	G4V	4.96	214.2	24.9	0.97
	B	1793 118	11.97	0.63	-9.9	-25.2	9.92	0.52	2.13	K1V	6.18	149.6	19.2	0.74
BVD 28	**A**	4703 693	9.83	1.01	144.2	-21.5	7.22	0.67	2.67	K4V	7.02	37.6	26.0	0.62
	B	4703 247	10.31	1.73	146.0	-19.5	7.41	0.76	2.89	K5V	7.30	39.9	27.8	0.59

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass (M☉)**
BVD 29	**A**	4706 719	10.64	0.76	43.2	-28.7	8.55	0.52	2.13	K1IV	3.10	329.0	81.0	1.60
	B	4706 509	11.10	1.00	45.4	-32.6	9.84	0.36	1.25	F6V	3.60	315.4	83.5	1.37
BVD 71	**A**	9151 1732	9.02	0.70	-54.1	-33.9	7.42	0.42	1.62	G5V	5.10	61.5	18.6	0.94
	B	9151 1733	10.51	1.25	-55.7	-33.0	7.87	0.72	2.67	K4V	7.02	50.7	16.0	0.62
POP 223	**A**	2860 2207	9.79	0.26	20.8	-5.2	9.00	0.14	0.74	F0V	2.60	268.4	27.3	1.78
03113+4431	**B**	2860 1629	10.99	0.39	17.5	-5.5	9.88	0.17	1.14	F5V	3.40	334.8	29.1	1.44
BVD 31	**A**	4061 98	7.99	0.26	40.7	-32.7	7.37	0.10	0.61	A8V	2.36	133.1	32.9	1.91
	B	4061 387	9.58	0.84	30.6	-31.6	7.29	0.59	2.26	K2V	6.46	41.6	8.7	0.69
BVD 32	**A**	3714 1092	8.14	0.46	72.8	-6.7	6.85	0.31	1.25	F6V	3.60	79.6	27.6	1.37
	B	3714 1080	11.33	0.98	71.8	-3.8	8.61	0.72	3.05	K6V	7.64	63.7	21.7	0.55
BVD 33	**A**	6445 850	10.27	0.57	12.1	24.1	9.18	0.30	1.14	F5V	3.40	242.5	31.0	1.44
	B	6445 883	11.15	0.34	10.5	26.7	9.84	0.28	1.25	F6V	3.60	315.4	42.9	1.37
BVD 34	**A**	2353 1073	9.53	1.09	20.3	-12.5	6.64	0.64	2.89	G8III	0.58	455.0		2.20
	B	2353 1699					***9.50***	0.30	1.36	F2III:	1.12	634.0		4.90
BVD 35	**A**	7023 675	11.42	0.47	-9.5	-30.6	9.94	0.36	1.57	G4V	4.96	204.6	31.1	0.97
	B	7023 583	11.57	0.67	-9.2	-35.1	10.09	0.35	1.50	G2V	4.68	241.4	41.5	1.04
BVD 36	**A**	2870 895	9.93	0.72	-0.9	-39.3	8.45	0.36	1.54	G3V	4.82	108.1	20.1	1.01
	B	2870 917	10.26	0.54	-0.6	-39.7	8.69	0.37	1.50	G2V	4.68	126.7	23.8	1.04
BVD 37	**A**	3321 2332	11.30	0.45	11.0	-26.3	9.87	0.33	1.45	**G0V**	**3.08**	242.5	32.8	1.12
	B	3321 1003	11.46	0.70	12.8	-27.6	9.76	0.37	1.57	G4V	4.96	188.3	27.2	0.97
FEL 1	**A**	9156 2166	7.41	0.60	-10.7	-96.5	5.99	0.36	1.42	F9V	4.20	43.9	20.2	1.17
	B	9156 742	7.57	0.56	-10.4	-98.3	6.17	0.31	1.39	F8V	4.00	51.6	24.2	1.23
BVD 39	**A**	6454 219	11.33	0.70	2.8	-52.2	9.64	0.44	1.84	G8V	5.58	151.6	37.6	0.84
	B	6454 319	11.93	1.08	2.0	-50.8	9.85	0.53	2.13	K1V	6.18	144.8	34.9	0.74
HJL 54	**A**	4521 1378	9.72	0.49	-43.5	50.7	8.45	0.26	1.25	F6V	3.60	166.3	52.6	1.37
	B	4521 1350	10.22	0.54	-43.2	52.9	8.84	0.35	1.39	F8V	4.00	176.5	57.1	1.23
BVD 40AB-C	**A**	6461 1120 1	10.38	1.05	77.2	-18.4	7.20	0.76	3.05	K6V	7.64	33.3	12.5	0.55
	B	6461 1120 2	10.40	1.11	73.7	-18.8	7.52	0.76	2.89	K5V	7.30	42.0	15.1	0.59
BVD 41	**A**	5315 308	10.51	0.67	-1.0	36.2	9.10	0.36	1.48	G1V	4.54	161.4	27.7	1.08
	B	5315 310	12.06	0.45	-0.7	32.8	10.09	0.44	1.76	G7V	5.42	193.6	30.1	0.88
BVD 42	**A**	73 204	10.64	0.78	50.2	-8.0	9.20	0.40	1.57	G4V	4.96	145.5	35.1	0.97
	B	73 769	11.67	1.29	49.5	-6.9	9.65	0.55	2.26	K2V	6.46	123.3	29.2	0.69
BVD 43	**A**	8071 1288	9.19	1.15	-7.7	-34.4	6.52	0.71	2.67	K2 IV-III	1.70	327.0	53.0	2.05
	B	8071 854	11.60	0.47	-7.1	-36.4	9.91	0.33	1.45	G0V	4.40	247.1	43.4	1.12
BVD 44	**A**	8874 383	8.83	0.55	-37.6	-25.6	7.41	0.35	1.42	F9V	4.20	84.5	18.2	1.17
	B	8874 1276	9.48	0.69	-37.5	-26.0	8.03	0.35	1.50	G2V	4.68	93.5	20.2	1.04
SRT 2	**A**	5889 1441	5.81	0.16	44.9	51.1	5.46	0.08	0.34	A1V+F/G:	0.90	96.0	31.0	2.90
	B	5889 1440	7.65	0.30	45.3	48.3	6.98	0.18	0.68	A9V	2.48	108.5	34.1	1.85

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_{\odot}$)**
BVD 45	**A**	4726 649	11.23	0.45	32.8	-33.3	8.85	0.54	2.26	K2V:	6.46	85.3	18.9	0.69
	B	4726 749	11.51	0.37	34.9	-35.9	10.2	0.32	1.42	F9V:	4.20	305.4	72.5	1.17
HJL 2	**A**	4069 1243	8.31	0.76	-127.1	-57.2	6.55	0.40	1.76	G7V	5.42	37.9	25.0	0.88
	B	4069 1103	9.87	1.03	-126.8	-52.5	7.69	0.54	2.26	K2V	6.46	50.0	32.5	0.69
BVD 46	**A**	4518 173	10.92	0.81	-4.4	-24.2	9.50	0.36	1.42	F9V	4.20	221.2	25.8	1.17
	B	4518 337	11.86	0.50	-6.9	-24.1	10.05	0.46	1.84	G8V	5.58	183.1	21.8	0.84
BVD 72	**A**	5324 24	9.92	0.78	-87.0	-61.9	7.88	0.48	2.00	K0V	5.90	62.6	31.7	0.79
	B	5324 172	11.32	1.03	-86.1	-59.5	8.75	0.59	2.47	K3V	6.74	78.7	39.0	0.66
BVD 47	**A**	1843 331	11.34	0.51	1.3	-156.4	9.51	0.43	1.76	G7V	5.42	148.0	110.0	0.87
	B	1843 1	11.67	1.01	2.2	-159.6	9.30	0.56	2.26	K2V	6.46	104.9	79.4	0.69
BVD 38	**A**	6471 619	11.24	0.73	-20.2	65.0	8.48	0.72	2.67	K4V	7.02	67.1	21.7	0.62
	B	6471 785	11.85	1.50	-22.1	71.4	8.74	0.79	3.37	K8V	8.15	61.9	21.9	0.66
BVD 48AB	**A**	7049 1852	6.70	0.47	75.1	10.2	5.39	0.33	1.36	F6III :	1.34	121.0	43.0	4.20
	B	7049 1853	8.61	0.59	75.8	11.6	7.29	0.37	1.36	F7V	3.80	93.5	34.0	1.30
	C	7049 1507	8.86	0.62	71.8	7.5	7.27	0.36	1.57	G4V	4.96	59.8	20.5	0.97
BVD 49	**A**	7587 338	9.69	0.53	4.9	-54.8	8.29	0.32	1.39	F8V	4.00	137.0	35.7	1.23
	B	7587 414	11.05	0.86	7.7	-56.6	9.20	0.49	1.84	G8V	5.58	123.8	33.5	0.84
BVD 50	**A**	706 1025	8.31	0.36	-6.8	-22.6	7.31	0.20	0.96	F3V	3.08	109.0	12.2	1.57
	B	706 1835	8.46	0.33	-4.3	-21.9	7.44	0.22	0.96	F3V	3.08	115.7	12.2	1.57
BVD 51	**A**	4756 1243	7.70	0.52	-45.5	3.4	6.41	0.30	1.36	F7V	3.80	62.3	13.5	1.30
	B	4756 1194	9.49	0.63	-49.9	4.1	8.04	0.40	1.48	G1V	4.54	99.0	23.5	1.08
BVD 52	**A**	5902 1130	7.62	0.93	-99.8	28.9	5.44	0.57	2.26	G/K IV	3.50	69.0	34.0	1.60
	B	5902 856	8.97	0.72	-103.7	28.6	7.49	0.38	1.54	G3V	4.82	69.5	35.4	1.01
BVD 53	**A**	6475 1563	10.55	0.49	3	24.8	9.3	0.31	1.25	F6V	3.60	245.9	29.1	1.37
	B	6475 132	11.28	0.33	3.3	24.4	9.85	0.32	1.42	F9V	4.20	259.9	30.3	1.17
BVD 89	**A**	8887 836	11.00	0.88	-8.3	93.2	9.50	0.43	1.50	G2V	4.68	184.0	81.6	1.04
	B	8887 497	12.13	0.64	-9.4	92.6	9.74	0.55	2.13	K1V	6.18	137.7	60.7	0.74
BVD 20AC	**A**	7595 710	9.22	0.94	86.5	19.4	6.98	0.55	2.26	K2V	6.46	36.0	15.1	0.69
	B	7595 649	10.78	1.17	89.9	18.7	7.57	0.78	3.20	K7V	7.98	36.2	15.8	0.66
BVD 54	**A**	8098 261	12.21	0.58	7.9	41.9	10.83	0.31	1.39	F8V	4.00	441.4	89.2	1.23
	B	8098 233	12.64	0.48	6.8	42.0	11.15	0.34	1.48	G1V	4.54	414.8	83.6	1.08
BVD 55	**A**	7057 1444	9.40	0.43	-35.0	8.4	8.22	0.24	1.14	F5V	3.40	155.9	26.6	1.44
	B	7057 1445	10.71	0.45	-42.1	6.1	9.52	0.25	1.14	F5V	3.40	283.7	57.2	1.44
BVD 56	**A**	5918 1241	9.05	0.52	52.1	-1.2	7.62	0.32	1.42	F9V	4.20	93.1	23.0	1.17
	B	5918 1151	11.63	1.22	53.7	-1.5	9.11	0.64	2.67	K4V	7.02	89.7	22.8	0.62
BVD 57AB-C	**A**	8528 1345	8.40	0.63	-30.2	-51.3	6.80	0.40	1.57	G4V	4.96	48.2	13.6	0.97
	B	8528 1324	10.31	0.75	-29.4	-51.9	7.97	0.66	2.26	K2V	6.46	56.9	16.1	0.69

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		GSC	V	B-V	μ(α)	μ(δ)	K	J-K	V-K	Sp	Mv	Dist. (pc)	Vt (km/s)	Mass ($M_\odot$)
BVD 58	A	4529 13	11.41	0.53	-14.5	-41.3	9.79	0.36	1.57	G4V	4.96	190.9	39.6	0.97
	B	4529 245	12.05	0.94	-17	-44.5	10.07	0.53	2.13	K1V	6.18	160.3	36.2	0.74
BVD 91	A	7611 1572	9.15	0.45	-36.4	53.2	7.92	0.28	1.25	F6V	3.60	130.3	39.8	1.37
	B	7611 98	10.62	0.53	-33.5	55.2	8.66	0.45	1.84	G8V	5.58	96.6	29.6	0.84
BVD 93	A	7076 2300	10.48	0.80	-68.1	152.4	8.77	0.52	1.76	G7V	5.42	105.4	83.4	0.88
	B	7076 2317	11.95	0.93	-72.9	151.1	9.43	0.71	2.89	K5V	7.30	101.1	80.4	0.59
BVD 59	A	8902 1379	11.36	0.63	1.7	34.6	9.80	0.41	1.68	G6V	5.26	175.7	28.9	0.91
	B	8902 1812	11.37	0.36	0.5	36.6	10.06	0.29	1.25	F6V	3.60	349.0	60.5	1.37
BVD 60	A	2426 368	10.32	1.09	41.2	-42.3	7.86	0.59	2.47	K3V	6.74	52.0	15.0	0.66
	B	2426 1311	12.23	0.75	43.5	-46.2	11.54	0.34	1.48	G1V	4.54	492.0	33.0	1.08
BGH 22	A	5382 166	9.44	0.86	-164.1	95.9	7.41	0.55	2.00	K0V	5.90	50.4	45.4	0.79
06386-0946	B	5382 402	9.79	0.91	-162.9	97.5	7.54	0.59	2.26	K2V	6.46	46.6	42.0	0.69
BVD 112	A	7626 224	9.00	0.39	25.2	-57.5	7.96	0.23	1.05	F4V	3.24	142.6	42.4	1.50
	B	7626 2206	10.10	0.47	22.8	-58.8	8.59	0.35	1.42	F9V	4.20	145.5	43.5	1.17
BVD 61	A	3778 947	9.43	0.55	62.3	4.9	7.95	0.33	1.45	G0V	4.40	100.2	29.7	1.12
	B	3778 1205	11.10	0.71	60.9	3.0	8.85	0.49	2.26	K2V	6.46	85.3	24.6	0.69
BVD 120	A	5971 1405	9.16	0.40	26.6	-68.8	7.91	0.24	1.25	F6V	3.60	129.7	45.3	1.37
	B	5971 2457	9.82	0.45	27.9	-70.3	8.57	0.30	1.25	F6V	3.60	175.7	63.0	1.37
BVD 62	A	3771 839	11.23	0.86	-61.7	-37.6	9.63	0.34	1.57	G4V	4.96	177.3	60.7	0.97
	B	3771 837	11.38	0.77	-58.7	-39.5	9.80	0.44	1.76	G7V	5.42	169.4	56.8	0.88
ARN 94	A	3767 1058	10.51	0.60	-2.5	-20.1	9.24	0.29	1.25	F6V	3.60	239.2	23.0	1.37
07061+5259	B	3767 1380	10.92	0.31	-1.8	-20.4	9.43	0.28	1.48	G1V	4.54	187.8	18.2	1.08
BVD 129	A	5389 255	10.24	0.68	-72.6	29.4	8.50	0.45	1.76	G7V	5.42	93.1	34.6	0.88
	B	5389 869	10.59	0.63	-74.5	29.0	8.66	0.51	1.92	G9V	5.74	93.1	35.3	0.81
BVD 64	A	5406 482	10.58	0.67	72.8	-180.9	8.48	0.52	2.00	K0V	5.90	82.6	76.3	0.79
	B	5406 658	11.51	0.56	78.6	-182	8.51	0.75	3.20	K7V	7.98	55.8	52.5	0.66
XMI 63	A	5404 59	10.30	0.63	-44.4	30.0	8.93	0.37	1.42	F9V	4.20	170.1	43.2	1.17
07317-1300	B	5404 285	10.51	0.71	-45.3	30.5	9.15	0.41	1.45	G0V	4.40	174.1	45.1	1.12
GRV 737	A	1364 1203	9.57	0.71	-36	-77.6	8.08	0.36	1.54	G3IV	3.00	205.0	83.0	1.50
07328+1757	B	1364 1217	10.66	0.85	-32.8	-77.2	9.23	0.38	1.43	F9 V	4.20	196.0	78.0	1.20
BVD 67	A	9393 594	10.09	0.62	-46.0	-10.2	8.41	0.37	1.62	G5V	5.10	97.0	21.7	0.94
	B	9393 670	10.41	0.58	-45.4	-10.8	8.77	0.38	1.62	G5V	5.10	114.5	25.3	0.94
BVD 68	A	3413 210	11.20	0.83	-33.1	-154.1	9.27	0.47	1.92	G9V	5.74	123.3	92.1	0.81
	B	3413 5	11.25	0.66	-34.7	-153.6	9.31	0.43	1.92	G9V	5.74	125.5	93.7	0.81
BVD 69	A	5424 2530	8.87	0.35	-7.4	-7.2	7.81	0.24	1.05	F4V	3.24	133.1	6.5	1.50
	B	5424 2531	9.59	0.47	-8.6	-9	8.43	0.32	1.14	F5V	3.40	171.7	10.1	1.44
BVD 70	A	7659 2220	10.34	0.48	-26.3	33.9	9.24	0.26	1.14	F5V	3.40	249.3	50.7	1.44
	B	7659 3173	11.35	0.43	-27.0	32.9	9.97	0.33	1.45	G0V	4.40	254.0	51.2	1.12
LEP 30	A	802 408	7.71	0.71	-198.3	-233.3	6.06	0.38	1.68	G6V	5.26	31.4	45.6	0.91
	B	802 150	9.75	0.91	-198.3	-229.5	7.15	0.60	2.47	K3V	6.74	37.7	54.1	0.66

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
BVD 161AC	**A**	2478 858	8.52	0.66	-118.8	-111.3	6.82	0.37	1.68	G6V	5.26	44.5	34.4	0.91
	B	2478 671	11.70	0.82	-132.6	-149	8.43	0.82	3.69	M0V	9.00	42.1	39.8	0.58
BVD 73	**A**	1949 1327	10.63	0.67	-34.1	0.6	8.83	0.46	1.76	G7V	5.42	108.3	17.5	0.88
	B	1949 1809	11.71	0.15	-33.1	-1.6	10.00	0.33	1.45	G0V	4.40	257.5	40.4	1.12
BVD 74	**A**	8591 1674	10.83	0.47	-7.4	21.0	9.47	0.32	1.36	F7V	3.80	255.2	26.9	1.30
	B	8591 1575	11.66	0.18	-7.6	18.3	10.25	0.31	1.39	F8V	4.00	337.9	31.7	1.23
BVD 75	**A**	7152 476	11.81	0.94	-27.7	13.3	9.43	0.60	2.47	K3V	6.74	107.6	15.7	0.66
	B	7152 1558	12.24	0.71	-29.1	15.0	10.50	0.33	1.45	G0V	4.40	324.2	50.3	1.12
BVD 76	**A**	7165 2125	9.63	0.46	42.5	-49.0	8.35	0.32	1.25	F6V	3.60	158.8	48.8	1.37
	B	7165 3003	10.50	0.53	41.0	-47.7	9.07	0.40	1.42	F9V	4.20	181.5	54.1	1.17
BVD 145	**A**	6033 79	8.16	0.42	9.9	-77.1	7.05	0.25	1.14	F5V	3.40	90.9	33.5	1.44
	B	6033 1949	8.97	0.45	12.4	-80.2	7.62	0.37	1.36	F7V	3.80	108.8	41.9	1.30
BVD 77	**A**	4894 325	10.52	0.46	-58.3	20.9	9.13	0.36	1.36	F7V	3.80	218.2	64.0	1.30
	B	4894 595	11.55	0.40	-58.3	22.6	10.00	0.33	1.45	G0V	4.40	257.5	76.3	1.12
BVD 78	**A**	2497 222	10.88	0.39	-80	5.4	9.2	0.38	1.48	G1V	4.54	169.0	64.2	1.08
	B	2497 518	11.54	0.19	-89.2	13.8	9.6	0.41	1.68	G6V	5.26	160.3	68.6	0.91
BVD 79	**A**	7178 1299	10.45	0.78	-65.7	15.2	8.44	0.57	2.00	K0 IV	3.10	294.0	94.0	1.60
	B	7178 1718	12.10	0.69	-64.6	15.4	10.74	0.35	1.50	G2V	4.68	325.7	102.5	1.04
BVD 80	**A**	3818 626	11.47	0.49	-49.0	-6.3	10.23	0.27	1.25	F6V	3.60	377.4	88.4	1.37
	B	3818 677	12.22	0.63	-51.0	-5.2	10.81	0.34	1.48	G1V	4.54	354.6	86.2	1.08
BVD 81	**A**	1972 1402	5.84	1.22	-128.8	3.8	3.01	0.85	2.89	K2III	0.22	137.0	83.7	2.50
	B	1972 1272	10.01	0.74	-127.7	4.1	8.37	0.37	1.68	G6V	5.26	90.9	55.1	0.91
BVD 82	**A**	5498 919	10.69	0.77	-45.1	2.2	9.02	0.42	1.68	G6V	5.26	122.7	26.3	0.91
	B	5498 633	11.39	1.29	-43.5	5.1	9.25	0.66	2.67	K4V	7.02	95.7	19.9	0.62
BVD 83	**A**	8209 1398	11.01	0.28	-24.5	17.9	10.04	0.18	0.96	F3V	3.08	383.2	55.1	1.57
	B	8209 1274	11.96	0.40	-29.3	19.8	10.59	0.32	1.42	F9V	4.20	365.4	61.3	1.17
BVD 84	**A**	8969 805	10.22	0.85	-22.3	7.0	7.41	0.74	2.67	K1III	0.36	880.6	97.6	2.40
	B	8969 857	11.87	0.51	-19.7	5.0	10.83	0.23	1.05	F4V	3.24	534.7	51.5	1.50
BVD 146	**A**	9219 3416	8.73	0.56	-65.3	43.1	7.22	0.35	1.48	G1V	4.54	67.9	25.2	1.08
	B	9219 2375	10.51	0.83	-66.2	44.7	8.59	0.45	1.92	G9V	5.74	90.1	34.1	0.81
BVD 147	**A**	4913 1016	9.94	0.51	-69.3	-48.8	8.39	0.35	1.48	G1IV:	2.90	248.0	99.0	1.40
	B	4913 764	10.95	0.54	-68.1	-48.2	9.61	0.37	1.36	F7V	3.80	272.0	108.0	1.30
BVD 85	**A**	8198 1896	10.33	0.52	-61.0	-21.8	8.83	0.39	1.45	G0V	4.40	150.2	46.1	1.12
	B	8198 1628	10.61	0.67	-62.9	-21.4	9.03	0.38	1.57	G4V	4.96	134.5	42.4	0.97
BVD 86	**A**	4552 884	11.13	0.61	6.2	-56.5	9.42	0.41	1.68	G6V	5.26	147.5	39.7	0.91
	B	4552 933	12.32	0.65	9.3	-62.7	10.04	0.52	2.13	K1V	6.18	158.1	47.5	0.74
BVD 87	**A**	7736 1514	9.20	0.52	76.7	-71.1	7.85	0.29	1.36	F7V	3.80	121.0	60.0	1.30
	B	7736 1515	9.71	0.48	78.9	-69.6	8.13	0.40	1.48	G1V	4.54	103.2	51.5	1.08
BVD 88	**A**	6640 948	9.98	0.55	-85.6	-0.9	8.48	0.35	1.45	G0V	4.40	127.9	51.9	1.12
	B	6640 821	10.73	0.75	-85.2	-0.9	9.37	0.34	1.48	G1V	4.54	182.7	73.8	1.08

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
GRV 829	**A**	262 917	12.04	0.65	18.6	-39.2	10.17	0.47	1.92	G9V	5.74	186.6	38.4	0.81
11092+0044	**B**	262 542	12.18	0.58	21.7	-40.5	10.19	0.45	1.84	G8V	5.58	195.3	42.5	0.84
HJL 141	**A**	263 534	8.33	1.00	22.0	-117.7	5.73	0.67	2.67	K1 IV -III	1.70	219.0	124.0	2.00
11153+0204	**B**	263 505	10.22	0.45	21.4	-119.3	8.82	0.35	1.36	F7V	3.80	189.1	108.7	1.30
BVD 148	**A**	6658 179	8.71	0.43	-62.8	10.0	7.65	0.20	1.05	F4V	3.24	123.6	37.3	1.50
	B	6658 143	10.92	0.80	-66.6	9.0	9.09	0.51	1.84	G8V	5.58	117.7	37.5	0.84
BVD 90	**A**	6091 2201	9.87	0.39	-7.5	-20.8	8.6	0.30	1.25	F6V	3.60	178.2	18.7	1.37
	B	6091 2202	10.62	0.24	-8.5	3.3	9.64	0.16	0.86	F2V	2.92	328.7	14.2	1.63
GRV 840	**A**	1984 683	11.43	0.60	-101.8	-44.6	9.56	0.42	1.76	G7V	5.42	151.6	79.9	0.88
11374+2853	**B**	1984 680	12.41	0.60	-101.1	-43.9	10.08	0.53	2.13	K1V	6.18	161.0	84.1	0.74
BVD 92	**A**	2523 1622	9.89	0.50	-92.2	43.3	8.64	0.26	1.25	F6V	3.60	181.5	87.6	1.37
	B	2523 1878	10.01	0.52	-94.1	45.9	8.73	0.27	1.25	F6V	3.60	189.1	93.9	1.37
GRV 841	**A**	3014 2133	10.00	0.77	-139.4	-11.5	8.25	0.38	1.76	G7V	5.42	82.9	55.0	0.88
11424+3934	**B**	3014 2397	10.63	0.94	-139.5	-12.2	8.25	0.61	2.47	K3V	6.74	62.5	41.5	0.66
BVD 94	**A**	8642 1106	10.35	0.51	-12.0	33.6	8.81	0.37	1.48	G1V	4.54	141.2	23.9	1.08
	B	8642 764	10.90	0.57	-12.0	35.4	9.33	0.33	1.57	G4V	4.96	154.5	27.4	0.97
BVD 95	**A**	3832 140	9.82	0.57	-43	30	8.48	0.29	1.36	F7V	3.80	161.7	40.2	1.30
	B	3832 138	11.74	1.19	-47.4	35.3	10.07	0.48	1.92	G9V	5.74	178.2	49.9	0.81
BVD 96	**A**	6674 350	8.83	0.50	-183.9	3.6	7.49	0.32	1.36	F7V	3.80	102.5	89.4	1.30
	B	6674 246	9.84	0.80	-186.4	-0.2	8.18	0.42	1.68	G6V	5.26	83.3	73.6	0.91
BVD 97	**A**	6099 1575	10.37	0.66	72.4	-55.7	8.76	0.40	1.62	G5V	5.10	114.0	49.3	0.94
	B	6099 1313	11.52	0.75	55.5	-42.2	9.83	0.46	1.84	G8V	5.58	165.5	54.7	0.84
BVD 98	**A**	8238 2116	10.15	0.90	-36.6	-2.7	7.99	0.58	2.13	K1V	6.18	61.5	10.7	0.74
	B	8238 2252	11.89	0.73	-35.8	-4.3	10.68	0.32	1.42	F9V	4.20	380.9	65.1	1.17
BVD 99	**A**	8234 897	9.48	0.19	-26.5	-5.4	8.93	0.10	0.54	A7V	2.24	279.8	35.9	1.98
	B	8234 663	11.62	0.73	-24.2	-4.4	10.20	0.33	1.45	G0V	4.40	282.4	32.9	1.12
BVD 149AB-C	**A**	8649 894	8.50	0.54	-143.0	-38.8	7.04	0.34	1.41	G0V	4.40	66.0	46.0	1.28
	B	8649 1075	11.01	0.93	-144.1	-37.6	9.17	0.53	1.84	G8V	5.58	122.1	86.2	0.84
BVD 100	**A**	4404 396	11.05	0.65	58.6	-92.7	9.13	0.43	1.92	G9V	5.74	115.6	60.1	0.81
	B	4404 778	11.24	1.59	58.5	-96.5	9.50	0.54	1.76	G7V	5.42	147.5	78.9	0.88
BVD 101	**A**	2535 1190	8.16	0.26	-35.8	-10.5	7.46	0.14	0.68	A9V	2.48	135.4	23.9	1.85
	B	2535 60	11.05	0.86	-35.3	-10.6	9.79	0.46	1.84	G8V	5.58	162.0	28.0	0.84
BVD 102	**A**	3028 862	11.15	0.81	-7.4	-48.2	8.96	0.59	2.26	K2V	6.46	89.7	20.7	0.69
	B	3028 888	12.18	0.57	-4.1	-48.4	10.28	0.44	1.84	G8V	5.58	203.6	46.9	0.84
BVD 150	**A**	6121 325	10.14	0.66	-65.4	8.5	8.50	0.37	1.62	G5V	5.10	101.1	31.6	0.94
	B	6121 320	11.69	1.03	-66.1	9.3	8.75	0.68	2.89	K5V	7.30	73.9	23.4	0.59
BVD 103	**A**	4969 722	10.35	0.63	15.6	-38.7	8.87	0.40	1.48	G1V	4.54	145.1	28.7	1.08
	B	4969 783	10.85	0.65	17.5	-40.6	9.30	0.40	1.54	G3V	4.82	159.9	33.5	1.01
HJL 193	**A**	4402 1313	9.22	0.62	64.1	-77.5	7.67	0.34	1.54	G3V	4.82	75.5	36.0	1.01
13401+6844	**B**	4402 1621	9.27	0.65	60.8	-80.8	7.75	0.34	1.54	G3V	4.82	78.3	37.5	1.01

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
HJL 195	**A**	312 1291	8.66	0.31	-44.5	0.1	7.78	0.20	0.86	F2V	2.92	139.6	29.4	1.63
13535+0338	**B**	312 1001	9.99	0.62	-46.0	-1.4	8.74	0.32	1.36	F7V	3.80	182.3	39.8	1.30
BVD 104	**A**	4561 812	10.08	0.54	41.1	-51.3	8.50	0.37	1.50	G2V	4.68	116.1	36.2	1.04
	B	4561 1444	11.87	0.88	40.4	-51.0	10.32	0.45	1.84	G8V	5.58	207.4	64.0	0.84
BVD 105	**A**	4174 293	9.95	0.99	-7.2	-43.9	7.68	0.55	2.26	K2V:	6.46	50.0	10.0	1.00
	B	4174 305	10.16	0.73	-10.3	-43.4	8.67	0.36	1.57	G4V:	4.96	114.0	24.1	0.97
BVD 106	**A**	4562 1801	10.45	0.61	-30.2	32.3	9.05	0.34	1.42	F9V	4.20	179.8	37.7	1.17
	B	4562 1649	10.59	0.68	-28.1	32.7	9.34	0.29	1.39	F8V	4.00	222.2	45.4	1.23
BVD 107	**A**	4178 720	10.51	0.93	-14.5	40.9	8.50	0.51	2.00	K0IV	3.10	303.0	62.0	1.60
	B	4178 737	11.64	0.40	-14.2	40.2	10.22	0.27	1.25	F6V	3.60	375.7	75.9	1.37
BVD 108	**A**	5568 839	7.68	1.67	-13.9	5.5	3.52	1.03	4.15	M1III	-.50	431.3	30.6	5.30
	B	5568 743	10.06	2.19	-20.1	8.4	10.67	0.33	-.31					
BVD 109	**A**	6159 1112	8.31	0.43	-47.8	-46.4	7.15	0.22	1.14	F5V	3.40	95.2	30.1	1.44
	B	6159 1111	9.02	0.59	-47.1	-48.5	7.65	0.32	1.39	F8V	4.00	102.0	32.7	1.23
BVD 151	**A**	8702 170	9.61	0.68	-90.6	-31.2	8.09	0.34	1.54	G3V	4.82	91.6	41.6	1.01
	B	8702 53	9.74	0.66	-93.7	-28.8	8.23	0.38	1.54	G3V	4.82	97.7	45.4	1.01
BVD 110	**A**	3874 17	10.73	0.89	-75.3	74.0	8.31	0.62	2.47	K3V	6.74	64.2	32.1	0.66
	B	3874 553	10.99	1.07	-75.1	69.1	8.46	0.63	2.47	K3V	6.74	68.8	33.3	0.66
BVD 111	**A**	9263 434	10.40	0.84	-12.2	-48.1	8.83	0.38	1.68	G6V	5.26	112.4	26.4	0.91
	B	9263 412	10.64	0.72	-11.8	-47.7	8.93	0.40	1.68	G6V	5.26	117.7	27.4	0.91
GRV 903	**A**	2028 273	9.02	0.93	-90.8	-114.6	6.77	0.54	2.26	K2V	6.46	32.7	22.7	0.69
15211+2534	**B**	2028 252	10.99	0.97	-86.2	-118.5	7.66	0.80	3.37	K8V	8.32	34.8	24.2	0.63
BVD 113	**A**	7321 464	10.66	0.85	-44.7	-43.0	8.93	0.42	1.76	G7V	5.42	113.4	33.4	0.88
	B	7321 467	11.92	0.43	-43.6	-46.7	9.48	0.56	2.26	K2V	6.46	114.0	34.5	0.69
BVD 114	**A**	6183 882	10.62	0.87	-3.6	-32.0	8.80	0.47	1.84	G8V	5.58	103.0	15.7	0.84
	B	6183 1018	11.55	0.42	-4.5	-29.0	9.42	0.47	1.92	G9V	5.74	132.1	18.4	0.81
BVD 115	**A**	9263 591	10.28	0.45	-20.1	-37.6	8.86	0.34	1.36	F7V	3.80	192.7	38.9	1.30
	B	9263 541	11.17	0.48	-17.9	-35.0	9.71	0.31	1.39	F8V	4.00	263.5	49.1	1.23
BVD 116	**A**	7327 2239	11.42	0.81	-20.1	-17.7	9.90	0.34	1.48	G1V	4.54	233.2	29.6	1.08
	B	7327 2240	11.65	0.45	-22.7	-19.6	9.91	0.31	1.39	F8V	4.00	288.9	41.1	1.23
BVD 117	**A**	7856 701	10.41	0.53	-22.6	-30.8	8.88	0.28	1.48	G1V	4.54	145.8	26.4	1.08
	B	7856 822	11.48	0.78	-23.5	-32.8	9.46	0.47	1.92	G9V	5.74	134.5	25.7	0.81
BVD 118	**A**	5035 472	10.47	0.80	-46.2	-0.5	8.14	0.56	2.26	K2V	6.46	61.5	13.5	0.69
	B	5035 226	10.65	1.50	-47.5	-0.5	8.36	0.60	2.26	K2V	6.46	68.0	15.3	0.69
BVD 119AB-C	**A**	8730 170	9.24	0.46	-51.9	-45.6	7.86	0.32	1.36	F7V	3.80	121.6	39.8	1.30
	B	8730 401	11.40	0.70	-46.4	-47.1	9.66	0.47	1.92	G9V	5.74	147.5	46.2	0.81
GRV 959	**A**	2087 425	10.17	0.82	-15.3	-45.5	7.9	0.59	2.26	K2IV:	3.50	215.0	49.0	1.60
17302+2901	**B**	2087 1177	10.76	0.51	-18.6	-49.6	9.15	0.40	1.50	G2V	4.68	156.6	39.3	1.04
BVD 121	**A**	8733 308	9.14	0.44	83.9	-2.6	7.87	0.29	1.25	F6V	3.60	127.3	50.6	1.37
	B	8733 814	10.00	0.47	81.2	-4.8	8.61	0.31	1.36	F7V	3.80	171.7	66.2	1.30

Table 3 continues on next page.

New Wide Common Proper Motion Binaries

Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
BVD 122	**A**	7384 122	10.61	0.67	-17.8	-34.9	8.83	0.45	1.76	G7V	5.42	108.3	20.1	0.88
	B	7384 35	11.42	0.56	-18.1	-36.0	9.82	0.41	1.68	G6V	5.26	177.3	33.9	0.91
BVD 123	**A**	5672 536	10.79	0.90	4.4	-43.6	9.03	0.53	1.76	G7V	5.42	118.8	24.7	0.88
	B	5672 877	11.31	0.47	5.5	-40.6	9.54	0.48	1.92	G9V	5.74	139.6	27.1	0.81
BVD 124	**A**	994 240	11.30	0.54	-4.0	-37.3	9.58	0.36	1.57	G4V	4.96	173.3	30.8	0.97
	B	994 1499	12.18	0.85	-5.2	-39.8	10.56	0.39	1.62	G5V	5.10	261.1	49.7	0.94
BVD 125	**A**	2098 629	8.15	0.43	-42.1	-116.9	6.94	0.26	1.25	F6V	3.60	82.9	48.9	1.37
	B	2098 496	9.92	0.65	-39.2	-123.3	8.15	0.50	1.76	G7V	5.42	79.2	48.6	0.88
BVD 152	**A**	7890 1416	9.13	0.49	-44.2	-52.1	7.91	0.25	1.25	F6V	3.60	129.7	42.0	1.37
	B	7890 2073	11.37	0.40	-43.1	-52.1	9.33	0.47	1.92	G9V	5.74	126.7	40.6	0.81
BVD 126	**A**	5698 3041	11.21	1.29	19.2	60.0	9.28	0.57	1.92	G9V	5.74	123.8	37.0	0.81
	B	5698 5013	11.84	1.00	22.6	66.5	9.40	0.57	2.26	K2V	6.46	109.8	36.6	0.69
BVD 127	**A**	4438 1755	9.63	0.50	28.4	95.7	8.37	0.26	1.25	F6V	3.60	160.3	75.8	1.37
	B	4438 1785	11.36	0.55	31.9	96.4	9.59	0.46	1.84	G8V	5.58	148.2	71.3	0.84
BVD 128	**A**	4578 808	9.99	0.52	-12.9	25.6	8.64	0.29	1.36	F7V	3.80	174.1	23.7	1.30
	B	4578 843	10.89	0.67	-13.3	23.1	9.35	0.35	1.54	G3V	4.82	163.6	20.7	1.01
SRT 1	**A**	5705 507	8.96	0.54	41.2	-155.1	7.31	0.38	1.62	G5V	5.10	58.5	44.5	0.94
18501-1317	**B**	5705 286	9.45	0.64	40.6	-152.6	7.63	0.42	1.76	G7V	5.42	62.3	46.7	0.88
BVD 130	**A**	5130 357	10.26	0.62	35.4	27.7	8.83	0.28	1.45	G0V	4.40	150.2	32.0	1.12
	B	5130 817	10.83	0.54	37.6	26.8	9.18	0.42	1.68	G6V	5.26	132.1	28.9	0.91
ARY 48	**A**	2690 1597	8.18	0.49	46.4	79.2	6.93	0.26	1.25	F6V	3.60	82.6	35.9	1.37
20378+3224	**B**	2690 1464	8.70	0.58	45.7	78.7	7.26	0.31	1.42	F9V	4.20	78.8	34.0	1.17
BVD 131	**A**	5177 10	10.34	0.48	-29.2	-27.9	8.81	0.39	1.45	G0V	4.40	148.9	28.5	1.12
	B	5177 1136	11.15	0.44	-32.5	-28.5	9.60	0.36	1.54	G3V	4.82	183.6	37.6	1.01
BVD 132AB-C	**A**	9101 1039	9.08	0.53	2.3	-101.4	7.65	0.31	1.42	F9V	4.20	94.4	45.4	1.17
	B	9101 408	9.98	0.64	5.2	-97.8	8.27	0.40	1.68	G6V	5.26	86.9	40.3	0.91
BVD 133	**A**	8421 1258	10.29	0.59	4.6	-32.4	9.02	0.31	1.36	F7V	3.80	207.4	32.2	1.30
	B	8421 1224	10.51	0.68	6.8	-32.9	9.04	0.41	1.50	G2V	4.68	148.9	23.7	1.04
BVD 153	**A**	7974 946	10.31	0.45	64.7	12.2	9.15	0.28	1.14	F5V	3.40	239.2	74.7	1.44
	B	7974 244	11.13	0.46	60.9	10.0	9.94	0.29	1.25	F6V	3.60	330.2	96.6	1.37
BVD 134	**A**	3953 330	10.51	1.13	-13.9	-60.3	7.95	0.63	2.47	K3IV-V				
	B	3953 964	11.67	0.34	-16.8	-62.7	9.61	0.39	1.62	G5V	5.10	168.6	51.9	0.94
BVD 135	**A**	4461 627	7.92	0.37	10.6	-46.8	6.93	0.20	0.96	F3V	3.08	91.5	20.8	1.57
	B	4461 677	9.29	0.65	13.9	-48.2	7.93	0.36	1.42	F9V	4.20	107.3	25.5	1.17
BVD 136	**A**	8434 1082	9.96	0.61	-17.2	-44.0	8.66	0.37	1.36	F7V	3.80	175.7	39.3	1.30
	B	8434 737	12.03	1.42	-18.2	-43.3	9.97	0.51	2.00	K0V	5.90	164.0	36.5	0.79
BVD 137	**A**	6947 961	7.65	0.61	200.7	-63.5	6.09	0.38	1.54	G3V	4.82	36.5	36.4	1.01
	B	6947 759	9.78	0.87	206.7	-66.0	7.62	0.68	2.13	K1V	6.18	51.9	53.3	0.74
BVD 138	**A**	6939 947	11.45	0.96	3.4	-60.5	9.36	0.51	2.00	K0V	5.90	123.8	35.6	0.79
	B	6939 913	12.02	1.22	1.6	-59.3	9.37	0.63	2.47	K3V	6.74	104.7	29.4	0.66

Table 3 continues on next page.

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Table 3 (continued): Astrophysical data for the components of the double stars.

			Tycho-2				2MASS							
Double		**GSC**	**V**	**B-V**	**μ(α)**	**μ(δ)**	**K**	**J-K**	**V-K**	**Sp**	**Mv**	**Dist. (pc)**	**Vt (km/s)**	**Mass ($M_\odot$)**
BVD 139AB-C	**A**	5795 175	8.47	0.60	136.0	36.3	6.87	0.40	1.57	G4V	4.96	49.8	33.2	0.97
	B	5795 250	10.85	0.67	136.7	35.0	9.03	0.53	1.84	G8V	5.58	114.5	76.6	0.84
BVD 154	**A**	7493 121	10.25	0.62	56.1	-23.5	8.84	0.35	1.45	G0V	4.40	150.9	43.5	1.12
	B	7493 627	11.20	0.65	56.7	-20.7	9.26	0.47	1.92	G9V	5.74	122.7	35.1	0.81
BVD 140	**A**	6382 814	10.63	0.64	27.0	-46.4	8.82	0.45	1.84	G8V	5.58	103.9	26.4	0.84
	B	6382 964	11.06	0.22	31.2	-45.7	9.17	0.35	1.84	G8V	5.58	122.1	32.0	0.84
BVD 155	**A**	6958 1533	9.60	0.55	66.9	-140.3	8.10	0.34	1.45	G0V	4.40	107.3	79.1	1.12
	B	6958 1454	10.33	0.51	65.1	-139.9	8.62	0.37	1.57	G4V	4.96	111.4	81.5	0.97
BVD 141	**A**	9123 153	9.30	0.55	116.7	43.7	7.84	0.34	1.45	G0V	4.40	95.2	56.3	1.12
	B	9123 1881	10.60	0.75	122.8	43.3	8.64	0.54	1.92	G9V	5.74	92.2	56.9	0.81
BVD 156	**A**	8008 899	9.97	0.47	56.9	-48.7	8.53	0.36	1.39	F8V	4.00	153.0	54.3	1.23
	B	8008 734	11.47	0.50	58.6	-46.6	9.71	0.40	1.68	G6V	5.26	168.6	59.8	0.91
BVD 157	**A**	8454 750	10.46	0.60	26.3	-52.5	9.07	0.37	1.42	F9V	4.20	181.5	50.5	1.17
	B	8454 716	12.21	0.57	24.4	-51.5	9.59	0.58	2.26	K2V	6.46	119.9	32.4	0.69
BVD 142AB-C	**A**	3225 2806	7.75	0.42	-97.7	-83.6	6.56	0.24	1.14	F5V	3.40	72.6	44.2	1.44
	B	3225 2312	10.18	0.94	-96.0	-83.5	8.21	0.51	2.00	K0V	5.90	72.9	44.0	0.79
BVD 158	**A**	8454 107	9.11	0.62	-3.5	-79.3	7.54	0.36	1.57	G4V	4.96	67.7	25.5	0.97
	B	8454 6	10.10	0.82	-3.5	-77.2	8.19	0.46	1.92	G9V	5.74	75.0	27.5	0.81
BVD 143	**A**	9129 969	9.86	0.47	47.5	-28.9	8.54	0.29	1.36	F7V	3.80	166.3	43.8	1.30
	B	9129 1760	10.58	0.62	51.0	-25.8	8.96	0.39	1.62	G5V	5.10	125.0	33.9	0.94

Table 4: Astrometric Measurements

Designation	**RA_ 2000**	**DEC_2000**	**Epoch**	**θ**	**ρ**	**N**	**Observer**	**Method**
BVD 30 AB-C	00 02 51.02	-74 35 52.0	1907.981	11.0	37.53	1	FMR	AC2000
			1991.700	11.5	37.81	1	FMR	TYCHO2
BVD 46	00 08 01.35	-31 38 41.8	1912.922	328.0	20.01	1	FMR	AC2000
			1991.693	328.4	20.18	1	FMR	TYCHO2
			1998.874	328.5	20.19	1	FMR	2MASS
BVD 11	00 09 34.95	+53 24 56.2	1901.817	111.9	13.11	1	FMR	AC2000
			1991.657	111.8	12.95	1	FMR	TYCHO2
			1998.847	113.1	13.02	1	FMR	2MASS
			2006.516	113.2	12.93	10	RNA	CCD
			2006.578	113.4	12.92	5	OMG	CCD
			2006.626	113.1	12.99	5	ERE	CCD

Table 4 continues on next page.

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Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
BVD 63	00 11 24.73	-40 48 39.6	1899.337	126.2	68.41	1	FMR	AC2000
			1991.675	126.2	68.67	1	FMR	TYCHO2
HJL 1	00 11 54.81	+66 21 09.8	1895.341	351.1	30.94	1	FMR	AC2000
			1991.620*	350.7	30.90	1	FMR	TYCHO2
			1999.795*	350.7	30.92	1	FMR	2MASS
			2006.609	350.6	30.89	10	RNA	CCD
			2006.625	350.6	30.96	5	ERE	CCD
			2006.635	350.5	30.88	5	OMG	CCD
LDS 5	00 13 39.15	-28 18 02.6	1991.705*	3.0	44.01	1	FMR	TYCHO2
			1998.850*	2.8	43.90	1	FMR	2MASS
			2006.631	2.8	43.85	5	ERE	CCD
BVD 12	00 30 38.04	-18 37 15.4	1991.635	314.2	143.74	1	FMR	TYCHO2
			1999.549	314.3	143.81	1	FMR	2MASS
BVD 13	00 36 49.02	-38 48 26.1	1905.339	223.6	22.62	1	FMR	AC2000
			1977.687	223.6	22.74	1	BVD	DSS
			1991.800	222.9	22.51	1	FMR	TYCHO2
			1999.582	222.9	22.51	1	FMR	2MASS
BVD 66	00 50 16.50	-02 26 59.8	1895.807	108.6	39.50	1	FMR	AC2000
			1991.568	108.7	39.59	1	FMR	TYCHO2
			1995.893	108.8	39.67	1	BVD	DSS
			1998.746	108.5	39.50	1	FMR	2MASS
BVD 14	00 52 45.94	+27 13 31.7	1897.181	225.9	12.31	1	FMR	AC2000
			1991.662	225.0	12.56	1	FMR	TYCHO2
			1997.825	224.7	12.73	1	FMR	2MASS
			2006.629	224.6	12.73	5	ERE	CCD
BVD 15	01 20 21.31	+09 36 45.0	1910.887	213.4	46.29	1	FMR	AC2000
			1954.681	213.1	46.45	1	BVD	DSS
			1991.657	213.4	46.47	1	FMR	TYCHO2
			1995.801	213.3	46.67	1	BVD	DSS
			2000.732	213.4	46.48	1	FMR	2MASS
			2006.626	213.5	46.62	4	ERE	CCD
BVD 16	01 23 39.94	-41 48 14.1	1900.988	98.7	21.44	1	FMR	AC2000
			1977.632	98.7	21.31	1	BVD	DSS
			1991.615	98.3	21.28	1	FMR	TYCHO2
			1998.833	98.4	21.25	1	FMR	2MASS
BVD 17	01 30 06.46	-40 24 07.8	1900.870	175.9	21.21	1	FMR	AC2000
			1977.632	176.7	20.38	1	BVD	DSS
			1991.657	175.6	20.46	1	FMR	TYCHO2
			1998.833	176.2	20.65	1	FMR	2MASS

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
BVD 18	01 32 19.10	+45 59 27.4	1898.575	231.1	85.49	1	FMR	AC2000
			1953.784	230.9	85.68	1	BVD	DSS
			1991.537	231.1	85.32	1	FMR	TYCHO2
			1992.801	230.8	85.57	1	BVD	DSS
			1999.702	231.1	85.18	1	FMR	2MASS
			2006.557	231.0	85.28	9	RNA	CCD
			2006.626	231.1	85.33	4	ERE	CCD
BVD 19	01 34 03.62	+82 25 39.0	1898.728	37.7	17.06	1	FMR	AC2000
			1991.718	37.2	17.30	1	FMR	TYCHO2
			2000.722	37.5	17.01	1	FMR	2MASS
			2009.197	37.2	17.05	6	BVD	CCD
HJL 20	01 35 01.39	+60 46 45.5	1991.857*	79.0	44.31	1	FMR	TYCHO2
			1999.741*	79.0	44.32	1	FMR	2MASS
			2006.617	79.0	44.33	9	RNA	CCD
			2006.626	79.0	44.32	5	ERE	CCD
			2009.205	79.0	44.38	6	BVD	CCD
BVD 21	01 56 47.31	+23 03 04.2	1892.368	137.9	59.61	1	FMR	AC2000
			1991.677	137.7	59.41	1	FMR	TYCHO2
			1998.880	137.9	59.36	1	FMR	2MASS
BVD 22	02 05 15.48	+23 52 15.6	1892.539	0.5	44.49	1	FMR	AC2000
			1991.745	1.1	44.70	1	FMR	TYCHO2
			1997.798	0.7	44.66	1	FMR	2MASS
			2006.640	0.7	44.74	5	ERE	CCD
			2006.905	0.6	44.70	8	RNA	CCD
BVD 23	02 05 38.24	+00 31 09.8	1903.514	341.9	30.70	1	FMR	AC2000
			1953.774	341.7	30.47	1	BVD	DSS
			1991.875	342.6	30.80	1	FMR	TYCHO2
			1996.784	343.1	30.81	1	BVD	DSS
			2000.658	342.4	30.74	1	FMR	2MASS
BVD 24	02 19 51.74	-31 54 05.6	1913.330	128.9	114.15	1	FMR	AC2000
			1991.492	128.9	114.33	1	FMR	TYCHO2
BVD 25	02 33 03.13	-77 37 44.7	1895.944	271.9	40.71	1	FMR	AC2000
			1991.690	272.1	40.66	1	FMR	TYCHO2
BVD 65	02 43 23.21	-42 32 02.8	1900.260	330.2	31.98	1	FMR	AC2000
			1991.695	330.4	31.92	1	FMR	TYCHO2
BVD 26	02 44 34.24	+79 11 56.0	1897.872	60.8	48.73	1	FMR	AC2000
			1991.590	61.8	48.62	1	FMR	TYCHO2
			2000.744	62.0	48.55	1	FMR	2MASS
			2009.255	62.0	48.42	6	BVD	CCD

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
BVD 27	02 50 26.95	+29 58 21.5	1902.418	141.5	24.88	1	FMR	AC2000
			1991.733	141.6	25.19	1	FMR	TYCHO2
			1997.962	141.1	25.02	1	FMR	2MASS
			2006.626	141.1	25.05	4	ERE	CCD
			2006.635	141.1	25.02	5	OMG	CCD
			2006.904	141.1	25.05	12	RNA	CCD
			2009.197	141.4	24.98	6	BVD	CCD
BVD 28	02 53 27.89	-03 29 38.5	1991.690	338.8	105.15	1	FMR	TYCHO2
			1998.740	338.8	105.34	1	FMR	2MASS
BVD 29	02 59 15.22	-05 15 41.8	1895.076	0.3	52.02	1	FMR	AC2000
			1991.670	0.6	51.66	1	FMR	TYCHO2
			1998.741	0.7	51.65	1	FMR	2MASS
BVD 71	03 07 31.05	-74 30 27.0	1894.877	276.2	60.26	1	FMR	AC2000
			1991.705	276.3	60.31	1	FMR	TYCHO2
POP 223	03 11 23.71	+44 29 56.6	1895.932	180.2	15.01	1	FMR	AC2000
			1991.650*	181.4	15.04	1	FMR	TYCHO2
			1998.850*	181.2	15.04	1	FMR	2MASS
			2006.651	181.2	15.06	5	ERE	CCD
			2006.904	181.2	15.05	10	RNA	CCD
BVD 31	03 17 06.28	+67 05 27.1	1894.428	162.0	53.58	1	FMR	AC2000
			1991.790	163.2	53.23	1	FMR	TYCHO2
			1999.807	163.3	53.25	1	FMR	2MASS
			2009.255	163.6	53.11	6	BVD	CCD
BVD 32	03 17 42.76	+58 46 58.1	1914.073	58.4	86.14	1	FMR	AC2000
			1991.730	58.3	85.77	1	FMR	TYCHO2
			1999.875	58.2	85.79	1	FMR	2MASS
			2009.255	58.2	85.61	6	BVD	CCD
BVD 33	03 18 24.38	-27 34 12.8	1913.035	301.2	24.52	1	FMR	AC2000
			1991.787	301.4	24.57	1	FMR	TYCHO2
BVD 34	03 20 07.47	+36 10 51.1	1938.216	64.7	15.39	1	FMR	AC2000
			1998.827	62.6	15.30	1	FMR	2MASS
			2006.626	62.4	15.22	5	ERE	CCD
			2006.904	62.1	15.21	10	RNA	CCD
			2009.205	62.3	15.24	6	BVD	CCD
BVD 35	03 22 02.67	-33 49 06.6	1914.298	239.6	17.93	1	FMR	AC2000
			1991.703	238.7	18.08	1	FMR	TYCHO2
BVD 36	03 35 28.14	+42 18 03.2	1896.023	291.5	39.07	1	FMR	AC2000
			1991.568	291.5	39.02	1	FMR	TYCHO2
			1999.765	291.4	39.06	1	FMR	2MASS

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			2006.651	291.4	39.08	5	ERE	CCD
			2006.904	291.4	39.05	6	RNA	CCD
			2009.112	291.3	39.05	6	BVD	CCD
BVD 37	03 44 43.36	+49 39 38.5	1903.952	142.2	11.03	1	FMR	AC2000
			1991.613	141.9	11.20	1	FMR	TYCHO2
			1999.779	142.4	11.42	1	FMR	2MASS
			2006.777	142.3	11.35	15	ERE	CCD
			2009.112	142.5	11.37	6	BVD	CCD
FEL 1	03 44 46.86	-70 01 35.1	1893.541	82.8	75.87	1	FMR	AC2000
			1991.640	83.1	75.88	1	FMR	TYCHO2
BVD 39	03 48 55.73	-28 06 33.0	1913.777	36.0	51.39	1	FMR	AC2000
			1991.625	35.8	51.38	1	FMR	TYCHO2
HJL 54	03 59 43.23	+82 15 27.0	1898.908*	42.0	23.99	1	FMR	AC2000
			1991.672*	41.7	24.06	1	FMR	TYCHO2
			2009.120	41.7	24.12	6	BVD	CCD
BVD 40AB-C	04 00 03.78	-29 02 16.4	1912.148	170.6	11.24	1	FMR	AC2000
			1991.650	171.7	11.45	1	FMR	TYCHO2
BVD 41	04 07 01.74	-11 46 10.0	1902.383	326.5	18.44	1	FMR	AC2000
			1991.642	326.3	18.15	1	FMR	TYCHO2
			2009.112	326.5	18.19	6	BVD	CCD
BVD 42	04 07 51.04	+02 16 00.6	1909.705	142.6	47.23	1	FMR	AC2000
			1991.557	142.6	47.15	1	FMR	TYCHO2
			2000.061	142.5	47.08	1	FMR	2MASS
			2009.112	142.6	47.20	6	BVD	CCD
BVD 43	04 08 21.26	-48 12 38.9	1903.099	238.2	29.79	1	FMR	AC2000
			1991.613	237.8	29.86	1	FMR	TYCHO2
BVD 44	04 10 03.66	-67 19 33.7	1893.273	256.1	26.22	1	FMR	AC2000
			1991.772	256.1	26.09	1	FMR	TYCHO2
SRT 2	04 11 36.18	-20 21 22.6	1918.837*	334.2	62.20	1	FMR	AC2000
			1991.488*	334.4	61.77	1	FMR	TYCHO2
BVD 45	04 18 01.38	+00 30 35.9	1901.112	182.0	38.73	1	FMR	AC2000
			1951.009	182.4	38.73	1	BVD	DSS
			1991.042	181.9	38.84	1	BVD	DSS
			1991.705	178.3	38.96	1	FMR	TYCHO2
			1998.722	181.8	38.82	1	FMR	2MASS
HJL 2	04 25 40.25	+63 40 29.5	1908.046	213.5	209.93	1	FMR	AC2000
			1991.500	213.5	209.63	1	FMR	TYCHO2
			1999.187	213.6	209.67	1	FMR	2MASS
			2009.255	213.6	209.73	6	BVD	CCD

Table 4 continues on next page.

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Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
BVD 144	04 26 27.25	+78 47 26.0	1898.913	344.8	12.97	1	FMR	AC2000
			1991.675	343.8	13.01	1	FMR	TYCHO2
			1999.888	344.0	13.12	1	FMR	2MASS
			2009.197	343.9	13.12	6	BVD	CCD
BVD 72	04 39 48.39	-10 09 33.1	1903.992	123.4	25.08	1	FMR	AC2000
			1991.613	122.7	25.09	1	FMR	TYCHO2
			1998.866	122.8	25.06	1	FMR	2MASS
BVD 47	04 45 25.41	+29 55 29.8	1991.645	145.4	84.16	1	FMR	TYCHO2
			1999.009	145.2	83.87	1	FMR	2MASS
			2006.694	145.3	84.23	5	ERE	CCD
			2009.112	145.3	84.14	6	BVD	CCD
BVD 38	04 46 36.21	-29 31 16.6	1912.101	226.8	17.21	1	FMR	AC2000
			1991.563	228.7	17.08	1	FMR	TYCHO2
BVD 48AB	04 51 54.19	-34 14 19.2	1913.483	160.1	52.02	1	FMR	AC2000
			1991.773	159.8	51.91	1	FMR	TYCHO2
			1997.008	160.0	51.86	1	BVD	DSS
			1998.975	160.0	52.25	1	FMR	2MASS
BVD 48AC	04 51 54.19	-34 14 19.2	1913.483	308.7	99.61	1	FMR	AC2000
			1991.758	308.5	99.59	1	FMR	TYCHO2
			1997.008	307.8	99.56	1	BVD	DSS
			1998.975	308.4	99.58	1	FMR	2MASS
BVD 49	04 56 25.97	-38 39 04.0	1912.564	101.4	48.23	1	FMR	AC2000
			1991.657	101.3	48.61	1	FMR	TYCHO2
BVD 50	05 09 12.56	+11 29 43.2	1910.414	104.1	30.86	1	FMR	AC2000
			1991.665	103.8	31.06	1	FMR	TYCHO2
			1999.984	103.8	31.03	1	FMR	2MASS
BVD 51	05 15 23.72	-03 21 57.5	1901.795	317.9	43.81	1	FMR	AC2000
			1991.820	317.5	44.57	1	FMR	TYCHO2
			1998.719	317.3	44.62	1	FMR	2MASS
BVD 52	05 18 08.92	-16 11 13.6	1905.759	225.9	90.13	1	FMR	AC2000
			1991.742	226.0	90.11	1	FMR	TYCHO2
			1999.751	226.0	90.05	1	FMR	2MASS
BVD 53	05 20 45.29	-23 08 33.2	1916.450	84.2	19.10	1	FMR	AC2000
			1980.105	84.8	19.21	1	BVD	DSS
			1991.740	84.4	19.13	1	FMR	TYCHO2
			1999.708	84.6	19.12	1	FMR	2MASS
BVD 89	05 27 04.46	-65 33 26.9	1892.084	31.0	22.78	1	FMR	AC2000
			1991.585	30.8	22.67	1	FMR	TYCHO2
BVD 20AC	05 28 28.01	-39 22 15.7	1904.639	96.1	71.93	1	FMR	AC2000

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			1976.963	95.9	72.24	1	BVD	DSS
			1991.645	96.1	72.37	1	FMR	TYCHO2
			1999.178	96.1	72.42	1	FMR	2MASS
BVD 54	05 28 34.83	-50 53 48.9	1905.048	35.7	27.32	1	FMR	AC2000
			1991.630	35.5	27.35	1	FMR	TYCHO2
BVD 55	05 44 59.58	-30 30 24.3	1913.921	315.1	20.65	1	FMR	AC2000
			1991.645	313.7	21.12	1	FMR	TYCHO2
BVD 56	05 45 55.97	-15 47 38.1	1903.065	108.8	72.75	1	FMR	AC2000
			1991.605	108.9	72.30	1	FMR	TYCHO2
			2009.197	109.0	72.02	6	BVD	CCD
BVD 57AB-C	05 53 35.84	-56 40 13.5	1893.937	115.1	51.34	1	FMR	AC2000
			1991.605	116.0	51.42	1	FMR	TYCHO2
BVD 58	06 00 20.31	+78 33 46.2	1898.542	114.3	17.05	1	FMR	AC2000
			1954.766	115.8	17.01	1	BVD	DSS
			1991.598	115.5	16.95	1	FMR	TYCHO2
			1997.178	116.0	16.96	1	BVD	DSS
			1999.162	115.4	17.02	1	FMR	2MASS
			2009.255	115.2	16.92	6	BVD	CCD
BVD 91	06 03 12.81	-37 57 46.1	1911.715	56.4	45.53	1	FMR	AC2000
			1991.645	55.9	46.10	1	FMR	TYCHO2
BVD 93	06 03 12.81	-37 57 46.1	1999.189	55.9	46.16	1	FMR	2MASS
			1991.660	251.1	20.15	1	FMR	TYCHO2
BVD 59	06 24 25.81	-64 29 57.4	1912.267	124.4	20.86	1	FMR	AC2000
			1991.667	124.0	20.72	1	FMR	TYCHO2
BVD 60	06 35 30.57	+32 41 50.7	1925.417	78.4	54.37	1	FMR	AC2000
			1991.853	77.9	53.99	1	FMR	TYCHO2
			1998.146	74.8	52.64	1	FMR	2MASS
			2006.883	74.6	52.57	5	ERE	CCD
			2009.197	74.5	52.45	6	BVD	CCD
BGH 22	06 38 33.72	-09 45 41.6	1991.835*	150.6	40.01	1	FMR	TYCHO2
BVD 112	06 39 36.12	-43 21 47.9	1899.598	227.4	20.42	1	FMR	AC2000
			1979.955	227.6	20.60	1	BVD	DSS
			1991.655	227.3	20.79	1	FMR	TYCHO2
			1999.255	227.7	20.79	1	FMR	2MASS
BVD 61	06 52 27.26	+59 39 07.8	1907.167	65.9	46.05	1	FMR	AC2000
			1991.728	66.1	45.77	1	FMR	TYCHO2
			2000.012	66.1	45.76	1	FMR	2MASS
			2009.112	66.0	45.74	6	BVD	CCD
BVD 120	06 58 28.46	-20 05 50.8	1918.350	232.1	71.86	1	FMR	AC2000

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			1991.823	232.0	71.61	1	FMR	TYCHO2
BVD 62	06 59 40.58	+55 08 25.9	1913.346	337.7	29.54	1	FMR	AC2000
			1991.540	338.1	29.33	1	FMR	TYCHO2
			1999.012	338.5	29.33	1	FMR	2MASS
			2009.197	338.5	29.35	6	BVD	CCD
ARN 94	07 06 04.09	+52 59 16.0	1903.472	90.8	16.77	1	FMR	AC2000
			1991.807*	91.2	16.79	1	FMR	TYCHO2
			1998.947*	91.2	16.81	1	FMR	2MASS
			2009.112	91.3	16.87	6	BVD	CCD
BVD 129	07 07 17.29	-11 26 13.6	1902.652	89.7	70.26	1	FMR	AC2000
			1991.833	89.6	70.11	1	FMR	TYCHO2
			2009.197	89.6	70.19	6	BVD	CCD
BVD 64	07 09 46.27	-13 59 35.5	1902.175	20.0	149.69	1	FMR	AC2000
			1986.397	20.1	149.81	1	BVD	DSS
			1991.825	20.2	149.72	1	FMR	TYCHO2
			2000.011	20.2	149.46	1	FMR	2MASS
XMI 63	07 31 40.66	-13 00 09.8	1902.103	340.9	18.15	1	FMR	AC2000
			1991.705*	340.8	18.22	1	FMR	TYCHO2
			2009.112	340.8	18.43	6	BVD	CCD
GRV 737	07 32 49.09	+17 57 55.9	1895.743	55.8	23.60	1	FMR	AC2000
			1991.800*	56.1	23.91	1	FMR	TYCHO2
			2009.255	56.1	23.76	6	BVD	CCD
BVD 67	07 43 41.63	-81 42 08.8	1898.436	32.9	34.49	1	FMR	AC2000
			1991.680	32.9	34.44	1	FMR	TYCHO2
			1999.908	32.9	34.40	1	FMR	2MASS
BVD 68	07 48 07.51	+50 13 04.5	1991.730	341.9	31.20	1	FMR	TYCHO2
			2000.225	341.9	31.22	1	FMR	2MASS
			2009.112	341.9	31.21	6	BVD	CCD
BVD 69	07 57 08.93	-13 23 40.3	1902.198	101.9	20.55	1	FMR	AC2000
			1991.657	102.3	20.53	1	FMR	TYCHO2
BVD 70	08 08 19.65	-38 55 42.9	1910.281	318.1	28.68	1	FMR	AC2000
			1991.718	318.2	28.63	1	FMR	TYCHO2
LEP 30	08 15 33.32	+11 25 53.4	1913.261	238.1	32.07	1	FMR	AC2000
			1951.236	238.6	32.09	1	BVD	DSS
			1991.542*	238.3	31.91	1	FMR	TYCHO2
			2000.116*	238.5	31.92	1	FMR	2MASS
			2009.112	238.4	31.88	6	BVD	CCD
BVD 161AC	08 21 20.81	+34 18 36.8	1940.830	98.7	72.79	1	FMR	AC2000
			1991.515	100.5	72.35	1	FMR	TYCHO2

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			1998.217	98.7	72.82	1	FMR	2MASS
			1999.873	99.9	72.43	1	BVD	DSS
			2009.255	98.7	72.79	6	BVD	CCD
BVD 73	08 53 18.33	+28 11 05.9	1898.224	233.3	29.55	1	FMR	AC2000
			1991.590	233.1	29.58	1	FMR	TYCHO2
			2009.197	233.4	29.74	6	BVD	CCD
BVD 74	09 12 32.80	-56 31 50.2	1925.146	104.1	17.63	1	FMR	AC2000
			1991.720	104.8	17.68	1	FMR	TYCHO2
BVD 75	09 15 50.38	-31 22 38.4	1913.063	250.6	31.41	1	FMR	AC2000
			1991.557	251.0	31.49	1	FMR	TYCHO2
BVD 76	09 21 22.46	-36 45 37.1	1913.328	9.9	41.95	1	FMR	AC2000
			1991.682	9.7	42.16	1	FMR	TYCHO2
BVD 145	09 21 32.34	-17 45 25.6	1915.117	317.6	46.60	1	FMR	AC2000
			1991.655	317.4	46.44	1	FMR	TYCHO2
			2009.197	317.4	46.36	6	BVD	CCD
BVD 77	09 31 24.60	+00 12 11.0	1902.870	276.7	41.65	1	FMR	AC2000
			1991.938	276.8	41.75	1	FMR	TYCHO2
			2009.197	276.4	41.72	6	BVD	CCD
BVD 78	09 35 16.06	+34 57 42.5	1937.118	289.0	43.58	1	FMR	AC2000
			1991.547	289.3	44.09	1	FMR	TYCHO2
			1998.225	289.2	44.01	1	FMR	2MASS
			1998.291	288.8	44.14	1	BVD	DSS
			2009.255	289.3	44.04	6	BVD	CCD
BVD 79	10 06 04.83	-35 00 47.0	1913.596	30.3	29.28	1	FMR	AC2000
			1991.672	30.4	29.30	1	FMR	TYCHO2
			1999.219	30.4	29.11	1	FMR	2MASS
BVD 80	10 07 06.64	+56 13 00.2	1912.273	139.9	24.99	1	FMR	AC2000
			1991.740	140.3	24.90	1	FMR	TYCHO2
			1999.053	140.6	24.97	1	FMR	2MASS
			2009.197	140.5	24.93	6	BVD	CCD
BVD 81	10 16 41.83	+25 22 14.5	1991.785	28.1	79.67	1	FMR	TYCHO2
			2009.197	28.1	79.32	38	BVD	CCD
BVD 82	10 34 00.56	-13 54 14.1	1901.237	208.5	18.37	1	FMR	AC2000
			1991.690	208.5	18.00	1	FMR	TYCHO2
			2009.205	209.0	18.24	6	BVD	CCD
BVD 83	10 34 09.64	-51 03 11.6	1905.400	216.9	15.64	1	FMR	AC2000
			1991.677	218.7	15.81	1	FMR	TYCHO2
BVD 84	10 39 50.93	-66 02 43.9	1903.497	24.1	21.13	1	FMR	AC2000
			1991.705	24.9	21.14	1	FMR	TYCHO2

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
BVD 146	10 42 53.84	-71 44 52.9	1892.700	32.6	52.00	1	FMR	AC2000
			1991.660	32.4	52.05	1	FMR	TYCHO2
BVD 147	10 49 07.16	+00 57 39.6	1896.192	128.6	62.81	1	FMR	AC2000
			1991.853	128.6	62.83	1	FMR	TYCHO2
			2009.205	128.7	62.77	6	BVD	CCD
BVD 85	10 52 14.15	-45 10 54.4	1902.776	224.7	44.55	1	FMR	AC2000
			1991.762	224.9	44.72	1	FMR	TYCHO2
BVD 86	10 52 49.54	+78 38 43.7	1896.812	214.0	21.79	1	FMR	AC2000
			1991.795	212.5	22.12	1	FMR	TYCHO2
			2009.205	212.9	21.90	6	BVD	CCD
BVD 87	10 53 20.22	-43 15 59.9	1902.851	354.2	15.11	1	FMR	AC2000
			1991.585	354.7	15.10	1	FMR	TYCHO2
BVD 88	11 06 34.30	-25 13 51.2	1910.202	75.6	48.33	1	FMR	AC2000
			1991.703	75.5	48.36	1	FMR	TYCHO2
GRV 829	11 09 15.26	+00 44 22.0	1909.236*	62.0	29.70	1	FMR	AC2000
			1991.815*	62.4	29.86	1	FMR	TYCHO2
			2009.255	62.1	29.67	6	BVD	CCD
HJL 141	11 15 17.89	+02 03 49.3	1909.810	59.7	64.12	1	FMR	AC2000
			1991.813*	59.9	64.16	1	FMR	TYCHO2
			2000.124*	59.7	64.23	1	FMR	2MASS
			2009.205	59.7	64.19	6	BVD	CCD
			2009.255	59.8	64.19	6	BVD	CCD
BVD 148	11 26 26.08	-27 35 06.1	1913.234	37.2	54.46	1	FMR	AC2000
			1991.627	36.9	54.03	1	FMR	TYCHO2
BVD 90	11 30 43.79	-21 26 09.0	1919.382	153.1	23.96	1	FMR	AC2000
			1991.720	151.5	22.21	1	FMR	TYCHO2
			2009.255	150.9	21.74	4	BVD	CCD
GRV 840	11 37 24.63	+28 53 14.1	1902.083	296.0	27.05	1	FMR	AC2000
			1991.830*	296.4	27.03	1	FMR	TYCHO2
			2000.097*	296.1	27.05	1	FMR	2MASS
			2006.496	296.1	27.06	4	ERE	CCD
			2006.497	296.1	27.06	5	JCA	CCD
			2006.554	296.0	27.02	10	RNA	CCD
			2009.255	296.1	27.05	6	BVD	CCD
BVD 92	11 38 43.15	+32 37 33.1	1925.874	60.0	113.92	1	FMR	AC2000
			1991.758	59.9	113.79	1	FMR	TYCHO2
			2000.277	59.9	113.78	1	FMR	2MASS
			2006.497	59.9	113.95	4	JCA	CCD
			2006.524	59.9	113.82	8	RNA	CCD

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			2009.255	59.8	113.82	6	BVD	CCD
GRV 841	11 42 26.53	+39 34 52.0	1895.316*	202.6	64.56	1	FMR	AC2000
			1991.625*	202.6	64.57	1	FMR	TYCHO2
			2000.031*	202.6	64.58	1	FMR	2MASS
			2006.497	202.7	64.55	5	JCA	CCD
			2009.255	202.7	64.48	6	BVD	CCD
BVD 94	11 44 16.90	-59 54 43.5	1894.020	305.4	26.16	1	FMR	AC2000
			1991.640	305.7	26.17	1	FMR	TYCHO2
BVD 95	11 47 23.33	+54 58 00.2	1914.207	215.9	28.98	1	FMR	AC2000
			1950.217	217.1	28.91	1	BVD	DSS
			1991.645	216.7	29.00	1	FMR	TYCHO2
			1994.286	217.3	29.00	1	BVD	DSS
			2000.127	216.7	29.08	1	FMR	2MASS
			2006.497	216.7	29.08	5	JCA	CCD
			2006.642	216.7	29.07	5	ERE	CCD
			2009.255	216.7	29.05	5	BVD	CCD
BVD 96	11 53 05.83	-27 18 29.1	1912.359	238.1	134.02	1	FMR	AC2000
			1978.401	238.0	134.18	1	BVD	DSS
			1991.617	238.0	134.35	1	FMR	TYCHO2
			2000.086	238.0	134.32	1	FMR	2MASS
BVD 97	11 54 25.37	-20 45 45.6	1919.272	183.7	31.58	1	FMR	AC2000
			1991.593	186.0	30.71	1	FMR	TYCHO2
			2009.255	186.7	30.38	6	BVD	CCD
BVD 98	12 11 41.83	-49 57 26.2	1904.871	206.6	21.24	1	FMR	AC2000
			1991.535	206.7	21.36	1	FMR	TYCHO2
BVD 99	12 21 58.87	-47 01 00.7	1902.212	319.0	25.74	1	FMR	AC2000
			1991.880	319.6	25.84	1	FMR	TYCHO2
			1999.343	319.9	25.68	1	FMR	2MASS
BVD 149AB-C	13 07 52.27	-52 42 29.8	1991.880	276.8	88.55	1	FMR	TYCHO2
			1999.392	276.5	88.50	1	FMR	2MASS
BVD 100	13 10 43.66	+70 46 07.0	1991.728	246.3	86.62	1	FMR	TYCHO2
			1999.373	246.5	86.65	1	FMR	2MASS
			2009.205	246.4	86.68	6	BVD	CCD
BVD 101	13 18 45.29	+32 10 11.7	1922.433	283.0	66.69	1	FMR	AC2000
			1991.510	283.0	66.49	1	FMR	TYCHO2
			1999.141	283.0	66.47	1	FMR	2MASS
			2006.439	283.0	66.55	7	ERE	CCD
			2006.477	283.1	66.55	4	JCA	CCD
			2006.502	283.0	66.57	10	RNA	CCD

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			2009.255	283.1	66.43	6	BVD	CCD
BVD 102	13 28 56.56	+40 40 33.3	1896.245	264.8	45.34	1	FMR	AC2000
			1991.557	264.8	45.06	1	FMR	TYCHO2
			1998.294	264.7	45.19	1	FMR	2MASS
			2006.496	264.7	45.30	4	ERE	CCD
			2006.497	264.5	45.22	3	JCA	CCD
			2009.205	264.7	45.19	6	BVD	CCD
BVD 150	13 29 40.67	-16 33 55.5	1906.545	344.8	38.20	1	FMR	AC2000
			1991.810	344.9	38.33	1	FMR	TYCHO2
BVD 103	13 30 08.24	-04 12 57.4	1893.931	82.6	38.47	1	FMR	AC2000
			1991.617	82.8	38.47	1	FMR	TYCHO2
			1999.091	82.7	38.42	1	FMR	2MASS
			2009.205	82.8	38.47	6	BVD	CCD
HJL 193	13 40 08.39	+68 44 29.0	1897.488	110.1	34.50	1	FMR	AC2000
			1991.703*	110.9	34.36	1	FMR	TYCHO2
			1999.261*	110.9	34.34	1	FMR	2MASS
			2006.497	110.9	34.38	5	JCA	CCD
			2006.576	111.1	34.40	4	ERE	CCD
			2009.205	111.0	34.33	6	BVD	CCD
HJL 195	13 53 29.85	+03 37 36.8	1909.354	225.1	36.04	1	FMR	AC2000
			1991.583*	225.2	36.05	1	FMR	TYCHO2
			2000.160*	225.2	36.08	1	FMR	2MASS
			2006.515	225.2	36.08	3	ERE	CCD
BVD 104	13 56 40.32	+78 02 00.3	1898.315	66.6	48.24	1	FMR	AC2000
			1991.760	66.3	48.28	1	FMR	TYCHO2
			1999.439	66.2	48.30	1	FMR	2MASS
			2009.205	66.2	48.25	6	BVD	CCD
BVD 105	13 59 46.36	+64 41 30.4	1895.321	276.7	45.55	1	FMR	AC2000
			1991.728	276.7	45.81	1	FMR	TYCHO2
			1999.343	276.8	45.78	1	FMR	2MASS
			2006.441	276.7	45.80	8	ERE	CCD
			2006.477	276.6	45.79	4	JCA	CCD
			2006.502	276.6	45.68	10	RNA	CCD
			2009.255	276.8	45.77	6	BVD	CCD
BVD 106	14 16 43.57	+79 35 49.4	1898.849	344.0	24.50	1	FMR	AC2000
			1953.524	344.9	24.61	1	BVD	DSS
			1991.877	344.2	24.49	1	FMR	TYCHO2
			1998.226	343.7	24.51	1	BVD	DSS
			1999.308	343.9	24.35	1	FMR	2MASS

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			2009.255	344.1	24.42	6	BVD	CCD
BVD 107	14 22 21.30	+66 16 25.1	1895.313	231.9	38.38	1	FMR	AC2000
			1991.670	231.8	38.39	1	FMR	TYCHO2
			1999.381	231.7	38.42	1	FMR	2MASS
			2006.497	231.7	38.48	5	JCA	CCD
			2006.576	231.5	38.46	4	ERE	CCD
			2009.205	231.8	38.45	6	BVD	CCD
BVD 108	14 38 04.28	-09 44 16.4	1905.415	280.2	45.68	1	FMR	AC2000
			1991.760	280.5	46.20	1	FMR	TYCHO2
			1999.198	279.8	46.21	1	FMR	2MASS
			2006.515	279.3	46.10	4	ERE	CCD
			2006.562	279.4	46.00	5	JCA	CCD
			2006.628	279.5	45.96	5	ERE	CCD
			2009.255	279.4	46.27	6	BVD	CCD
BVD 109	14 51 32.50	-18 30 58.1	1916.584	91.9	59.09	1	FMR	AC2000
			1991.748	92.3	59.13	1	FMR	TYCHO2
			1998.349	92.2	59.08	1	FMR	2MASS
			2006.560	92.3	59.08	5	ERE	CCD
BVD 151	15 14 35.65	-58 01 05.5	1922.999	168.1	23.44	1	FMR	AC2000
			1991.712	168.5	23.24	1	FMR	TYCHO2
BVD 110	15 14 36.06	+59 17 03.6	1905.671	171.1	22.33	1	FMR	AC2000
			1991.673	171.0	22.82	1	FMR	TYCHO2
			1999.278	171.2	22.79	1	FMR	2MASS
			2006.500	171.1	22.92	5	JCA	CCD
			2006.574	171.1	22.83	5	ERE	CCD
			2006.642	171.1	22.82	8	RNA	CCD
			2009.205	171.1	22.85	6	BVD	CCD
BVD 111	15 16 40.81	-70 13 25.1	1894.998	124.8	29.76	1	FMR	AC2000
			1991.660	124.7	29.77	1	FMR	TYCHO2
GRV 903	15 21 09.41	+25 34 02.7	1905.868	243.4	68.96	1	FMR	AC2000
			1991.515*	242.8	69.23	1	FMR	TYCHO2
			2000.075*	243.1	69.07	1	FMR	2MASS
			2006.441	242.9	69.34	12	ERE	CCD
			2006.477	242.9	69.22	4	JCA	CCD
			2006.505	242.9	69.20	13	RNA	CCD
			2009.255	242.8	69.16	6	BVD	CCD
BVD 113	15 21 26.56	-34 57 44.1	1913.227	266.9	26.73	1	FMR	AC2000
			1991.525	266.3	26.64	1	FMR	TYCHO2
BVD 114	15 21 39.75	-20 40 05.0	1919.931	119.6	21.47	1	FMR	AC2000

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			1991.550	119.0	21.43	1	FMR	TYCHO2
			1998.368	119.3	21.39	1	FMR	2MASS
			2006.560	119.4	21.33	5	ERE	CCD
BVD 115	15 30 47.58	-69 23 45.0	1894.991	338.3	26.00	1	FMR	AC2000
			1991.685	338.9	26.20	1	FMR	TYCHO2
BVD 116	15 39 36.91	-30 10 48.1	1913.549	170.2	16.12	1	FMR	AC2000
			1991.583	170.7	16.21	1	FMR	TYCHO2
BVD 117	16 15 26.58	-40 22 15.6	1901.870	303.1	24.77	1	FMR	AC2000
			1991.520	302.4	24.73	1	FMR	TYCHO2
BVD 118	16 26 28.68	+00 42 21.3	1893.821	239.1	21.85	1	FMR	AC2000
			1991.565	239.2	21.95	1	FMR	TYCHO2
			1999.218	238.9	21.85	1	FMR	2MASS
			2006.516	239.0	21.87	5	ERE	CCD
			2006.530	239.1	21.87	5	JCA	CCD
			2006.601	239.0	21.87	10	RNA	CCD
			2006.631	239.1	21.89	5	RNA	CCD
			2009.255	238.9	21.87	6	BVD	CCD
BVD 119AB-C	16 55 37.76	-54 34 10.7	1903.216	354.6	28.54	1	FMR	AC2000
			1991.542	353.3	27.12	1	FMR	TYCHO2
GRV 959	17 30 13.31	+29 01 12.9	1903.517	356.3	24.50	1	FMR	AC2000
			1991.565*	355.7	24.16	1	FMR	TYCHO2
			2000.256*	355.7	24.27	1	FMR	2MASS
			2006.499	355.6	24.26	1	JCA	CCD
			2006.499	355.6	24.26	24	RNA	CCD
			2006.500	355.7	24.23	5	ERE	CCD
			2009.255	355.3	24.24	6	BVD	CCD
BVD 121	17 38 40.32	-54 28 09.7	1903.614	184.7	39.45	1	FMR	AC2000
			1992.005	185.0	39.68	1	FMR	TYCHO2
BVD 122	17 41 18.87	-34 40 36.1	1912.859	98.2	37.31	1	FMR	AC2000
			1991.450	98.4	37.24	1	FMR	TYCHO2
			1999.507	98.4	37.08	1	FMR	2MASS
BVD 123	17 42 26.77	-13 53 14.3	1907.387	269.1	18.66	1	FMR	AC2000
			1991.792	269.9	18.50	1	FMR	TYCHO2
			1998.321	270.3	18.30	1	FMR	2MASS
			2006.493	270.3	18.49	4	ERE	CCD
			2006.530	270.2	18.52	5	JCA	CCD
			2006.606	270.3	18.48	10	RNA	CCD
BVD 124	17 47 15.46	+08 50 51.6	1912.200	243.0	21.04	1	FMR	AC2000
			1991.588	242.6	21.32	1	FMR	TYCHO2

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			2000.319	242.5	21.22	1	FMR	2MASS
			2006.518	242.4	21.20	5	ERE	CCD
			2006.530	242.5	21.19	5	JCA	CCD
			2006.565	242.5	21.18	10	RNA	CCD
			2006.597	242.5	21.20	5	OMG	CCD
			2006.625	242.5	21.22	4	RNA	CCD
BVD 125	17 54 05.10	+27 20 34.0	1991.615	32.5	48.36	1	FMR	TYCHO2
			2000.204	32.4	48.26	1	FMR	2MASS
			2006.496	32.5	48.32	5	ERE	CCD
			2006.500	32.6	48.24	4	JCA	CCD
			2006.565	32.5	48.29	15	RNA	CCD
			2009.255	32.6	48.27	6	BVD	CCD
BVD 152	17 55 13.02	-39 34 03.0	1907.438	147.9	50.68	1	FMR	AC2000
			1991.358	148.1	50.64	1	FMR	TYCHO2
BVD 126	18 23 21.01	-11 37 01.3	1906.640	288.7	19.10	1	FMR	AC2000
			1991.738	290.7	18.98	1	FMR	TYCHO2
			1999.319	290.3	19.14	1	FMR	2MASS
			2006.518	290.2	19.10	4	ERE	CCD
			2006.530	290.1	19.14	4	JCA	CCD
			2006.606	290.2	19.13	10	RNA	CCD
			2006.625	289.9	19.23	5	RNA	CCD
BVD 127	18 24 04.02	+72 20 05.2	1895.480	326.4	20.00	1	FMR	AC2000
			1991.680	327.2	19.90	1	FMR	TYCHO2
			2000.245	327.5	19.87	1	FMR	2MASS
			2008.544	327.4	19.83	1	BVD	CCD
BVD 128	18 25 14.68	+80 27 44.1	1897.175	317.1	24.90	1	FMR	AC2000
			1991.740	316.8	24.74	1	FMR	TYCHO2
			1999.439	316.5	24.50	1	FMR	2MASS
			2009.205	316.6	24.63	6	BVD	CCD
SRT 1	18 50 04.34	-13 16 28.9	1907.153*	250.9	29.05	1	FMR	AC2000
			1988.309	251.0	29.22	1	BVD	DSS
			1991.637*	251.2	28.92	1	FMR	TYCHO2
			1998.338*	251.3	28.98	1	FMR	2MASS
			2006.493	251.1	29.01	4	ERE	CCD
			2006.513	251.1	28.96	25	RNA	CCD
			2006.530	251.1	28.99	5	JCA	CCD
BVD 130	19 22 04.77	+00 36 37.8	1896.784	295.9	30.44	1	FMR	AC2000
			1991.685	296.2	29.96	1	FMR	TYCHO2
			1999.322	296.0	30.12	1	FMR	2MASS

Table 4 continues on next page.

New Wide Common Proper Motion Binaries

Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			2006.557	296.0	30.21	5	ERE	CCD
			2006.563	296.1	30.16	5	JCA	CCD
			2006.601	296.1	30.12	10	RNA	CCD
ARY 48	20 37 44.96	+32 23 42.3	1914.914	41.2	53.01	1	FMR	AC2000
			1991.670*	41.1	53.16	1	FMR	TYCHO2
			1998.456*	41.2	53.12	1	FMR	2MASS
			2006.557	41.2	53.19	5	ERE	CCD
			2006.563	41.3	53.09	4	JCA	CCD
BVD 131	20 39 01.80	+00 34 42.0	1903.043	133.6	30.23	1	FMR	AC2000
			1991.500	134.0	30.08	1	FMR	TYCHO2
			1998.713	133.9	30.12	1	FMR	2MASS
			2006.557	134.0	30.17	4	ERE	CCD
			2006.563	134.1	30.14	5	JCA	CCD
BVD 132AB-C	20 54 29.92	-60 59 33.2	1923.574	175.4	70.87	1	FMR	AC2000
			1991.735	175.0	70.69	1	FMR	TYCHO2
BVD 133	21 08 04.57	-45 04 35.0	1904.569	246.4	21.61	1	FMR	AC2000
			1991.867	246.0	21.18	1	FMR	TYCHO2
BVD 153	21 12 08.84	-41 27 50.4	1904.090	131.3	44.22	1	FMR	AC2000
			1991.790	131.7	44.17	1	FMR	TYCHO2
BVD 134	21 15 12.76	+53 50 34.6	1900.805	57.2	23.00	1	FMR	AC2000
			1991.655	57.4	22.71	1	FMR	TYCHO2
			1998.860	57.2	22.79	1	FMR	2MASS
			2006.557	57.4	22.91	4	ERE	CCD
			2006.563	57.2	22.93	4	JCA	CCD
			2006.582	57.4	22.79	10	RNA	CCD
BVD 135	21 15 42.59	+68 21 08.1	1894.409	310.2	25.22	1	FMR	AC2000
			1991.780	310.1	24.83	1	FMR	TYCHO2
			2000.768	310.1	24.78	1	FMR	2MASS
			2006.557	310.2	24.99	5	ERE	CCD
			2006.563	310.2	24.88	5	JCA	CCD
			2009.255	310.3	24.76	6	BVD	CCD
BVD 136	21 16 45.98	-51 23 22.7	1902.761	212.1	32.42	1	FMR	AC2000
			1991.800	212.4	32.51	1	FMR	TYCHO2
			1999.647	212.0	32.49	1	FMR	2MASS
BVD 137	21 33 30.86	-27 53 24.4	1991.618	58.3	40.34	1	FMR	TYCHO2
			1998.571	58.0	40.24	1	FMR	2MASS
			2006.553	58.2	40.26	4	ERE	CCD
BVD 138	21 34 16.49	-23 53 29.9	1910.186	121.0	25.44	1	FMR	AC2000
			1991.525	121.1	25.19	1	FMR	TYCHO2

Table 4 continues on next page.

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Table 4: Astrometric Measurements

Designation	RA_ 2000	DEC_2000	Epoch	θ	ρ	N	Observer	Method
			1998.540	121.3	25.12	1	FMR	2MASS
			2006.552	121.2	25.21	5	JCA	CCD
			2006.553	121.1	25.18	4	ERE	CCD
BVD 139AB-C	21 39 39.19	-12 37 20.2	1991.607	287.4	127.96	1	FMR	TYCHO2
			1999.412	287.4	127.97	1	FMR	2MASS
			2006.496	287.3	128.24	4	ERE	CCD
			2006.552	287.3	128.03	5	JCA	CCD
BVD 154	21 41 54.30	-37 09 46.6	1912.843	100.1	31.93	1	FMR	AC2000
			1991.560	99.5	31.87	1	FMR	TYCHO2
BVD 140	21 54 19.41	-20 20 09.6	1920.859	256.3	36.17	1	FMR	AC2000
			1991.593	256.1	35.91	1	FMR	TYCHO2
			1998.521	256.1	35.62	1	FMR	2MASS
			2006.552	256.2	35.75	5	JCA	CCD
			2006.574	256.1	35.81	5	ERE	CCD
			2006.635	256.2	35.83	5	OMG	CCD
BVD 155	22 09 53.23	-25 13 36.0	1991.693	281.4	47.62	1	FMR	TYCHO2
			1998.839	281.5	47.54	1	FMR	2MASS
			2006.552	281.4	47.62	5	JCA	CCD
			2006.553	281.4	47.62	4	ERE	CCD
BVD 141	22 24 49.56	-66 51 33.9	1991.705	183.2	11.61	1	FMR	TYCHO2
BVD 156	23 04 48.01	-40 22 38.3	1903.193	276.3	18.17	1	FMR	AC2000
			1991.593	277.1	18.11	1	FMR	TYCHO2
BVD 157	23 10 18.13	-50 16 06.5	1904.762	17.8	53.63	1	FMR	AC2000
			1991.710	17.9	53.65	1	FMR	TYCHO2
			1999.841	17.9	53.61	1	FMR	2MASS
BVD 142AB-C	23 10 29.37	+41 19 19.5	1991.540	164.7	79.57	1	FMR	TYCHO2
			1999.699	164.6	79.59	1	FMR	2MASS
			1999.699	164.6	79.59	1	FMR	2MASS
			2006.557	164.7	79.68	4	ERE	CCD
BVD 158	23 12 51.36	-51 41 08.9	1905.720	166.3	38.08	1	FMR	AC2000
			1905.720	166.3	38.08	1	FMR	AC2000
			1991.605	166.3	37.78	1	FMR	TYCHO2
			1991.605	166.3	37.78	1	FMR	TYCHO2
BVD 143	23 33 41.24	-64 13 51.7	1906.303	275.7	47.80	1	FMR	AC2000
			1906.303	275.7	47.80	1	FMR	AC2000
			1991.748	275.7	47.92	1	FMR	TYCHO2
			1991.748	275.7	47.92	1	FMR	TYCHO2
			1999.880	275.8	47.93	1	FMR	2MASS
			1999.880	275.8	47.93	1	FMR	2MASS

New Wide Common Proper Motion Binaries

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Double Star Catalog, UCAC2 and USNO-B1.0 maintained at the U.S. Naval Observatory.

The data mining required for this work has been made possible with the use of the SIMBAD astronomical database and VIZIER astronomical catalogs service, both maintained and operated by the *Center de Données Astronomiques de Strasbourg* (http://cdsweb.u-strasbg.fr/)

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