



BRIEF

CATALOGS SIMBAD





Online Catalogs

Overview

This lesson will focus on SIMBAD. This catalog can be accessed via two methods: CDS and Stelle Doppie.

Information that can be accessed is: Stellar data and summaries and Publication information.



Online Catalogs

SIMBAD via Stelle Doppie

Stelle Doppie

HOME DATABASE WORKBENCH MISC SETUP HELP

FILE | NOTES | REPORTS | MEASURES | IMAGES | NEIGHBORHOODS | COMPLETE

13510+6819 STTA127AB

13^h 50^m 59.40^s +68° 18' 55.6" P.A. 63 SEP 87.5 MAG 6.53,8.32 SP K2IV DIST. 102.35 PC (333.87 L.Y.)

Coord 2000	13510+6819	Discov num	STTA127	Comp	AB	Coord arcsec 2000	13 50 59.40 +68 18 55.6
Date first	1844	Date last	2015	Obs	35		
Pa first	68	Pa last	63	P.A. Now (θ)	63°		
Sep first	71.2	Sep last	87.5	Sep. Now (ρ)	87.5"		
Mag pri	6.53	Mag sec	8.32	delta mag (ΔM)	1.79	Spectral class	K2IV (yellow-orange)
Pri motion ra	-176	Sec motion ra	-104				
Pri motion dec	-058	Sec motion dec	+011				

Notes N L (See Notes, Linear solution)

Theoretical Visual Limit:
rPM=0.54

13510+6819 SYSTEM COMPONENTS

SHOW	NAME	SAO	COORD_2000	DISCOV#	COMP	FIRST	LAST	OBS	PA	SEP	MAG1	MAG2	D_MAG	ORB	CURRENT
Show		16197	13510+6819	STTA127	AB	1844	2015	35	63	87.5	6.53	8.32	1.79		<===
Show		16200	13510+6819	STTA127	BC	1912	2003	4	69	51.9	8.32	13.23	4.91		

Triple system, 0 couples separable
3 visible stars in this system

OTHER CATALOGS AND DESIGNATIONS

Constellation	Draco	SAO	16197	HIP	67589	Tycho2	4402-01968-1
HD	121146	HR	5227	BD	BD+69 724	Distance	102.35
Distance ly	333.87	last precise pa	62.7	last precise sep	87.469		

Actions: [Advanced Search](#), [Go to Simbad](#), [New report](#), [New measure](#)

Computed Lists: [Populars](#), [Latest Populars](#), [Doubles in this session](#), [Doubles seen](#)

Current System: 13510+6819 STTA127AB

Nearby Doubles: 44' : 13443+6841 HJ 2685

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Online Catalogs

SIMBAD via Stelle Doppie

The initial page will show a list of cataloged stars around the RA/DEC from the WDS star inserted into Stelle Doppie.

The stars will be listed by distance from center.

Click on the desired identifier to access more information.

Portal Simbad Vizier Aladin X-Match

AladinLite
Interactive AladinLite view

coord 13 50 59.40 +68 18 55.6 (ICRS, J2000, 2000), radius: 10 arcmin

other query Identifier Coordinate Criteria Reference Bas
modes : query query query query que

Query : coord 13 50 59.40 +68 18 55.6 (ICRS, J2000, 2000)

Number of rows : 10 Plot

Show 100 entries

Search:

N	Identifier	dist (asec)	Otype	ICRS (J2000) RA	ICRS (J2000) DEC	Mag U	Mag B	Mag V	Mag R	Mag I	Sp type	#ref 1850 - 2016	#not
1	HD 121146	1.65	PM*	13 50 59.11872	+68 18 55.0735		7.588	6.402	5.7	5.1	K2IV	65	
2	HD 121163	84.31	*	13 51 12.89091	+68 19 34.5846		8.78	8.26			G5	11	
3	CCDM J13511+6819C	129.95	*i*	13 51 20.7	+68 19 50			13.0			~	0	
4	USNO-A2.0 1575-03385609	268.00	Q?	13 51 36.468	+68 21 47.95		18.8		19.4		~	1	
5	IRXS J135001.1+681855	323.11	X	13 50 01.102	+68 18 55.48						~	0	
6	2MASS J13495975+6818477	330.66	Q?	13 49 59.76	+68 18 47.7		18.3		18.1		~	1	
7	LEDA 91319	370.30	G	13 51 54.2	+68 22 28						~	5	
8	USNO-A2.0 1575-03386435	407.08	Q?	13 52 08.470	+68 21 14.94		19.4		19.0		~	1	
9	TYC 4402-1589-1	531.92	*	13 49 29.079	+68 21 56.97		12.92	11.82			~	0	
10	2MASX J13520714+6812172	548.01	G	13 52 07.141	+68 12 17.27		17				~	1	

Showing 1 to 10 of 10 entries

Previous 1 Next




Online Catalogs

SIMBAD via Stelle Doppie

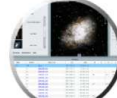
Plots and Images

plot around


radius arcmin



CDS portal



CDS Simplay
(requires flash)



Aladin applet

References (65 between 1850 and 2016)

Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for all other objects (outside the solar system).
Follow new references on this object

sort references reference summary

from: to:

Sort reference summaries by: (not exhaustive, [explanation here](#))

Date | Title/Abstract/Keyword | In table | Score

External archives :

Catalogue information from [VizieR](#) :

[Generic search by coordinates \(radius: 5 arcsec\)](#)

AG+68 565	BD+69 724	CCDM J13511+6819A	DO 34489	FKS 3103
GSC 04402-01968	HD 121146	HIC 67589	HIP 67589	HR 5227
IRAS 13497+6833	LSPM J1350+6818	2MASS J13505915+6818551	NLTT 35503	PPM 18761
SAO 16197	TYC 4402-1968-1	USNO-B1.0 1583-00151750	WDS J13510+6819A	

Portal **Simbad** VizieR Aladin X-Match Other - Help

HD 121146

other query modes :

Identifier query
Coordinate query
Criteria query
Reference query
Basic query
Script submission
TAP
Output options
Help

Query: HD 121146 C.D.S. - SIMBAD4 rel 1.5 - 2016.05.28CEST00:13:48

Available data : [Basic data](#) • [Identifiers](#) • [Plot & images](#) • [Bibliography](#) • [Measurements](#) • [External archives](#) • [Notes](#) • [Annotations](#)

Basic data :

HD 121146 -- High proper-motion Star

Other object types: * (AG, ASCC, ...), ** (BDS, CCM, ...), **PM*** (LTT, LSPM, ...), **IR** (IRAS, 2MASS)

ICRS coord. (ep=*J2000*) : **13 50 59.11872 +68 18 55.0735 (Optical) [3.25 2.91 89] A 2007A&A...474..653V**

FK5 coord. (ep=*J2000* eq=*2000*) : 13 50 59.119 +68 18 55.07 [3.25 2.91 89]

FK4 coord. (ep=*B1950* eq=*1950*) : 13 49 45.27 +68 33 46.0 [18.78 16.75 90]

Gal coord. (ep=*J2000*) : 114.7979 +47.8616 [3.25 2.91 89]

Proper motions *mas/yr* : **-176.93 -59.03 [0.33 0.37 0] A 2007A&A...474..653V**

Radial velocity / Redshift / cz : **V (km/s) -46.60 [0.11] / z (-) -0.000155 [0.000000] / cz -46.60 [0.11] A 2005A&A...430..165F**

Parallax (mas) : **9.77 [0.36] A 2007A&A...474..653V**

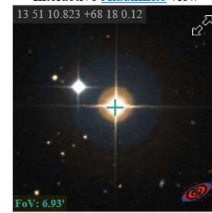
Spectral type : **K2IV D 1995AJ...110.2968L**

Fluxes (7) :

B 7.588 [~] C ~	R 5.7 [~] E 2003AJ...125..984M
V 6.402 [~] C ~	I 5.1 [~] E 2003AJ...125..984M
J 4.351 [0.240] D 2003yCat.2246....0C	H 3.753 [0.232] D 2003yCat.2246....0C
K 3.655 [0.258] D 2003yCat.2246....0C	

SIMBAD with radius arcmin

Interactive [AladinLite](#) view



FoV: 6.93"

2MASS
 DSS
 SDSS

[VizieR photometry viewer](#)

within radius arcsec

Identifiers (33) :

LTT 14048	GC 18744	IDS 13485+6849 A	SKY# 25404
AG+68 565	GCRV 8186	IRAS 13497+6833	TYC 4402-1968-1
ASCC 84047	GEN# +1.00121146	LSPM J1350+6818	UBV M 19809
BD+69 724	Gmb 2060	2MASS J13505915+6818551	USNO-B1.0 1583-00151750
BDS 6664 A	GSC 04402-01968	NLTT 35503	WDS J13510+6819A
CCDM J13511+6819A	HD 121146	FLX 3168	[GSB3] 131
CSI+69 724 1	HIC 67589	PLX 3168.00	
DO 34489	HIP 67589	PPM 18761	
FKS 3103	HR 5227	SAO 16197	

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Online Catalogs - SiMBAD

SIMBAD via CDS for Research

SiMBAD is principally used to access published papers that are referenced in your WDS historical data such as this example:

Click on the SiMBAD link.

WFC1998	Urban, S.E., Corbin, T.E., Wycoff, G.L., Martin, J.C., Jackson, E.S., Zacharias, M.I., & Hall, D.M. AJ 115, 1212, 1998 (Astrographic Cat. 2000)	1998AJ...115.1212U
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The screenshot shows the homepage of the Centre de Données astronomiques de Strasbourg (CDS). The navigation bar includes links for Portal, Simbad, Vizier, Aladin, X-Match, Other, and Help, along with a search bar for CDS web pages. The main content area features the CDS logo and the text 'Centre de Données astronomiques de Strasbourg' and 'Strasbourg astronomical Data Center'. Below this, there are four main service buttons: 'Entry point to all services', 'Object database' (highlighted with a red box), 'Catalogue database', and 'Interactive sky atlas'. Each button has a corresponding search input field. The 'Object database' button is labeled 'Object database' and has a search field labeled 'Obj/position/bibcode'. The 'Catalogue database' button is labeled 'Catalogue database' and has a search field labeled 'Keywords, target, ...'. The 'Interactive sky atlas' button is labeled 'Interactive sky atlas' and has a search field labeled 'Object/position'. The 'Entry point to all services' button is labeled 'Entry point to all services' and has a search field labeled 'Object/position'. Below these buttons, there are sections for 'Other services' (including X-match, InPO, Dictionary, Sesame, and SimPlay) and 'Hosted services' (including ADS mirror, A&A, and TIPTOPbase INES). A 'Latest news' section is also present, listing recent updates and a 'More news' button.

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Online Catalogs - SiMBAD

SIMBAD via CDS for Research

When you click on the SiMBAD link, you will see a page like below. Our attention will focus on the red area: “Queries”

SIMBAD Astronomical Database

Queries	Documentation	Information
basic search	User's guide	Presentation
by identifier		
by coordinates		Image thumbnails
by criteria	Query by urls	
reference query	Nomenclature Dictionary	
scripts	Object types	SimWatch
TAP queries	List of journals	
	Measurement description	
options	Spectral type coding	Release: SIMBAD4 1.5 - Mar-2016
Display all user annotations	User annotations documentation	Release history
	Acknowledgment	

Content	Basic search
The SIMBAD astronomical database provides basic data, cross-identifications, bibliography and measurements for astronomical objects outside the solar system. SIMBAD can be queried by object name, coordinates and various criteria. Lists of objects and scripts can be submitted. Links to some other on-line services are also provided.	<input type="text"/> <small>identifier, coordinates (radius=10 arcmin), or bibcode</small> <input type="button" value="SIMBAD search"/> <input type="button" value="clear"/> help Install the Simbad basic search in your tool bar

Acknowledgment	Statistics								
<p>If the Simbad database was helpful for your research work, the following acknowledgment would be appreciated:</p> <p><i>This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France</i></p> <p>2000,A&AS,143.9, "The SIMBAD astronomical database", Wenger et al.</p>	<p>Simbad contains on 2016.05.26</p> <table border="1"> <tr> <td>8,253,346</td> <td>objects</td> </tr> <tr> <td>23,090,278</td> <td>identifiers</td> </tr> <tr> <td>318,372</td> <td>bibliographic references</td> </tr> <tr> <td>13,845,859</td> <td>citations of objects in papers</td> </tr> </table>	8,253,346	objects	23,090,278	identifiers	318,372	bibliographic references	13,845,859	citations of objects in papers
8,253,346	objects								
23,090,278	identifiers								
318,372	bibliographic references								
13,845,859	citations of objects in papers								

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Online Catalogs - SIMBAD

SIMBAD via CDS for Research

Click on “reference query”

You will see a page like the screen capture on the right.

Queries
basic search
by identifier
by coordinates
by criteria
reference query
scripts
TAP queries
options
Display all user annotations

Portal Simbad Vizier Aladin X-Match Other - Help

SIMBAD: Query references

other query modes: Identifier query Coordinate query Criteria query Reference query Basic query Script submission TAP Output options Help

Enter search criteria:

Journals: Example: A&A,APJ,mnas

year limits: from 1850 to 2016 Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for all other objects (outside the solar system). *ScurentYear* can be used to specify dynamically the current year.

authors: Example: JASCHEK & ('egret d')Acker

title words: Example: supernova & ('crab nebula' | cygnus)

or Enter a bibcode or a DOI:

bibcode or DOI: regular bibcode or DOI Example: 2000A&A...353..322A

display objects in the reference (for regular bibcode only)

or reference items: year: journal abbrev: volume: page:

or Query a file of bibcodes

Enter the name of an ASCII file produced by a text editor, containing one bibcode per line:

2016.05.26-18:41:09



Online Catalogs - SIMBAD

SIMBAD via CDS for Research

If you were to click on the link for “Journals” you would get a list of the various Journals that can be queried by SIMBAD. See image right. These names may also be in your references from the USNO. Scroll through the list.

SIMBAD: Query

other query modes : Identifier query | Coordinate query | Criteria query | Reference query | Basic query | Script submission | TAP | Output options | Help

Enter search criteria:

Journals :

year limits : from to Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for *ScurrentYear* can be used to specify dynamically the current year.

authors : Example: JASCHEK & ('egret d'Acker)

title words :

submit criteria | clear

or Enter a bibcode or a DOI :

bibcode or DOI : Example: 2000A&A...353..322A

display objects in the reference (for regular bibcode only)

or reference items: year: journal abbrev: volume: page:

submit bibcode | clear

or Query a file of bibcodes

Enter the name of an ASCII file produced by a text editor, containing one bibcode per line:

submit file | clear

Portal Simbad VizierR Aladin X-Match Other - Help

List of journals

Simbad Help · Top · Previous · Next Version : 26-May-2016

A&A	<i>Astronomy and Astrophysics</i>
A&ARv	<i>Astronomy and Astrophysics Review</i>
A&AS	<i>Astronomy and Astrophysics, Supplement Series</i>
A&ASS	<i>Astronomy and Astrophysics, Special Supplement Series</i>
A&AT	<i>Astronomical and Astrophysical Transactions (russe ?)</i>
A&C	<i>Astronomy and Computing</i>
A&G	<i>Astronomy and Geophysics (continuation from QJRAS from no 38 - 1997)</i>
A&R	<i>Astronomie und Raumfahrt</i>
AA	<i>Astronomy and Astrophysics Abstracts, Heidelberg</i>
AAfz	<i>Astrometriya i Astrofizika. Respublikanskij Mezhdomsivennyj Sbornik</i>
AAHam	<i>Astronomische Abhandlungen der Hamburger Sternwarte</i>
AAONw	<i>Anglo-Australian Observatory Epping - Newsletter</i>
AAOPr	<i>Anglo-Australian Observatory Epping - Preprint</i>
AAS	<i>American Astronomical Society meeting</i>
AASFA	<i>Academia Scientiarum Fennica, Annales, Series A VI-Physica</i>
AASPP	<i>Astron. Astrophys. Serie, Ed. Pachart Publishing House Tucson</i>
AbaOB	<i>Abastumanskaya Astrofizicheskaya Observatoriya, Gora Kanobili, Byulleten</i>
AbhKP	<i>Stern-Katalog für die Zone von -6 bis -10 Südlicher Deklination für das Äquinoktium 1890, erste und zweite Abteilung.</i>
AcA	<i>Acta Astronomica</i>
AcApS	<i>Acta Astrophysica Sinica (continued by ChJAA from 2001, then by RAA in 2009)</i>
AcAS	<i>Acta Astronomica Supplementa</i>
AcASn	<i>Acta Astronomica Sinica</i>
AcC	<i>Acta Cosmologica</i>
AcCh	<i>Astronomical Circular</i>
AcMan	<i>Astronomical Contributions from the University of Manchester</i>
AcMPH	<i>Acta Universitatis Carolinae. Mathematica et Physica</i>
AcPhA	<i>Acta Physica Austriaca</i>
AdA&A	<i>Advances in Astronomy and Astrophysics</i>
AdAst	<i>Advances in Astronomy</i>
ADS	<i>New general catalogue of double stars within 120 of the north pole. Carnegie Inst. Washington D.C. Publ. 417,1932</i>
ADUrb	<i>University of Illinois. Astronomy Department, Urbana Illinois</i>
AExpr	<i>Astronomy Express</i>
AFGL	<i>The AFGL four-color infrared sky survey. AFGL-TR-0208 Environmental Research papers,576,1976</i>
AFOEV	<i>Bulletin de l'Association Francaise d'Observateurs d'Etoiles Variables</i>
Afz	<i>Astrofizika</i>
AGAb	<i>Astronomische Gesellschaft, Abstract Series</i>
AGDN	<i>Atlas of galactic dark nebulae. Byull. Abastumansk. Astrofiz. Obs. (in Russian)</i>
AGK2	<i>Zweiter Katalog der Astronomische Gesellschaft. Hamburger Sternwarte Bergedorf,Bonn,1958</i>

2016.05.26-18:41:09

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SiMBAD via CDS for Research

We will now process an example using the reference below, extracted from the historical file of a Double Star. In the “Enter a bibcode or a DOI:” section, we added this info in the “bibcode or DOI” line: To be repetitive, it was also added in the separate blocks in the “or reference items” line. Hit “Submit bibcode”

UC_2013b	Hartkopf, W.I., Mason, B.D., Finch, C.T., Zacharias, N., Wycoff, G.L., & Hsu, D.	2013AJ....146...76H
	AJ 146, 76, 2013	(UC 301 - 5058)

or Enter a bibcode or a DOI :

bibcode or DOI : Example: *2000A&A...353..322A*

~ 1 objects display objects in the reference (for regular bibcode only)

or reference items: year: **journal abbrev:** volume: page:



Online Catalogs - SIMBAD

SIMBAD via CDS for Research

Here is the page that was displayed as a result of the query:

The following data is provided:

Abstract

Abstract Copyright

Journal Keywords

Simbad Comments

VizieR on-line data (VizieR to be discussed later)

Simbad Objects

Links, and

CDS Status

Now, click on “Full Paper” located on the “Links” line.

other query Identifier Coordinate Criteria Reference Basic Script TAP Output Help
modes : query query query query query submission options

Reference query: 2013AJ...146...76H (1 found) C.D.S. - SIMBAD4 rel 1.5 - 2016.05.26CEST19:10:28

send the bibcodes to ADS

2013AJ...146...76H - Astron. J., 146, 76 (2013) - 15.10.13 24.04.16 October 2013 2013-10-01

Double stars in the USNO CCD astrographic catalog.

HARTKOPF W.L.; MASON B.D.; FINCH C.T.; ZACHARIAS N.; WYCOFF G.L.; HSU D.

Abstract (from CDS): The newly completed Fourth USNO CCD Astrographic Catalog (UCAC4) has proven to be a rich source of double star astrometry and photometry. Following initial comparisons of UCAC4 results against those obtained by speckle interferometry, the UCAC4 catalog was matched against known double stars in the Washington Double Star Catalog in order to provide additional differential astrometry and photometry for these pairs. Matches to 58,131 pairs yielded 61,895 astrometric and 68,935 photometric measurements. Finally, a search for possible new common proper motion (CPM) pairs was made using new UCAC4 proper motion data; this resulted in 4755 new potential CPM doubles (and an additional 27,718 astrometric and photometric measures from UCAC and other sources).

Abstract Copyright: American Astronomical Society 2013

Journal keyword(s): astrometry - binaries: general - binaries: visual - catalogs

Simbad comments: In section 4.2, 06405-3921 is a misprint for WDS J06405-3912 and 11545+2154 is a misprint for WDS J11545-2154. In figures 2-3 : U0026+494, U0044+635, U0120+751 and U0153+731 not identified (not enough information).

VizieR on-line data: <Available at CDS ([J/AJ/146/76](#)): table1.dat table2.dat table4.dat table5.dat>

Simbad objects (1)

Link(s): [Full paper ADS services](#)

CDS status: could be processed

To bookmark this query, right click on this link: [simbad:2013AJ...146...76H](#) and select 'bookmark this link' or equivalent in the popup menu



Online Catalogs - SiMBAD

SIMBAD via CDS for Research

After clicking on the "Full Paper" link, this is displayed. NOTE: This format of this page will vary by catalog.

Search the page for the link to the full paper.

In this case, it is here.

Click on it.



THE ASTRONOMICAL JOURNAL



DOUBLE STARS IN THE USNO CCD ASTROGRAPHIC CATALOG

William I. Hartkopf, Brian D. Mason, Charlie T. Finch, Norbert Zacharias, Gary L. Wycoff, and Danley Hsu

Published 2013 August 21 • © 2013. The American Astronomical Society. All rights reserved.
The Astronomical Journal, Volume 146, Number 4



+ Article information

Abstract

The newly completed Fourth USNO CCD Astrographic Catalog (UCAC4) has proven to be a rich source of double star astrometry and photometry. Following initial comparisons of UCAC4 results against those obtained by speckle interferometry, the UCAC4 catalog was matched against known double stars in the Washington Double Star Catalog in order to provide additional differential astrometry and photometry for these pairs. Matches to 58,131 pairs yielded 61,895 astrometric and 68,935 photometric measurements. Finally, a search for possible new common proper motion (CPM) pairs was made using new UCAC4 proper motion data; this resulted in 4755 new potential CPM doubles (and an additional 27,718 astrometric and photometric measures from UCAC and other sources).

299 Total downloads

Cited by 6 articles

Export citation and abstract

BibTeX RIS

Hide share options

E-mail

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Google+

CiteULike

Mendeley

Abstract

1. THE USNO CCD ASTROGRAPHIC CATALOG PROJECT

2. SPECKLE INTERFEROMETRY OF UCAC DOUBLE STAR DETECTIONS

3. UCAC4 MEASURES OF KNOWN WDS PAIRS

4. NEW COMMON PROPER MOTION PAIRS FROM UCAC4

Footnotes

References

Citations



Online Catalogs - SIMBAD

SIMBAD via CDS for Research

The paper in which the star was referenced will appear.
Save the paper.

Review the paper for your star.

Make references as appropriate in your research paper.

THE ASTRONOMICAL JOURNAL, 146:76 (8pp), 2013 October
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doi:10.1088/0004-6256/146/4/76

DOUBLE STARS IN THE USNO CCD ASTROGRAPHIC CATALOG

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Received 2013 June 24; accepted 2013 July 18; published 2013 August 21

ABSTRACT

The newly completed Fourth USNO CCD Astrographic Catalog (UCAC4) has proven to be a rich source of double star astrometry and photometry. Following initial comparisons of UCAC4 results against those obtained by speckle interferometry, the UCAC4 catalog was matched against known double stars in the Washington Double Star Catalog in order to provide additional differential astrometry and photometry for these pairs. Matches to 58,131 pairs yielded 61,895 astrometric and 68,935 photometric measurements. Finally, a search for possible new common proper motion (CPM) pairs was made using new UCAC4 proper motion data; this resulted in 4755 new potential CPM doubles (and an additional 27,718 astrometric and photometric measures from UCAC and other sources).

Key words: astrometry – binaries: general – binaries: visual – catalogs

Online-only material: color figure, machine-readable and VO tables

1. THE USNO CCD ASTROGRAPHIC CATALOG PROJECT

The USNO CCD Astrographic Catalog (UCAC; Zacharias et al. 2013) is a compiled, all-sky star catalog covering mainly the 8–16 mag range in a single bandpass between V and R . Positional errors are about 15–20 mas for stars in the 10–14 mag range. Since the release of UCAC2 (Zacharias et al. 2004), the UCAC catalogs have been widely used in the community, mainly for astrometric reference stars extending the optical reference frame beyond *Hipparcos* and *Tycho-2*.

Observations for UCAC were obtained using the USNO's 1970s vintage 8 inch Twin Astrograph, originally designed for photographic survey work. The astrograph has two lenses and tubes (both $f/10$, 2 m focal length) mounted in parallel on a Boller and Chivens 24 inch mount. For the UCAC project, the visual bandpass corrected lens was used for guiding, while the five-element "red lens" (a 1990s replacement of the original "blue lens"), equipped with a 579–643 nm bandpass filter, was used for imaging. The detector was a Kodak 4k × 4k CCD with 9 μm square pixels, giving a scale of 0.905 arcsec pixel⁻¹. Although the lens was designed for 8 × 10 inch photographic plates and gives a 9° field of view, only the ~1 deg² area covered by the single CCD was used for the program, providing uniform optical quality with all stellar images close to the optical axis.

The entire southern hemisphere and up to about $\delta = +20^\circ$ was observed first from the Cerro Tololo Inter-American Observatory between 1998 and 2001, followed by observations of the remaining parts of the northern hemisphere from the USNO Flagstaff AZ Station. Observations were completed in 2004.

northern proper motions) version of the previous UCAC3 release (Zacharias et al. 2010) following the same pixel data (Zacharias 2010) and astrometric reductions (Finch et al. 2010).

UCAC astrograph data were combined with many earlier epoch catalog positions to derive proper motions. Thus the published UCAC catalogs contain mean positions based on the astrograph observational program and other data dating back in some cases a century or more. UCAC4 lists over 113 million objects, mainly stars with accurate positions. About 110 million of these also have accurate proper motions. UCAC data are supplemented by Two Micron All Sky Survey (2MASS)¹ near-IR photometry and APASS² five-band optical photometry.

1.1. Blended Images and Doubles in the UCAC

For this paper we analyzed UCAC astrograph data to identify double stars. Instead of the published mean catalog positions, object detections on individual astrograph exposures form the basis of this investigation. Depending on the seeing, the typical FWHM of a UCAC astrograph observed stellar profile is about 1'.5–2'.2. (Note that the diffraction limit of the 206 mm aperture for the "red lens" is already about an arcsecond.)

For detected objects, first and second moments were calculated to obtain centroids and a measure of image elongation. The centroids served as starting values for two-dimensional image profile fits to the pixel data. Instead of a Gaussian profile, a modified Lorentz profile was used with the same number of parameters to fit after determining two more shape parameters; these parameters were based on pilot investigations over a large

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Questions?