RevMexAA (Serie de Conferencias), **25**, 16–17 (2006)

IMPROVED ASTROMETRIC PARAMETERS FOR EQUATORIAL LDS SYSTEMS

C. E. López[1,2]

RESUMEN

La publicación de extensos catálogos, astrométricos y no astrométricos, junto con la implementación de herramientas para su manejo por parte de incipientes Observatorios Virtuales, constituyen una excelente combinación para la búsqueda a gran escala de diferentes tipos de objetos. Un ejemplo es el que reportamos en este trabajo, donde se dan parámetros astrométricos y magnitudes en diferentes bandas a sistemas dobles ecuatoriales de Luyten (LDS).

ABSTRACT

The advent of very large astrometric and non-astrometric catalogues plus the tools implemented by some of the Virtual Observatory (VO) initiatives constitute an excellent combination to perform extensive searches for different kinds of objects. We report the first results of our data mining project aimed at the identification of equatorial Luyten Double Stars (LDS) systems in those catalogues in order to provide new astrometric parameters as well as magnitudes in different bands.

Key Words: **ASTROMETRY — BINARIES: GENERAL — CATALOGS — STARS: KINEMATICS**

The LDS are groups of stars with an almost identical proper motion and separations in the range $1'' \leq \rho \leq 9'$. These systems were discovered by Luyten during the period 1940—1987 and published in the *Publ. Astr. Obs. Univ. Minnesota* series. Due to their nature, these stars are now included in the Washington Double Stars (WDS) Catalogue (Mason, Wycoff, & Hartkopf 2004). In most cases (in the equatorial band), the epoch of the last observation quoted in the WDS took place around 1960; for other stars there is no observation epoch data, and just a few have been reobserved as recently as 2003.

In order to provide new data, such as accurate coordinates, proper motions and magnitudes in different bands, we are performing data mining of large astrometric and non-astrometric databases through the assistance of the Virtual Observatory (VO). The possibility of using the VO tools in double stars research (among other astrometric projects) has been discussed by López (2004).

Most of the coordinates of the LDS stars given in the WDS are only approximate. As a result, it was necessary to identify each star of the system as the first step. We consider that the different tools provided by ALADIN are quite good. One of the tools, called *RGB*, enables to superimpose colored (in *Red*, *Green* or *Blue*) digitized photographic surveys performed in different epochs (we chose those with the largest epoch differences). The identification of objetcs with rather high proper motions—which is the case of most of the LDS objects—is greatly facilitated.

Once every star of the system was identified, another tool of ALADIN (named $Surveys-in-VizieR$) was used to superimpose 2MASS data in order to get—in addition to the magnitudes—accurate coordinates for each component. With the 2MASS positions, we searched one of the three astrometric catalogues (ordered as follow): the R band of the SuperCosmos Sky Survey (SSSR) (Hambly, Davenhall, Irwin, & MacGillivray 2001), USNO B1.0 (Monet et al. 2003) or UCAC2 (Zacharias et al. 2004). We select the catalogues that provided proper motion data for every member of the system. For LDS systems with $\rho \leq 5''$ (and depending on the magnitude of the components), the photographic surveys SSSR and USNO B1.0 (and sometimes the UCAC2, despite being a CCD based catalogue) generally failed to detect the system components. In those cases, the data extracted from 2MASS is the only information available.

Table 1 presents a sample of the kind of data we have extracted from each catalogue. A complete set of new data for the approximately 800 LDS systems of the area will be soon published.

[1] Observatorio Astronómico Félix Aguilar, Universidad Nacional de San Juan, Argentina.
[2] Yale Southern Observatory, San Juan, Argentina.

TABLE 1

IDENTIFICACTION OF SOME LDS SYSTEMS

LDS#	Catalog	RA (J2000.0) DEC	Epoch	pmRA (mas/yr)	pmDEC (mas/yr)	Magnitudes (J/B)	$(H/R1)$	$(K/R2)$	$(/I)$
5312 A	2MASS	01 04 17.920 −08 25 33.90	1998.9	···	···	12.409	11.804	11.573	···
5312 A	SSSR	01 04 17.842 −08 25 33.14	1988.8	111.	−44.	16.308	···	14.251	12.996
5312 B	2MASS	01 04 17.100 −08 21 33.20	1998.9	···	···	11.987	11.366	11.136	···
5312 B	SSSR	01 04 17.015 −08 21 32.89	1988.8	117.	−24.	16.960	···	14.768	12.882
5321 A	2MASS	01 11 06.440 −11 08 06.90	2000.8	···	···	11.669	11.034	10.820	···
5321 A	SSSR	01 11 06.565 −11 08 07.32	1988.8	−137.	28.	15.421	···	13.111	11.439
5321 B	2MASS	01 11 04.170 −11 08 26.40	2000.8	···	···	13.206	12.619	12.346	···
5321 B	SSSR	01 11 04.299 −11 08 26.93	1988.8	−150.	29.	18.079	···	15.800	14.042

The system ALADIN was used in this research.

This publication makes use of data products from the Two Micron All Sky Survey, which is a joint project of the University of Massachusetts and the Infrared Processing and Analysis Center/California Institute of Technology, funded by the National Aeronautics and Space Administration and the National Science Foundation.

The USNOFS Image and Catalogue Archive, operated by the United States Naval Observatory, Flagstaff Station (`http://www.nofs.navy.mil/data/fchpix/`), was used in this work.

REFERENCES

Hambly, N. C., Davenhall, A. C., Irwin, M. J., & MacGillivray, H. T. 2001, MNRAS, 326, 1315

López, C. E. 2004, Ap&SS, 290, 439

Mason, B. D., Wycoff, G. L., & Hartkopf, W. I. 2004, The Washington Double Star Catalog, `http://ad.usno.navy.mil/wds/`

Monet, D. G. et al. 2003, AJ, 125, 984

Zacharias, N., et al. 2004, AJ, 127, 3043