KOI Objects in the WDS Catalog

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Abstract: The very presence of Kepler Objects of Interest in the WDS catalog seems curious enough to have a closer look at a random sample of such objects. This report counter-checks about 50 double stars with reference to the Kepler mission for being potentially physical pairs

1. Introduction

The mission of the Kepler project is the detection of exo-planets so the very existence of objects with the designation KOI (Kepler Objects of Interest) in the WDS catalog is at first moment a bit surprising – but a look into referenced papers like Slawson et al. 2011 or Furlan et al. 2017 makes clear that the detection of binaries is a side result of the Kepler project. The next question arises when objects with other designations like for example DEA presented in Deacon et al. 2016 are also found to be based on results of the Kepler mission – the explanation seems simple: Research funded by Kepler mission sources resulted in KOI designations and other research using Kepler data but not funded by Kepler sources resulted in the usual discoverer code designations. But as Brian Mason/USNO points out: There are no fixed rules regarding discoverer codes which might meanwhile anyway have lost their original significance.

2. Results of Photometry and Catalog Checking

To have a closer look at a random sample of KOI and DEA objects we selected objects by a few basic parameters like current altitude in the northern sky, sufficient brightness of the secondary (usually listed with magnitudes in the red band) and sufficient angular separation allowing for resolution with the equipment available to us at least with some probability. For all selected objects one single image was taken with iTelescope iT24 with V-filter and 60s exposure time because in most cases the secondary is very faint and not to resolve with shorter exposure times. This setup came at the price of CCD saturation for primaries brighter than 9 Vmag – in such cases no photometry for the primary was possible and precision of astrometry results was limited. Despite the long exposure time of 60s allowing resolution of stars up to about 19 Vmag several secondaries were too faint or too close to a bright primary to be resolved. The images were plate solved with Astrometrica using the URAT1 catalog with reference stars in the Vmag range of 8.5 to 17.5 giving not only RA/Dec coordinates but also photometry results for all reference stars used including an average dVmag error. The objects were then located in the center of the image and astrometry/photometry was then done by the rather comfortable Astrometrica procedure with point and click at the components delivering RA/Dec coordinates and Vmag measurements based on all reference stars used for plate solving. To use the existing image material to full extent we looked also for other WDS objects nearby and took measurements also for these. To counter-check the claim that the reported KOI and DEA objects are physical pairs we had a look at other catalogs to locate data allowing us to apply our standard common proper motion assessment procedure (Knapp and Nanson 2017). For this reason we report also catalog data with observation date before the "Last" WDS date but published after this date. As the work on this report overlapped with the availability of Gaia data release 2 we decided to check these data as an additional step allowing for a more precise assessment of these objects for being physical or not.

The measurement results are given in Table 1 with the following structure:

- First row gives the WDS data as of Oct 2017 (probably meanwhile updated):
  - Name gives the discoverer code of the object
  - RA/Dec gives the position in the HH:MM:SS/ DD:MM:SS format for the primary
  - Sep, PA, M1, M1, pmRA and pmDec give the WDS catalog data for this object
  - Date gives the year of the last observation
  - Source/Notes gives additional references to the WDS catalog
- Data rows give data from other checked catalogs like especially Gaia DR1:
  - RA/Dec gives the position in degrees for the primary
  - Sep gives separation in arcseconds in the data lines calculated from the coordinates for both components if available
  - PA gives position angle in degrees in the data lines calculated from the coordinates for both components if available
  - M1 and M2 if visual magnitudes are given in the used catalog
  - Proper motion data if available in the used catalogs or in some cases calculated from position comparison between catalog positions
  - Ap and Me give aperture and used observation method
  - CPM Rat gives the common proper motion rating based on the available PM data according to the description in Appendix A
  - CPM % gives an estimated probability for being a physical pair (see Appendix A)
  - Source/Notes refers to the used catalogs with additional comments if necessary
- Measurement row gives the results from processing of own images:
  - RA/Dec gives the position in degrees for the primary
  - Sep gives separation in arcseconds in the data lines calculated from the positions of resolved pairs
  - PA gives position angle in degrees in the data lines calculated from the positions of resolved pairs
  - M1 and M1 give Vmags for both components measured by differential photometry
  - Date gives the Julian observation epoch
  - Notes indicate the telescope used, number of images with exposure time and additional comments if considered necessary

3. Common Proper Motion Summary

The KOI objects in our random sample proved to be difficult objects for our imaging as well as for catalog data research. Many secondaries were simply too faint or too close to the primary to be resolved. Yet for a part of these objects we were able to provide new observations with Vmags from differential photometry and CPM assessment results mostly from 2MASS to Gaia DR1 positions and from Gaia DR2 proper motion data. This CPM assessment, with very few exceptions, did not provide the expected confirmation of the claim that all these pairs are physical. On the contrary, in most cases with the necessary data for CPM assessment available, the result was a clear "most probably optical". The situation with the DEA objects is the other way around – most pairs were, with few exceptions, confirmed to be solid common proper motion pairs.

4. Check for Potential Gravitational Relationship

As most KOI objects are listed with very small proper motion values (too small for common proper motion assessment), we decided to also have a look at the parallax data provided from Gaia DR2 to check for potential gravitational relationship regardless proper motion speed. The result of this check is presented in Table 2.

5. Overall summary

While the DEA objects did rather well also with Gaia DR2 parallax data the expectation that the pattern of insignificant proper motion values for the KOI objects could be overruled by Gaia DR2 parallax data providing evidence of potential gravitational relationship was not realized. A large part of the DR2 parallax data for KOI objects showed quality issues with negative parallaxes, parallax values smaller than 3 times the Plx error range or duplicity issues. For the remainder the mostly insignificant Plx data with very few exceptions do not allow for gravitational relationship. This could either mean that even Gaia DR2 is not up to the task providing useful data for the KOI objects or that the data quality of the WDS KOI objects is especially poor.

(Text continues on page 156)

KOI Objects in the WDS Catalog

Table 1. Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 18 AG	19 57 37.68	+44 02 06.1	7.3	148	12.10	16.00	4	-2							2009			WDS 19576+4402, WDS data as middle of Oct 2017.
	299.407039	44.035051					-1.10	-3.50	1.84				0.20	Eu	2003.434			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.407034	44.035040	7.293	148.821	13.41	18.14	4.49	-1.59	5.79	5.71	-3.61	7.72	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data for primary calculated from position comparison with 2MASS.
	299.407034	44.035039	7.292	148.821	13.40	18.11	-0.20	-3.24	0.05	-1.54	-3.00	0.32	0.96	Hg	2015.500	DDBC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	299.407038	44.035033	7.267	146.497	13.44	18.29							0.61	C	2017.773			iT24 1x60s. SNR G <10.
KOI 18 AI	19 57 37.68	+44 02 06.1	9.7	345	12.10	18.40	4	-2							2009			WDS 19576+4402, WDS data as middle of Oct 2017.
	299.407039	44.035051					-1.10	-3.50	1.84				0.20	Eu	2003.434			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.407034	44.03503845	9.742	345.137	13.68								1.80	C	2011.934			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag.
	299.407034	44.035040			13.41		4.49	-1.59	5.79				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mag. PM data for primary calculated from position comparison with 2MASS. Secondary not visible in Aladin image, thus not identified by either 2MASS or Gaia DR1.
	299.407034	44.035039			13.40		-0.20	-3.24	0.05				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	299.407038	44.035033			13.44								0.61	C	2017.773			iT24 1x60s. No resolution of I, has to fainter than 19.5
BRT 2248 AB	19 57 36.71	+43 58 50.3	5.6	136	9.80	10.30	-5	-3		-2	-18				2010			WDS 19577+4359, WDS data as middle of Oct 2017.
	299.402991	43.980662	5.658	135.791			-4.70	-6.30	1.56	-4.10	-13.00	1.56	0.20	Eu	2003.421	CCCB	**6**	UCAC5. PM data from UCAC5.
	299.402969	43.980641	5.718	135.795	11.74	12.13	-1.32	-1.64	5.79	-0.59	-9.67	5.79	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	299.402969	43.980640	5.721	135.821	11.84	12.18	-3.79	-5.12	0.08	-3.49	-13.15	0.08	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	299.402925	43.980622	5.731	133.988	11.81	12.18							0.61	C	2017.773			iT24 1x60s
DEA 105 AB	19 57 46.78	+43 57 23.6	6.2	255	12.60	16.00	19	-6		9	2				2013			WDS 19577+4357, WDS data as middle of Oct 2017.
	299.444969	43.956525					6.30	-7.40	1.56				0.20	Eu	2003.442			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.444997	43.956501	6.312	256.668	13.13	18.78	6.25	-6.56	5.79	3.42	-8.35	5.79	0.96	Hg	2015.000	CACC	**15**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	299.444999	43.956500	6.309	256.701	13.10	18.78	7.85	-6.33	0.06	8.54	-7.09	0.36	0.96	Hg	2015.500	ADAB	**5**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	299.444971	43.956519	5.398	263.832	13.12	18.92							0.61	C	2017.773			iT24 1x60s. SNR B <10

Table 1 continues on the next page.

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Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 103 AB	19 26 44.01	+37 45 05.7	4.0	47	11.00	18.50	-17	-25							2012			WDS 19267+3745, WDS data as of middle of Oct. 2017.
	291.683347	37.751549					-13.00	-21.40	1.98				0.20	Eu	2002.652			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	291.683290	37.751475			12.47		-11.63	-25.07	5.12				0.96	Hg	2015.000			Gaia DR1. M1 is Gaia DR1 Gmag. PM data for primary calculated from position comparison with 2MASS. Secondary not identified by either Gaia DR1 or 2MASS.
	291.683288	37.751473			12.79		-13.75	-21.41	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	291.683300	37.751450			12.74								0.61	C	2017.773			iT24 1x60s. No resolution of B, has to be fainter than 19mag
KOI 103 AC	19 26 44.01	+37 45 05.7	9.8	279	11.00	18.30	-9	-26							2009			WDS 19267+3745, WDS data as of middle of Oct. 2017.
	291.683347	37.751549					-13.00	-21.40	1.98				0.20	Eu	2002.652			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	291.683287	37.751458	9.736	280.681	12.99								1.80	C	2012.115			Pan-STARRS release 1 (PS1) Survey. M1is PS1 gmag.
	291.683290	37.751475	9.735	280.068	12.47	20.13	-11.63	-25.07	5.12				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS. Secondary not identified by 2MASS.
	291.683288	37.751473	9.730	280.141	12.79	20.70	-13.75	-21.41	0.06	-1.17	2.36	1.52	0.96	Hg	2015.500	DDCB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	291.683300	37.751450			12.74								0.61	C	2017.773			No resolution of C, has to be fainter than 19mag
DEA 332 AB	19 26 50.16	+37 44 30.3	14.2	151	15.10	19.20	-12	-24		-12	-16				2013			WDS 19268+3744, WDS data as middle of Oct 2017.
	291.709009	37.741758					-12.90	-15.40	3.61				0.20	Eu	2002.652			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	291.708956	37.741708	14.214	151.105	15.53	20.07							1.80	C	2012.048			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	291.708954	37.741705	14.213	151.085	15.14	19.36	-13.81	-18.56	5.12	-18.46	-20.91	5.97	0.96	Hg	2015.000	BCCB	**25**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	291.708951	37.741703	14.212	151.074	15.07	19.47	-11.30	-15.21	0.68	-11.79	-16.54	0.39	0.96	Hg	2015.500	ADAB	**5**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	291.709000	37.741678			15.09								0.61	C	2017.773			iT24 1x60s. No resolution of B, has to be fainter than 19mag
KOI 108 AC	19 15 56.29	+40 03 52.3	4.9	112	12.29	20.10	-4	-9							2010.000			WDS 19159+4004, WDS data as of middle of Oct. 2017. WDS shows different magnitudes for the primary (see AD, AE, and AF components below).
	288.984555	40.0645172					-0.80	-8.80	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	288.984551	40.064487	4.982	112.353	12.43	19.77	-2.98	-8.30	1.92				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags; M2 is Gaia DR1 Gmag. PM data from Gaia DR1. Secondary not identified by 2MASS.
	288.984551	40.064486	4.983	112.311	12.46	19.40	-1.24	-8.85	0.06	-1.51	2.67	1.79	0.96	Hg	2015.500	DDCB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	288.984542	40.064481			12.39								0.61	C	2017.773			iT24 1x60s.

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 108 AD	19 15 56.29	+40 03 52.3	3.2	101	11.20	18.60	-4	-9							2009			WDS 19159+4004, WDS data as of middle of Oct. 2017.
	288.984555	40.0645172					-0.80	-8.80	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	288.984551	40.064487			12.43		-2.98	-8.30	1.92				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data is from Gaia DR1. Secondary not identified by Gaia DR1 or 2MASs.
	288.984551	40.064486			12.46		-1.24	-8.85	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	288.984542	40.064481			12.39								0.61	C	2017.773			iT24 1x60s. No resolution for D, has to be fainter than 19mag
KOI 108 AE	19 15 56.29	+40 03 52.3	8.9	19	11.20	18.60	-4	-9							2009			WDS 19159+4004, WDS data as of middle of Oct. 2017.
	288.984555	40.0645172					-0.80	-8.80	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	288.9845484	40.06446573	8.998	20.040	12.48								1.80	C	2012.308			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag. Secondary not identified by PS1.
	288.984551	40.064486	8.942	20.135	12.43	20.07	-2.98	-8.30	1.92				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags; M2 is Gaia DR1 Gmag. PM data from Gaia DR1. Secondary not identified by 2MASS.
	288.984551	40.064486	8.940	20.142	12.46	20.67	-1.24	-8.85	0.06	1.09	-13.04	1.65	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	288.984542	40.064481			12.39								0.61	C	2017.773			iT24 1x60s. No resolution for E, has to be fainter than 19mag
KOI 108 AF	19 15 56.29	+40 03 52.3	9.5	349	11.20	16.70	-4	-9							2009			WDS 19159+4004, WDS data as of middle of Oct. 2017.
	288.984555	40.0645172					-0.80	-8.80	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	288.984551	40.064486	9.595	349.712	12.43	17.37	-1.10	-8.45	5.11	-4.08	6.16	5.96	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS. PM errors high relative to PM rates, although opposite directional movement in declination indicates there is no shared motion.
	288.984551	40.064486	9.598	349.716	12.46	17.29	-1.24	-8.85	0.06	-0.42	-3.15	0.17	0.96	Hg	2015.500	ADBC	**5**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	288.984542	40.064481	9.495	348.987	12.39	17.38							0.61	C	2017.773			iT24 1x60s.
ALI 1110 AB	19 16 21.64	+39 54 12.5	13.0	324	9.31	12.00	-26	-14		-3	5				2010			WDS 19164+3954, WDS data as middle of Oct 2017.
	289.090198	39.903476	13.023	323.467			-25.20	-14.50	2.97	1.00	3.90	1.84	0.20	Eu	2002.687	CCCB	**6**	UCAC5. PM data from UCAC5.
	289.090086	39.903426	13.018	325.204	9.33	11.67	-24.71	-14.02	1.92	2.93	6.06	5.55	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	289.090081	39.903425	13.017	325.263	9.68	11.69	-24.35	-13.45	0.07	0.74	3.20	0.06	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	289.090117	39.903367	13.360	325.419	9.82	11.45							0.61	C	2017.773			iT24 1x60s. A too bright for reliable measurement

Table 1 continues on the next page.

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Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KO 116 AE	20 03 27.35	+44 20 15.2	5.8	141	11.40	18.70	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864005	44.337550			13.03		5.33	-1.12	5.23				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified in either Gaia DR1 or 2MASS.
	300.864006	44.337550			13.02		7.94	-0.76	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for E, has to be fainter than 19mag
KO 116 AF	20 03 27.35	+44 20 15.2	7.5	107	11.40	17.60	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864004	44.337550	7.951	103.786	13.30								1.80	C	2012.646			Pan-STARRS release 1 (PS1) Survey. M1 isPS1 gmag.
	300.864005	44.337550			13.03		5.33	-1.12	5.23				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR1 or 2MASS.
	300.864006	44.337550			13.02		7.94	-0.76	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified in Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for F, has to be fainter than 19mag
KO 116 AG	20 03 27.35	+44 20 15.2	8.0	354	11.40	15.20	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864004	44.337550	8.541	350.134	13.30	19.84							1.80	C	2012.047			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	300.864005	44.337550	8.539	350.079	13.03	19.44	5.33	-1.12	5.23	3.85	-7.44	5.23	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	300.864006	44.337550	8.538	350.104	13.02	19.13	7.94	-0.76	0.06	12.86	-8.51	1.76	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for G, has to be fainter than 19mag
KO 116 AH	20 03 27.35	+44 20 15.2	10.9	20	11.40	18.90	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864004	44.337550	11.609	14.796	13.30								1.80	C	2012.260			Pan-STARRS release 1 (PS1) Survey. M1 isPS1 gmag.
	300.864005	44.337550			13.03		5.33	-1.12	5.23				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR1 or 2MASS.
	300.864006	44.337550			13.02		7.94	-0.76	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for H, has to be fainter than 19mag

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KO 116 AI	20 03 27.35	+44 20 15.2	13.1	357	11.40	17.70	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864004	44.337550	13.923	359.880	13.30								1.80	C	2012.238			Pan-STARRS release 1 (PS1) Survey. M1 isPS1 gmag.
	300.864005	44.337550			13.03		5.33	-1.12	5.23				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR1 or 2MASS.
	300.864006	44.337550			13.02		7.94	-0.76	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for I, has to be fainter than 19mag
KO 116 AJ	20 03 27.35	+44 20 15.2	13.0	144	11.40	16.20	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864004	44.337550	13.836	141.355	13.30	20.69							1.80	C	2012.028			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	300.864005	44.337550	13.839	141.388	12.76	19.06	5.33	-1.12	5.23				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary from position comparison with 2MASS. Secondary not identified in 2MASS.
	300.864006	44.337550	13.836	141.406	13.02	19.95	7.94	-0.76	0.06	-2.36	-1.16	0.65	0.96	Hg	2015.500	DDCC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for J, has to be fainter than 19mag
KO 116 AK	20 03 27.35	+44 20 15.2	13.5	114	11.40	17.70	7	5							2013			WDS 20035+4420, WDS data as of middle of Oct. 2017.
	300.863972	44.337554					7.20	-1.20	1.98				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.864004	44.337550	14.410	110.738	13.30								1.80	C	2011.964			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag.
	300.864005	44.337550			13.03		5.33	-1.12	5.23				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR1 or 2MASS.
	300.864006	44.337550			13.02		7.94	-0.76	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	300.864017	44.337558			12.98								0.61	C	2017.773			iT24 1x60s. No resolution for K, has to be fainter than 19mag
KOI 4724 AB	20 03 42.89	+44 21 23.7	3.1	30	14.50	15.80	0	7							2011			WDS 20037+4421, WDS data as middle of Oct 2017.
													0.20	Eu				UCAC5. Neither component identified by UCAC5.
	300.928686	44.356572	3.067	31.380	17.95	19.28							1.80	C	2011.930			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	300.928687	44.356574	3.073	31.412	17.94	19.45	-7.81	-7.17	12.66	-14.27	-20.59	15.92	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.928686	44.356573	3.074	31.416	17.45	18.78	-3.40	-5.43	0.17	-3.07	-5.28	0.34	0.96	Hg	2015.500	ADBB	**5**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	300.928654	44.356503			17.36								0.61	C	2017.773			iT24 1x60s. No resolution of B, has to be fainter than 19mag

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 4724 AC	20 03 42.89	+44 21 23.7	3.2	184	15.30	15.20	0	7							2011			WDS 20037+4421, WDS data as middle of Oct 2017. Note: WDS shows different magnitude for A in the listings for the AB and BC components
										-14.00	-31.30	19.03	0.20	Eu	2003.430			UCAC5. PM data from UCAC5. Primary not identified by UCAC5, secondary data only listed here.
	300.928687	44.356574	3.298	183.160	17.94	16.87	-7.81	-7.17	12.66	-11.09	-4.47	6.98	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.928686	44.356573	3.301	183.207	17.45	16.60	-3.40	-5.43	0.17	-9.22	-11.11	0.12	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	300.928654	44.356503	3.022	182.237	17.36	16.54							0.61	C	2017.773			iT24 1x60s.
KOI 123 AD	19 21 34.25	+40 17 05.5	9.5	199	11.30	16.50	-13	12							2009			WDS 19216+4017, WDS data as of middle of Oct. 2017.
	290.392716	40.284869					-7.90	10.90	1.84				0.20	Eu	2002.705			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	290.392681	40.284906	9.713	198.878	12.45	17.29	-7.31	7.77	5.55	2.87	-24.76	7.67	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	290.392679	40.284907	9.724	198.845	12.49	17.25	-7.74	10.90	0.06	-3.21	-12.35	0.19	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	290.392667	40.284922	9.691	198.876	12.41	17.31							0.61	C	2017.773			iT24 1x60s.
KOI 123 AE	19 21 34.25	+40 17 05.5	10.2	95	11.30	17.70	-13	12							2009			WDS 19216+4017, WDS data as of middle of Oct. 2017.
	290.392716	40.284869					-7.90	10.90	1.84				0.20	Eu	2002.705			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	290.392689	40.284946	10.302	96.752	12.70	19.52							1.80	C	2011.950			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	290.392681	40.284906	10.309	95.967	12.22	18.60	-7.31	7.77	5.55				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are from Gaia DR1 Gmags. PM data for primary from position comparison with 2MASS. Secondary not identified by 2MASS.
	290.392679	40.284907	10.313	95.980	12.49	19.18	-7.74	10.90	0.06	0.43	4.12	0.46	0.96	Hg	2015.500	DDBC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	290.392667	40.284922			12.41								0.61	C	2017.773			iT24 1x60s. No resolution of E, has to be fainter than 19mag
KOI 148 AB	19 56 33.41	+40 56 56.5	2.5	248	13.04	18.10	15	-15							2012			WDS 19566+4057, WDS data as of middle of Oct. 2017.
	299.139259	40.949006					10.70	-18.70	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.139307	40.948942			13.38		15.56	-16.88	5.55				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for pimary calculated from position comparison with 2MASS. Secondary not identified by either Gaia DR1 or 2MASS.
	299.139309	40.948939	2.566	249.095	13.36	17.93	13.23	-20.36	0.04				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, M2 is Gaia DR2 Gmag. PM data for primary from Gaia DR2, no PM data shown for secondary.
	299.139317	40.948928			13.41								0.61	C	2017.773			iT24 1x60s. No resolution of B, has to be fainter than 19mag

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KO 148 AC	19 56 33.41	+40 56 56.5	4.4	222	13.04	16.40	15	-15							2012			WDS 19566+4057, WDS data as of middle of Oct. 2017.
	299.139259	40.949006					10.70	-18.70	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.139307	40.948942	4.430	222.395	13.38	16.60	15.56	-16.88	5.55	-3.18	-12.27	7.25	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	299.139309	40.948939	4.427	222.538	13.36	16.55	13.23	-20.36	0.04	0.30	-3.02	0.13	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	299.139317	40.948928	4.075	225.825	13.41	16.27							0.61	C	2017.773			iT24 1x60s.
KOI 148 AF	19 56 33.41	+40 56 56.5	8.1	244	11.70	18.00	15	-15							2009			WDS 19566+4057, WDS data as of middle of Oct. 2017.
	299.139259	40.949006					10.70	-18.70	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.139307	40.948942	8.205	245.810	13.38	18.15	15.56	-16.88	5.55	-21.08	-8.63	13.65	0.96	Hg	2015.000	CACB	**16**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	299.139309	40.948939	8.209	245.889	13.36	18.06	13.23	-20.36	0.04	-2.47	-5.43	0.30	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	299.139317	40.948928	7.961	248.096	13.41	19.88							0.61	C	2017.773			iT24 1x60s. SNR F <5
																		Note: WDS magnitues for the primary are 13.04 for the AB and AC pairs, 11.70 for the AF and AG pairs.
KOI 148 AG	19 56 33.41	+40 56 56.5	11.0	230	11.70	17.10	15	-15							2009			WDS 19566+4057, WDS data as of middle of Oct. 2017.
	299.139259	40.949006					10.70	-18.70	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.139307	40.948942	11.063	231.378	13.38	18.02	15.56	-16.88	5.55	3.98	1.30	16.61	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	299.139309	40.948939	11.064	231.436	13.36	17.89	13.23	-20.36	0.04	-1.90	-3.71	0.26	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2.
	299.139317	40.948928	10.742	233.893	13.41	18.08							0.61	C	2017.773			iT24 1x60s. SNR G <20
KOI 153 AC	19 11 59.49	+50 56 39.6	6.2	298	11.30	18.90	11	-41							2010			WDS 19120+5057, WDS data as of middle of Oct. 2017.
	287.997901	50.944321					-5.50	-41.00	2.26				0.20	Eu	2003.494			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	287.997873	50.944190			13.85								0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. No PM data available in Gaia DR1 for the primary. Secondary not identified by Gaia DR1 or 2MASS.
	287.997872	50.944185			13.46		-5.91	-38.88	0.04				0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	287.997863	50.944183			13.77								0.61	C	2017.773			iT24 1x60s. No resolution of C, both has to be fainter than 19mag
																		The C component appears to be confirmed in the BASS and 2Mass images available in Aladin, although it can’t be seen in the DSS and PS1 images.

Table 1 continues on the next page.

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 153 AD	19 11 59.49	+50 56 39.6	8.0	353	11.30	17.30	11	-41							2010			WDS 19120+5057, WDS data as of middle of Oct. 2017.
	287.997901	50.944321					-5.50	-41.00	2.26				0.20	Eu	2003.494			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	287.997873	50.944190			13.85								0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. No PM data available in Gaia DR1 for the primary. Secondary not identified by Gaia DR1 or 2MASS.
	287.997872	50.944185			13.46		-5.91	-38.88	0.04				0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	287.997863	50.944183			13.77								0.61	C	2017.773			iT24 1x60s. No resolution of D, has to be fainter than 19mag
																		Note: D appears to be bogus as it can't be seen in the 2MASS, PS1, and BASS images available in Aladin.
KOI 244 AB	19 06 33.21	+39 29 16.4	8.4	288	9.50	11.50	16	7							2010			WDS 19066+3929, WDS data as of middle of Oct. 2017.
	286.638393	39.487879	8.419	288.109			-0.60	6.90	1.41	0.40	8.80	1.84	0.20	Eu	2002.679	ACCC	**30**	UCAC5. PM data from UCAC5 Catalog.
	286.638391	39.487903	8.416	288.285	10.82	13.59	-0.58	2.36	5.55	-1.25	3.33	5.55	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	286.638391	39.487904	8.415	288.289	10.96	13.56	-0.46	6.17	0.06	0.30	6.20	0.04	0.96	Hg	2015.500	DAAC	**1**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	286.638354	39.487914	8.358	289.865	10.69	13.52							0.61	C	2017.773			iT24 1x60s.
KOI 244 AC	19 06 33.21	+39 29 16.4	8.4	101	9.50	16.50	16	7							2010			WDS 19066+3929, WDS data as of middle of Oct. 2017.
	286.638393	39.487879					-0.60	6.90	1.41				0.20	Eu	2002.679			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	286.638391	39.487903	8.422	103.200	10.82	19.94	-0.58	2.36	5.55				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags; M2 is Gaia DR1 Gmag. PM data for pimary from position comparison with 2MASS. Secondary not identified by 2MASS.
	286.638391	39.487904	8.422	103.269	10.96	20.27	-0.46	6.17	0.06	-11.26	-27.92	1.26	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	286.638354	39.487914			10.69								0.61	C	2017.773			iT24 1x60s. No resolution of C.
KOI 245 AB	18 56 14.29	+44 31 05.6	8.5	197	9.77	16.00	-58	49							2014			WDS 18562+4431, WDS data as of middle of Oct. 2017.
	284.059538	44.518214					-61.10	47.50	1.84				0.20	Eu	2003.425			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	284.059262	44.518366	8.511	197.031	9.89	16.26	-61.77	51.26	5.13	-30.90	-16.55	9.85	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS. Note high e_pm2 rate.
	284.059250	44.518373	8.528	196.784	10.14	15.90	-60.52	48.69	0.07	-1.40	-4.92	0.13	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	284.059213	44.518364	8.152	195.914	10.04	16.09							0.61	C	2017.773			iT24 1x60s. SNR B<20. Primary saturated, astrometry and photometry results questionable

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 246 AB	19 24 07.75	+49 02 25.0	11.0	145	10.08	17.00	-11	-9							2014			WDS 19241+4902, WDS data as of middle of Oct. 2017.
	291.032350	49.040248	10.622	145.576			-7.80	10.40	1.98	12.10	-31.80	27.29	0.20	Eu	2003.484	CCCB	**6**	UCAC5. PM data from UCAC5 Catalog.
	291.032312	49.040214	10.955	145.316	10.16	17.05	1.08	-14.21	5.80	1.17	-11.32	5.80	0.96	Hg	2015.000	ACCC	**30**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS. Note major differences in PM rates between UCAC5/Gaia and 2MASS/Gaia. Also quite a range of error rates.
	291.032310	49.040213	10.955	145.309	10.41	17.01	-7.33	-10.43	0.06	-4.66	-9.11	0.02	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	291.032346	49.040242	10.039	148.068	10.06	16.81							0.61	C	2017.773			iT24 1x60s. SNR B<10
KOI 720 AC	19 46 37.14	+46 50 06.9	9.0	76	13.75	18.30	-10	-2							2012			WDS 19466+4650, WDS data as of middle of Oct. 2017.
	296.654764	46.835227					-3.30	-0.70	2.40				0.20	Eu	2003.450			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	296.654748	46.835225	9.280	75.437	13.75	18.18	-2.50	-9.89	6.04	-4.15	12.54	21.79	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	296.654748	46.835224	9.276	75.458	13.99	18.16	-2.71	-2.20	0.05	-6.40	-9.44	0.31	0.96	Hg	2015.500	DDAC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	296.654783	46.835264	9.059	73.388	14.08	18.83							0.61	C	2017.773			iT24 1x60s. SNR C<10. More guessing than resolution
KOI 2426 AB	18 59 36.72	+43 57 14.2	8.8	150	13.89	16.90	4	33							2013			WDS 18596+4357, WDS data as of middle of Oct. 2017.
	284.903026	43.953973					8.90	26.30	2.19				0.20	Eu	2003.384			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	284.903066	43.954058	9.054	150.380	14.11	17.08	7.97	21.35	5.13	-5.71	-16.20	5.99	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	284.903068	43.954062	9.066	150.463	14.07	17.09	9.10	25.13	0.04	-2.02	-7.38	0.15	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	284.903038	43.954069	9.103	150.588	14.14	17.20							0.61	C	2017.773			iT24 1x60s
KOI 2453 AC	19 37 52.43	+44 45 14.2	11.4	208	16.40	18.90	-8	174		-10	174				2016			WDS 19379+4445, WDS data as of middle of Oct. 2017. The AC pair is identified in the WDS as DEA 288 AC with a first observation date of 1951.
	294.468440	44.754198					-2.70	172.60	7.71				0.20	Eu	2003.429			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	294.468428	44.754753	11.731	204.662	16.32	18.48	-5.25	171.75	5.13	-5.52	171.47	5.13	0.96	Hg	2015.000	AAAA	**100**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	294.468427	44.754777	11.729	204.666	16.36	18.67	-4.66	174.29	0.10	-4.72	174.42	0.26	0.96	Hg	2015.500	AAAA	**100**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	294.468400	44.754892	12.416	204.697	16.52	18.69							0.61	C	2017.773			iT24 1x60s. SNR C<20

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 2803 AB	19 39 28.05	+46 47 26.0	3.8	61	12.26	15.10	5	-12							2013			WDS 19395+4647, WDS data as of middle of Oct. 2017.
	294.866886	46.790529					7.80	-14.00	1.98				0.20	Eu	2003.453			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	294.866919	46.790475	3.769	60.836	12.91	15.86							1.80	C	2011.661			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	294.866922	46.790484	3.755	61.292	12.14	15.16	4.84	-17.71	5.57				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary from position comparison with 2MASS. Secondary not identified by 2MASS.
	294.866924	46.790482	3.756	61.180	12.49	15.41	7.08	-14.33	0.06	1.79	-0.80	0.11	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	294.866875	46.790506	5.032	69.526	12.50	15.56							0.61	C	2017.773			iT24 1x60s. Image quality questionable. Overlapping star disks with hint of elongation.
KOI 2803 AC	19 39 28.05	+46 47 26.0	4.4	65	12.26	18.30	5	-12							2013			WDS 19395+4647, WDS data as of middle of Oct. 2017.
	294.866886	46.790529					7.80	-14.00	1.98				0.20	Eu	2003.453			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	294.866922	46.790484			12.47		4.84	-17.71	5.57				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR1 or 2MASS.
	294.866924	46.790482			12.49		7.08	-14.33	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag. PM data from Gaia DR2. Secondary not identified in Gaia DR2 - see note below.
	294.866875	46.790506			12.50								0.61	C	2017.773			iT24 1x60s. No resolution for C, has to be fainter than 19mag
																		Note: Secondary not resolved by Gaia DR1 or DR2, nor in our image; also not visible in the Aladin DSS and 2MASS images. In PS1 image there is only one object very clearly visible at the location of the secondary. It appears likely the WDS listing for separate secondaries at the B and C positions is in error - note the similar PA's and separations, and also identical WDS magnitudes of 12.26. B is obvious in the PS1 image, whereas C is totally absent.
KOI 2803 AD	19 39 28.05	+46 47 26.0	8.6	205	12.26	18.30	5	-12							2012			WDS 19395+4647, WDS data as of middle of Oct. 2017.
	294.866886	46.790529					7.80	-14.00	1.98				0.20	Eu	2003.453			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	294.866919	46.790475	8.790	204.601	12.91	19.54							1.80	C	2011.619			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	294.866922	46.790484	8.829	204.627	12.47	19.16	4.84	-17.71	5.57	-5.25	-14.12	15.01	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	294.866924	46.790482	8.821	204.631	12.49	18.95	7.08	-14.33	0.06	2.43	-1.69	0.52	0.96	Hg	2015.500	DDCB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	294.866875	46.790506			12.50								0.61	C	2017.773			iT24 1x60s. No resolution for D, has to be fainter than 19mag

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 2803 AE	19 39 28.05	+46 47 26.0	3.9	308	10.60	17.70	5	-12							2013			WDS 19395+4647, WDS data as of middle of Oct. 2017. Note WDS shows a magnitude of 10.6 for the primary here versus 12.26 for the three pairs above.
	294.866886	46.790529					7.80	-14.00	1.98				0.20	Eu	2003.453			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	294.866922	46.790484			12.47		4.84	-17.71	5.57				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR1 or 2MASS.
	294.866924	46.790482			12.49		7.08	-14.33	0.06				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag. PM data from Gaia DR2. Secondary not identified in Gaia DR2.
	294.866875	46.790506			12.50								0.61	C	2017.773			iT24 1x60s. No resolution for E, has to be fainter than 19mag
KOI 2833 AB	19 52 51.66	+45 24 24.8	8.7	39	12.60	17.90	-23	-13							2013			WDS 19529+4524, WDS data as of middle of Oct. 2017.
	298.215193	45.406884					-24.30	-16.00	1.84				0.20	Eu	2003.458			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	298.215082	45.406833	8.955	41.414	12.77	18.04	-26.28	-13.52	5.13	-11.66	-1.02	11.96	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	298.215077	45.406831	8.967	41.452	12.76	18.08	-23.72	-14.83	0.06	1.67	-3.86	0.26	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	298.215083	45.406783	9.256	39.326	12.74	18.26							0.61	C	2017.773			iT24 1x60s. SNR C<10. More guessing than resolution
KOI 2904 AB	19 41 30.57	+39 02 52.9	0.7	227	12.68	15.80	-4	-1							2014			WDS 19415+3903, WDS data as of middle of Oct. 2017.
	295.377383	39.048015					7.70	5.90	1.98				0.20	Eu	2002.669			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	295.377417	39.048036			12.94		6.73	0.99	5.12				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified by Gaia DR! or 2MASS.
	295.377418	39.048036			12.91		5.60	3.04	0.13				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag. PM data from Gaia DR2. Secondary not identified in Gaia DR2.
	295.377429	39.048106			12.89								0.61	C	2017.773			No resolution of B
KOI 2904 AC	19 41 30.57	+39 02 52.9	5.3	50	12.68	16.30	-4	-1							2013			WDS 19415+3903, WDS data as of middle of Oct. 2017.
	295.377383	39.048015	5.620	47.777			7.70	5.90	1.98	1.80	-16.10	12.45	0.20	Eu	2002.669	CCCB	**6**	UCAC5. PM data from UCAC5 Catalog.
	295.377417	39.048036	5.387	49.403	12.94	16.22	6.73	0.99	5.12	0.30	-7.98	5.12	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	295.377418	39.048036	5.379	49.426	12.91	16.18	5.60	3.04	0.13	-0.74	-6.71	0.10	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	295.377429	39.048106	3.938	53.002	12.89	16.77							0.61	C	2017.773			iT24 1x60s. SNR C<10. More guessing than resolution

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 2904 AD	19 41 30.57	+39 02 52.9	8.5	21	12.68	17.00	-4	-1							2013			WDS 19415+3903, WDS data as of middle of Oct. 2017.
	295.377383	39.048015	8.738	22.247			7.70	5.90	1.98	-6.50	9.30	29.84	0.20	Eu	2002.669	CCCB	**6**	UCAC5. PM data from UCAC5 Catalog.
	295.377417	39.048036	8.713	21.081	12.94	16.53	6.73	0.99	5.12	-0.37	-9.79	5.98	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	295.377418	39.048036	8.709	21.066	12.91	16.53	5.60	3.04	0.13	0.98	0.81	0.12	0.96	Hg	2015.500	DDBC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	295.377429	39.048106	7.715	23.776	12.89	16.85							0.61	C	2017.773			iT24 1x60s. SNR D<10
KOI 2915 AC	19 19 40.18	+40 49 42.9	9.3	306	13.35	18.30	5	-11							2013			WDS 19197+4050, WDS data as of middle of Oct. 2017.
	289.917442	40.828598					5.80	-15.60	1.98				0.20	Eu	2002.715			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	289.917468	40.828545	9.521	305.557	13.66	18.47	10.16	-16.55	5.11	8.12	-16.35	23.87	0.96	Hg	2015.000	BBCC	**49**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS. Note rather high e_pm2 error rate.
	289.917469	40.828543	9.526	305.555	13.65	18.33	6.08	-15.13	0.04	-3.16	-10.74	0.28	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	289.917438	40.828481	9.541	309.354	13.66	18.82							0.61	C	2017.773			iT24 1x60s. SNR C<10
KOI 2939 AB	19 52 36.02	+40 39 22.2	2.8	131	13.55	15.80	-5	0							2013			WDS 19526+4039, WDS data as of middle of Oct. 2017.
	298.150086	40.656203					-6.10	-8.00	2.12				0.20	Eu	2002.707			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	298.150058	40.656176			13.81								0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. No PM data available in Gaia DR1 for the primary. Secondary not identified by Gaia DR1 or 2MASS.
	298.150057	40.656175	2.843	175.851	13.74	16.64	-4.91	-7.25	0.04	0.76	-1.76	0.15	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	298.150021	40.656233			13.85								0.61	C	2017.773			iT24 1x60s. Image quality questionable. No resolution of B, has to be fainter than 18.5mag
																		Note: WDS Obs PA is 175, which matches closer with the Gaia DR2 PA. There is no object visible at the WDS 131 PA position in DSS, 2MASS, and PS images, so it appears that PA is an error.
KOI 2939 AE	19 52 36.02	+40 39 22.2	9.8	356	13.55	18.80	-5	0							2013			WDS 19526+4039, WDS data as of middle of Oct. 2017.
	298.150086	40.656203					-6.10	-8.00	2.12				0.20	Eu	2002.707			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	298.150058	40.656176			13.81								0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. No PM data available in Gaia DR1 for the primary. Secondary not identified by Gaia DR1 or 2MASS.
	298.150057	40.656175	12.322	354.787	13.74	21.01	-4.91	-7.25	0.04				0.96	Hg	2015.500			Gaia DR2. M1 is GBR Vest mag, M2 is Gaia DR2 Gmag. PM data from Gaia DR2; no PM data for secondary available in Gaia DR2. No object visible in DSS, 2MASS, and PS1 images at the WDS 9.8” position.
	298.150021	40.656233			13.85								0.61	C	2017.773			iT24 1x60s. Image quality questionable. No resolution of E, has to be fainter than 18.5mag

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
DEA 60 AE	20 01 01.69	+48 15 28.5	61.7	7	6.70	12.45	-84	-79		-114	-86				2000			WDS 20011+4816, WDS data as of middle of Oct. 2017. WDS shows 8.91 mag for the A component in the listing of the AB and AC pairs. There is no 12.45 magnitude star anywhere near the separation and PA listed in the WDS.
	300.256461	48.257557					-117.70	-81.70					0.20	Eu	2003.469			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	300.256552	48.257629	61.694	6.563	8.20	15.50							1.30	E2	2000.419			2MASS. Object chosen as secondary was the closest to the separation and PA shown in the WDS. M1 and M2 estimated from 2MASS J- and K-bands.
	300.255894	48.257295			9.08		-108.09	-82.39	6.86				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM1 data from position comparison with 2MASS. Gaia DR1 does not identify the secondary.
	300.255870	48.257282	61.484	6.515	9.30	18.45	-115.88	-93.38	0.08	-114.11	-95.91	0.26	0.96	Hg	2015.500	BAAB	**78**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.256046	48.257289	61.837	6.249	9.98	18.78							0.61	C	2017.792			iT24 1x60s. SNR E<10. A too bright for reliable measurements
DEA 61 AB	21 34 46.56	+38 32 02.6	66.1	196	2.43	12.29	116	95		119	92				2000			WDS 21348+3832, WDS data as of middle of Oct. 2017. Note there is no 12.29 magnitude star anywhere near the separation and PA listed in the WDS.
	323.694093	38.534084	66.054	195.639	5.40	15.80							1.30	E2	2000.761			2MASS. M1 and M2 estimated from 2MASS J- and K-bands.
	323.694656	38.534446	66.030	195.675	5.77	16.24	123.61	101.47	31.97	124.04	106.75	6.78	0.20	Eu	2013.432	AACB	**78**	URAT1. M1 and M2 are URAT1 fmags. PM data from position comparison with 2MASS. Note unusually high 2MASS error for primary.
													0.96	Hg	2015.000			Gaia DR1. Primary not recognized by Gaia DR1, secondary questionable.
	323.694733	38.534495	66.003	195.623	6.56	18.05	113.67	100.40	0.31	118.52	101.56	0.28	0.96	Hg	2015.500	ACAB	**39**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	323.694942	38.534825	66.853	195.410		18.52							0.61	C	2017.792			iT24 1x60s. A far too bright for reliable measurements, SNR B <10
DEA 62 AB	22 10 28.87	+30 48 37.9	18.7	240	6.90	11.62	-69	-91		-72	-81				2015			WDS 22105+3049, WDS data as of middle of Oct. 2017.
	332.620234	30.810453					-68.00	-90.70	2.83				0.20	Eu	2002.216			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	332.619953	30.810131	18.296	240.726	8.04	16.00	-64.41	-96.20	5.61	-71.69	-91.23	5.61	0.96	Hg	2015.000	BAAB	**78**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	332.619942	30.810118	18.296	240.725	8.62	16.14	-69.33	-91.40	0.09	-69.48	-90.71	0.12	0.96	Hg	2015.500	AAAB	**97**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	332.619883	30.810125	18.503	239.934		16.36							0.61	C	2017.792			iT24 1x60s. A far too bright for reliable measurements

Table 1 continues on the next page.

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
DEA 63 AC	22 46 18.73	+33 19 15.0	16.0	348	7.91	14.65	149	26		168	44				1998			WDS 22463+3319, WDS data as of middle of Oct. 2017.
	341.578157	33.320853					148.70	30.70	1.56				0.20	Eu	2001.924			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	341.578662	33.320786	16.048	347.944	10.52	16.49							1.80	C	2012.155			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 Vmags.
	341.578804	33.320964			10.30		152.55	39.55	6.55				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM Rata for primary from position comparison with 2MASS. Secondary not identified in Gaia DR1.
	341.578827	33.320972			9.89								0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag. No PM data shown in Gaia DR2 for primary, secondary not identified. 2MASS and PS1 images clearly show an object at position of secondary.
	341.578954	33.321075											0.61	C	2017.792			iT24 1x60s. A far too bright for reliable measurements. No resolution of C
DEA 89 AB	21 51 07.58	+30 46 08.9	14.7	205	9.55	13.84	160	-89		155	-87				1999			WDS 21511+3046, WDS data as of middle of Oct. 2017. Secondary barely seen in Aladin image, clearly visible in 2MASS infrared image; WDS M2 is erroneous.
	327.781725	30.769111					149.60	-92.80	2.26				0.20	Eu	2002.499			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	327.782243	30.768809	14.668	205.190	14.92								1.80	C	2011.853			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag.
	327.782329	30.768789			14.08		150.77	-85.87	5.61				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary from position comparison with 2MASS. Secondary not identified in Gaia DR1.
	327.782354	30.768777	14.769	204.341	14.26	21.11	151.42	-89.70	0.11	149.13	-91.19	1.20	0.96	Hg	2015.500	AAAA	**100**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	327.782446	30.768711			14.29								0.61	C	2017.792			iT24 1x60s. No resolution of B - has to be fainter than 18.8
DEA 106 AB	19 55 23.98	+47 26 39.9	6.2	343	14.30	13.70	9	6		10	4				2013			WDS 19553+4726, WDS data as of middle of Oct. 2017.
	298.849844	47.444401	6.193	344.195			7.30	3.20	3.68	5.20	3.10	2.40	0.20	Eu	2003.470	CCCB	**6**	UCAC5. PM data from UCAC5 Catalog.
	298.849878	47.444411	6.199	343.976	15.04	14.11	3.88	1.57	5.79	5.75	3.27	5.79	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	298.849879	47.444411	6.199	343.977	14.97	14.04	4.45	0.67	0.06	4.36	0.03	0.04	0.96	Hg	2015.500	ACAC	**38**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	298.849900	47.444453	6.107	343.000	15.04	14.07							0.61	C	2017.795			iT24 1x60s
DEA 215 AB	19 59 12.41	+45 16 04.9	9.7	179	14.50	14.00	2	-13		2	-11				2013			WDS 19592+4516, WDS data as of middle of Oct. 2017.
	299.801696	45.267994	9.652	178.110			8.30	-24.50	2.26	-0.30	-8.10	1.98	0.20	Eu	2003.441	CCCB	**6**	UCAC5. PM data from UCAC5 Catalog.
	299.801734	45.267915	9.461	179.459	14.81	14.39	7.14	-26.70	5.79	2.17	-6.04	5.79	0.96	Hg	2015.000	BCCB	**25**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	299.801736	45.267912	9.451	179.485	14.73	14.32	7.20	-27.08	0.07	0.52	-7.66	0.04	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	299.801804	45.267889	9.260	180.327	14.73	14.32							0.61	C	2017.792			iT24 1x60s V-filter

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
DEA 323 AB	19 49 19.60	+43 21 34.4	13.5	139	14.00	14.20	7	-3		6	-5				2013			WDS 19493+4321, WDS data as of middle of Oct. 2017.
	297.331688	43.359525					-2.10	4.30	1.84				0.20	Eu	2003.386			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	297.331678	43.359539	13.508	138.938	14.09	17.80	-5.79	4.14	5.13	5.27	-5.46	5.13	0.96	Hg	2015.000	CBCC	**12**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	297.331678	43.359539	13.513	138.926	14.07	17.86	-1.86	3.11	0.05	7.38	-6.84	0.20	0.96	Hg	2015.500	DDAC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	297.331654	43.359578	14.071	137.959	14.07	18.37							0.61	C	2017.792			iT24 1x60s. SNR B<10
DEA 469 AB	19 59 44.22	+45 23 15.0	41.6	47	13.20	13.10	-46	2		-42	5				2013			WDS 19597+4523, WDS data as of middle of Oct. 2017.
	299.934209	45.387500	41.577	47.016			-44.60	2.00	1.70	-45.30	1.90	1.70	0.20	Eu	2003.441	AAAB	**97**	UCAC5. PM data from UCAC5 Catalog.
	299.934005	45.387506	41.570	47.010	13.28	13.10	-46.57	1.19	5.27	-47.24	2.27	5.27	0.96	Hg	2015.000	AACC	**76**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data from position comparison with 2MASS.
	299.933997	45.387506	41.570	47.010	13.27	13.11	-45.08	0.96	0.04	-44.85	1.25	0.06	0.96	Hg	2015.500	AAAB	**97**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	299.933958	45.387542	41.571	47.021	13.23	13.04							0.61	C	2017.792			iT24 1x60s
DEA 479 AB	19 49 02.25	+44 13 55.0	55.9	155	10.70	12.50	49	-68		42	-68				2013			WDS 19490+4413, WDS data as of middle of Oct. 2017.
	297.259401	44.231819					48.80	-69.30	1.70				0.20	Eu	2003.425			UCAC5. PM data from UCAC5 Catalog. Secondary not identified by UCAC5.
	297.259584	44.231626	55.735	155.089	10.71	12.48	46.34	-66.67	5.58	47.46	-67.67	5.59	0.20	Eu	2013.629	AABC	**90**	URAT1. M1 and M2 are URAT1 Vmags. PM data from position comparison with 2MASS.
	297.259620	44.231596			10.82		48.78	-68.84	1.92				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary is direct from Gaia DR1 catalog. Secondary not identified by Gaia DR1.
	297.259630	44.231587			10.55		49.03	-67.93	0.07				0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag. PM data from Gaia DR2; secondary not identified by Gaia DR2 even though it is clearly visible in Aladin DSS image.
	297.259617	44.231556	55.775	155.075	10.72	12.52							0.61	C	2017.792			iT24 1x60s
KOI 489 AB	19 26 09.83	+37 48 59.6	3.2	243	13.40	17.00	-19	-13							2010			WDS 19262+3479, WDS data as middle of Oct 2017.
	291.540976	37.816559	3.233	242.097	14.89								1.80	C	2011.919			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag.
	291.540984	37.816557			14.47		-2.80	-2.20					0.20	Eu	2013.551			URAT1. M1 is URAT1 f.mag. PM data from URAT1. Secondary not identified by URAT1.
						18.51							0.96	Hg	2015.000			Gaia DR1. M2 is Gaia DR1 Gmag. Primary not identified by Gaia DR1.
	291.540974	37.816559	3.209	242.432	14.66	18.67	-1.64	-3.86	0.07	-2.62	-5.06	0.66	0.96	Hg	2015.500	BDBB	**4**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	291.540996	37.816575			14.69								0.61	C	2017.773			iT24 1x60s. No resolution of B, has to be fainter than 19mag
																		Neither component identified by UCAC5.

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 1132 AB	20 04 04.01	+44 14 01.8	2.3	264	13.10	16.50	-53	27							2010			WDS 20040+4414, WDS data as middle of Oct 2017.
	301.016725	44.233815					-4.00	-3.90	2.76				0.20	Eu	2003.432			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	301.016707	44.233803			14.64		-0.64	-8.49	5.69				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary calculated from position comparison with 2MASS. Secondary not identified by either 2MASS or Gaia DR1.
	301.016707	44.233802	2.330	264.987	14.61	18.21	-1.51	-5.70	0.05	0.18	-1.61	0.55	0.96	Hg	2015.500	DDCB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	301.016696	44.233803			14.63								0.61	C	2017.773			iT24 1x60s. No resolution of B, no elongation - might be bogus or has to be fainter than 18.5mag
KOI 5512 AB	20 04 13.24	+44 18 22.4	3.9	30	14.60	18.90	-4	-1							2010			WDS 20042+4418, WDS data as middle of Oct 2017.
	301.055165	44.306269					-0.70	16.40	19.73				0.20	Eu	2003.430			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	301.055162	44.306216			16.79		-1.63	-3.54	5.71				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary calculated from position comparison with 2MASS. Secondary not identified by 2MASS or Gaia DR1.
	301.055161	44.306215			16.52		-1.31	-5.70	0.12				0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	301.055158	44.306217			16.82								0.61	C	2017.773			iT24 1x60s. No resolution of B, has to be fainter than 19mag
KOI 7020 AB	20 04 05.01	+44 13 55.9	3.3	23	13.50	14.90	17	-18							2015			WDS 20041+4414, WDS data as middle of Oct 2017.
	301.020910	44.232194					-8.40	-7.90	2.90				0.20	Eu	2003.342			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	301.020872	44.232168	3.173	23.187	13.41	14.85	-8.41	-16.63	10.04				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS. Secondary not identified by 2MASS.
	301.020871	44.232167	3.173	23.186	13.63	15.05	-4.58	-4.18	0.04	-4.75	-4.14	0.05	0.96	Hg	2015.500	BBAB	**62**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	301.020867	44.232178	3.002	23.640	13.60	14.73							0.61	C	2017.773			iT24 1x60s
ES 85 AB	20 03 52.48	+44 11 31.9	2.5	34	10.52	11.20	-2	-3		-2	-3				2002			WDS 20039+4411, WDS data as middle of Oct 2017. Note: WDS shows a different pair of PM numbers for the primary in the AC and AD listings below.
	300.968540	44.191989					-13.70	-22.50	2.40				0.20	Eu	2003.433			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	300.968478	44.191917			10.79		-14.30	-28.81	5.23				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary calculated from position comparison with 2MASS. Secondary not recognized by Gaia DR1 or 2MASS.
	300.968485	44.191918	2.498	34.400	10.78	11.22	-2.61	-4.66	3.01	-1.45	-6.16	0.11	0.96	Hg	2015.500	DDCB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.968504	44.191933	2.250	33.341	10.43	10.71							0.61	C	2017.773			iT24 1x60s

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
ES 85 AC	20 03 52.48	+44 11 31.9	10.6	85	10.52	12.00	0	-10		-4	-2				2003			WDS 20039+4411, WDS data as middle of Oct 2017.
	300.968540	44.191989	10.611	84.900			-13.70	-22.50	2.40	-3.20	-7.30	3.82	0.20	Eu	2003.433	CCCB	**6**	UCAC5. PM data from UCAC5.
	300.968478	44.191917	10.749	84.026	10.79	12.47	-14.30	-28.81	5.23	-0.63	-7.32	5.23	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.968485	44.191918	10.731	84.043	10.78	12.53	-2.61	-4.66	3.01	-1.64	-5.78	0.07	0.96	Hg	2015.500	DDCC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.968504	44.191933	10.667	84.351	10.43	12.48							0.61	C	2017.773			iT24 1x60s
ES 85 AD	20 03 52.48	+44 11 31.9	11.2	307	10.52	12.90	0	-10		-8	-5				2011			WDS 20039+4411, WDS data as middle of Oct 2017.
	300.968540	44.191989	11.269	307.385			-13.70	-22.50	2.40	-1.10	-6.00	1.98	0.20	Eu	2003.433	CCCB	**6**	UCAC5. PM data from UCAC5.
	300.968478	44.191917	11.271	308.603	10.79	13.11	-14.30	-28.81	5.23	-1.14	-6.75	5.23	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.968485	44.191918	11.281	308.528	10.78	13.12	-2.61	-4.66	3.01	-0.81	-6.31	0.04	0.96	Hg	2015.500	DDCC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.968504	44.191933	11.285	308.077	10.43	13.12							0.61	C	2017.773			iT24 1x60s
KOI 6600 AB	19 56 27.52	+40 44 55.1	2.3	314	9.40	12.40	26	27							2015			WDS 19565+4045, WDS data as middle of Oct 2017.
	299.114691	40.748645					22.50	24.30	1.84				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	299.114872	40.748557	2.469	306.311	11.76								1.80	C	2012.405			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag.
	299.114793	40.748728			10.93		22.99	25.38	1.92				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data from Gaia DR1 catalog. Secondary not identified by Gaia DR1 and 2MASS.
	299.114797	40.748732			10.70		24.09	25.50	0.07				0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag, PM data from Gaia DR2. Secondary not identified by Gaia DR2.
	299.114817	40.748756			10.89								0.61	C	2017.773			iT24 1x60s. No resolution of B. Might be bogus
KOI 3831 AB	19 56 19.00	+40 49 44.1	2.0	158	16.20	16.20	-1	-22							2011			WDS 19563+4050, WDS data as middle of Oct 2017.
	299.079165	40.828848			16.68		-0.70	-21.90					0.20	Eu	2013.258			URAT1. M1 is URAT1 f.mag. PM data from URAT1. Secondary not identified by URAT1.
	299.079019	40.829148	1.888	160.318	18.22	17.43							1.80	C	2012.203			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	299.079021	40.829155	1.982	161.643	17.52	17.25	-24.25	47.12	7.25				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	299.079020	40.829155	1.982	161.634	17.70	17.22	-4.45	-4.62	0.48	-3.68	-4.42	0.25	0.96	Hg	2015.500	BDBB	**4**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	299.079200	40.828697			17.11								0.61	C	2017.773			iT24 1x60s. No resolution of B.
																		Note: Considerable discrepancy between URAT1, 2MASS/Gaia DR1, and Gaia DR2 in PM numbers for primary - double-checked the 2MASS/Gaia DR1 numbers and found no error. No UCAC5 data available for neither component.

Table 1 continues on the next page.

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 2676 AB	19 55 55.29	+40 52 19.3	2.9	38	11.90	15.00	-1	-3							2010			WDS 19559+4052, WDS data as middle of Oct 2017.
	298.980362	40.872046					0.10	-1.90	2.12				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	298.980362	40.872039	2.899	38.262	13.46	16.64	-3.40	-0.19	5.11				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	298.980363	40.872040	2.893	38.252	13.75	16.75	1.41	0.58	0.05	-5.58	-5.98	0.17	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	298.980371	40.872039	3.431	35.584	13.81	16.25							0.61	C	2017.773			iT24 1x60s
KOI 839 AB	19 55 50.66	+40 51 46.1	3.1	348	13.40	19.30	-4	-22							2010			WDS 19558+4051, WDS data as middle of Oct 2017.
	298.961125	40.862774					-8.20	-21.10	3.82				0.20	Eu	2002.706			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	298.961088	40.862702			15.17		-8.14	-24.78	5.55				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary calculated from position comparison with 2MASS, secondary not recognized by either 2MASS or Gaia DR1.
	298.961087	40.862699			14.98		-7.80	-20.24	0.08				0.96	Hg	2015.500			Gaia DR2. M1 is Gaia DR2 Gmag. PM data from Gaia DR2, secondary not identified by Gaia DR2.
	298.961075	40.862689			15.22								0.61	C	2017.773			iT24 1x60s. No resolution of B. Might be bogus
DEA 397 AB	19 47 00.99	+46 53 48.6	20.2	290	16.30	17.50	17	-18		21	-18				2013			WDS 19470+4653, WDS data as middle of Oct 2017.
	296.754126	46.896736					12.70	-13.50	17.47				0.20	Eu	2003.447			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5. Unusually high error rate for UCAC5.
	296.754185	46.896693	20.746	290.595	16.46	17.36	19.36	-21.14	6.53	21.44	-23.15	6.53	0.96	Hg	2015.000	ABCC	**61**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	296.754189	46.896690	20.477	290.593	16.52	17.49	16.95	-20.64	0.10	17.10	-21.26	0.13	0.96	Hg	2015.500	ACAB	**39**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	296.754221	46.896769	20.404	289.021	16.65	17.55							0.61	C	2017.773			iT24 1x60s. SNR B<20
KOI 1579 AB	19 39 19.27	+46 44 03.6	2.5	138	12.40	17.60	-7	-8							2010			WDS 19393+4644, WDS data as middle of Oct 2017.
	294.830307	46.734345					-2.40	-6.20	1.98				0.20	Eu	2003.453			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	294.830294	46.734321	2.084	144.014	13.46								1.80	C	2012.216			Pan-STARRS release 1 (PS1) Survey. M1 is PS1 gmag.
	294.830296	46.734325			13.33		-2.70	-5.02	5.13				0.96	Hg	2015.000			Gaia DR1. M1 is visual estimate from Gaia DR1 Gmag and 2MASS J, H, and K mags. PM data for primary calculated from position comparison with 2MASS, secondary not recognized by either 2MASS or Gaia DR1.
	294.830295	46.734324	2.494	137.500	13.34	17.21	-2.78	-8.21	0.04	-2.70	-4.71	1.32	0.96	Hg	2015.500	DDCB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	294.830246	46.734306			13.45								0.61	C	2017.773			iT24 1x60s. No resolution of B

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
DEA 326 AB	19 53 02.05	+40 32 58.6	13.8	53	13.70	18.80	5	2		5	+0				2013			WDS 19530+4032, WDS data as middle of Oct 2017.
	298.258479	40.549664					7.80	-3.60	2.26				0.20	Eu	2002.707			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	298.258513	40.549651	13.589	53.703	13.98	20.19							1.80	C	2011.520			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	298.258514	40.549651	13.586	53.699	13.76	19.49	5.13	-1.86	6.81	-1.83	4.49	6.81	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	298.258515	40.549651	13.585	53.690	13.75	19.41	5.68	-3.47	0.04	2.78	0.31	0.39	0.96	Hg	2015.500	DDBC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	298.258679	40.549614			13.84								0.61	C	2017.773			iT24 1x60s. No resolution of B
STF 2619 AB	20 01 01.69	+48 15 28.5	4.2	239	8.91	8.92	-84	-79		-111	-101				2016			WDS 20011+4816, WDS data as middle of Oct 2017.
	300.256461	48.257557	4.062	241.277			-117.70	-81.70	4.10	-115.30	-94.10	5.09	0.20	Eu	2003.464	BAAA	**80**	UCAC5. PM data from UCAC5.
	300.255894	48.257295	4.110	239.340	9.08	9.12	-108.09	-82.39	6.86	-112.56	-83.93	6.86	0.96	Hg	2015.000	AABA	**95**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.255870	48.257282	4.109	239.326	9.30	9.32	-115.88	-93.38	0.08	-112.23	-93.64	0.08	0.96	Hg	2015.500	ABAA	**80**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.256046	48.257289	5.407	241.983									0.61	C	2017.792			iT24 1x60s. A and B too bright for reliable measurements
STF 2619 AC	20 01 01.69	+48 15 28.5	20.1	354	8.91	12.60	-84	-79							2015			WDS 20011+4816, WDS data as middle of Oct 2017.
	300.256461	48.257557	19.345	349.448			-117.70	-81.70	4.10	-4.50	-1.10	2.26	0.20	Eu	2003.466	CCCB	**6**	UCAC5. PM data from UCAC5.
	300.255894	48.257295	20.073	353.601	9.08	12.61	-108.09	-82.39	6.86	0.18	0.82	6.86	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.255870	48.257282	20.112	353.774	9.30	12.57	-115.88	-93.38	0.08	-4.12	-1.04	0.08	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.256046	48.257289	20.193	352.498		12.41							0.61	C	2017.792			iT24 1x60s. A too bright for reliable measurements
STF 2619 AD	20 01 01.69	+48 15 28.5			8.91	13.90	-84	-79		-131	100				2015			WDS 20011+4816, WDS data as middle of Oct 2017. Note: No measures for the AD pair listed in the WDS.
	300.256461	48.257557	14.055	347.003			-117.70	-81.70	4.10	2.10	-2.40	2.69	0.20	Eu	2003.466	CCCB	**6**	UCAC5. PM data from UCAC5.
	300.255894	48.257295	14.718	353.052	9.08	13.78	-108.09	-82.39	6.86	5.53	4.07	6.86	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	300.255870	48.257282	14.756	353.297	9.30	13.68	-115.88	-93.38	0.08	0.30	-0.96	0.05	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	300.256046	48.257289	14.774	351.722		13.65							0.61	C	2017.792			iT24 1x60s. A too bright for reliable measurements
ES 2713 AB	21 35 10.68	+38 38 48.5	17.5	98	9.70	10.83	-28	-12		-25	-11				2011			WDS 21352+3839, WDS data as middle of Oct 2017.
	323.794479	38.646810	17.494	97.650			-25.10	-9.80	2.12	-26.90	-10.10	1.70	0.20	Eu	2002.669	ABBB	**74**	UCAC5. PM data from UCAC5.
	323.794369	38.646776	17.473	97.672	9.73	10.73	-27.39	-9.03	6.48	-27.64	-9.01	6.48	0.96	Hg	2015.000	AACB	**78**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	323.794365	38.646775	17.468	97.688	10.00	10.88	-25.44	-9.40	0.06	-25.76	-8.86	0.23	0.96	Hg	2015.500	BAAB	**78**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	323.794271	38.646803	17.706	97.627	9.84	10.64							0.61	C	2017.792			iT24 1x60s. A too bright for reliable measurements

Table 1 continues on the next page.

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
ES 1995 AB	21 35 26.60	+38 34 03.0	2.3	51	13.20	16.20	8	-10							2015			WDS 21354+3837, WDS data as middle of Oct 2017.
	323.860817	38.567551					3.10	-12.80	1.84				0.20	Eu	2002.666			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	323.860831	38.567507	2.258	50.896	13.16	16.18	3.29	-12.98	5.96				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	323.860831	38.567505	2.258	50.780	13.66	16.30	4.36	-12.64	0.04	-0.70	-1.77	0.12	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	323.860800	38.567508	2.330	38.627	13.59	14.41							0.61	C	2017.792			iT24 1x60s. Overlapping star disks
CHE 428 AB	22 46 18.73	+33 19 15.0	31.3	165	10.36	13.72	149	26		20	2				2008			WDS 22463+3319, WDS data as middle of Oct 2017.
	341.578157	33.320853	31.414	162.088			148.70	30.70	1.56	8.50	1.80	1.56	0.20	Eu	2001.922	ACCB	**31**	UCAC5. PM data from UCAC5.
	341.577980	33.320786	31.329	160.934	10.00	13.80							1.30	E2	1998.759			2MASS. M1 and M2 estimated from 2MASS J- and K-bands.
	341.578804	33.320964	31.265	165.502	10.30	13.75	152.55	39.55	6.55	4.39	-1.08	5.68	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	341.578827	33.320972	31.375	165.631	10.52	13.74				10.33	1.98	0.05	0.96	Hg	2015.500			Gaia DR2. M1 and M2 are GBR Vest mags, PM data from Gaia DR2. No PM data in Gaia DR2 for primary.
	341.578954	33.321075	31.561	166.589		13.79							0.61	C	2017.792			iT24 1x60s. A far too bright for reliable measurements
BKO 666 AB	22 45 57.81	+33 16 04.1	8.9	232	13.80	14.50	135	113		-3	9				2008			WDS 22460+3316, WDS data as middle of Oct 2017.
	341.490856	33.268102	8.800	232.505			2.30	-2.60	1.84	-2.80	-3.80	3.11	0.20	Eu	2001.921	BCCC	**24**	UCAC5. PM data from UCAC5.
	341.490866	33.268093	8.862	232.688	14.05	15.25	-3.93	-6.96	5.68	-7.58	-7.89	5.68	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	341.490866	33.268092	8.865	232.700	14.04	15.21	2.07	-3.60	0.07	-4.59	-3.74	0.10	0.96	Hg	2015.500	DDAC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	341.490854	33.268081	9.234	231.724	14.12	15.34							0.61	C	2017.792			iT24 1x60s
CHE 419 AB	22 45 46.09	+33 19 57.2	17.8	147	10.29	14.50	-12	-3		5	-1				2010			WDS 22457+3320, WDS data as middle of Oct 2017.
	341.442027	33.332537	17.707	146.789			-5.60	0.10	1.41	-0.40	-1.60	1.56	0.20	Eu	2001.919	CCCC	**6**	UCAC5. PM data from UCAC5.
	341.442003	33.332537	17.763	146.643	12.52	13.41	-9.68	-1.07	5.22	-4.44	-5.78	5.22	0.96	Hg	2015.000	CCCC	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	341.442002	33.332537	17.765	146.636	12.55	13.41	-5.18	-0.83	0.07	0.58	-3.12	0.07	0.96	Hg	2015.500	DDAC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	341.442050	33.332567	17.715	147.859	12.51	13.44							0.61	C	2017.792			iT24 1x60s
BKO 667 AB	22 46 13.16	+33 08 38.6	4.6	188	12.50	13.00	-122	46							2008			WDS 22462+3309, WDS data as middle of Oct 2017.
	341.554846	33.144057	4.566	189.234			-9.40	2.80	1.91	-2.10	-4.90	2.55	0.20	Eu	2001.918	CCCB	**6**	UCAC5. PM data from UCAC5.
	341.554805	33.144067	4.652	187.865	14.21	14.68	-13.48	-3.10	6.10	-6.09	-8.63	6.10	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	341.554804	33.144067	4.652	187.815	14.15	14.67	-7.74	-0.19	0.06	0.41	-2.74	0.07	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	341.554758	33.144039	4.503	186.889	14.13	14.65							0.61	C	2017.792			iT24 1x60s

Table 1 continues on the next page.

KOI Objects in the WDS Catalog

Table 1 (continued). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
BKO 667 AC	22 46 13.16	+33 08 38.6	8.2	67	12.50	13.20	-122	46							2008			WDS 22462+3309, WDS data as middle of Oct 2017.
	341.554846	33.144057	7.999	67.229			-9.40	2.80	1.91	7.40	3.10	2.69	0.20	Eu	2001.919	CCCB	**6**	UCAC5. PM data from UCAC5.
	341.554805	33.144067	8.204	67.800	14.21	14.92	-13.48	-3.10	6.10	1.57	-1.75	6.10	0.96	Hg	2015.000	CCCB	**6**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	341.554804	33.144067	8.211	67.813	14.15	14.89	-7.74	-0.19	0.06	7.19	1.92	0.07	0.96	Hg	2015.500	DDAC	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	341.554758	33.144039	8.245	66.936	14.13	14.89							0.61	C	2017.792			iT24 1x60s
KOI 4797 AB	19 49 23.61	+43 25 16.3	3.6	127	16.10	17.20	-35	28							2013			WDS 19494+4325, WDS data as middle of Oct 2017.
	297.348346	43.421265					-5.50	-16.40	6.94				0.20	Eu	2003.387			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	297.348322	43.421212	3.535	127.763	15.61	16.71	-14.13	-1.54	5.13				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	297.348321	43.421209	3.530	127.631	16.04	17.18	-0.12	-10.51	0.89	-2.78	0.76	0.23	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	297.348292	43.421219	3.391	125.309	16.08	17.21							0.61	C	2017.792			iT24 1x60s
DEA 202 AB	19 49 13.85	+43 25 58.8	9.3	287	13.00	18.00	44	7		40	1				2013			WDS 19492+4325, WDS data as middle of Oct 2017.
	297.307727	43.432933					42.70	2.50	1.70				0.20	Eu	2003.385			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	297.307914	43.432943	9.814	287.360	13.34	19.80							1.80	C	2012.039			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	297.307917	43.432941	9.803	287.360	13.07	19.16	42.25	2.47	5.13	46.84	3.22	5.98	0.96	Hg	2015.000	ACCB	**31**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	297.307925	43.432942	9.803	287.355	13.05	19.05	43.71	2.05	0.05	43.37	2.15	0.35	0.96	Hg	2015.500	AAAB	**97**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	297.307967	43.432964			13.01								0.61	C	2017.792			iT24 1x60s. No resolution of B, has to be fainter than 19mag
KOI 5426 AB	19 49 09.71	+43 28 04.0	2.7	152	13.80	15.80	-16	16							2011			WDS19492+4328, WDS data as middle of Oct 2017.
	297.290411	43.467832					-0.20	13.60	2.12				0.20	Eu	2003.385			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	297.290409	43.467876	2.733	152.493	13.61	15.18	-8.60	18.02	5.13				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	297.290410	43.467877	2.737	152.504	13.83	15.36	2.12	7.14	0.05	0.09	0.08	0.35	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	297.290375	43.467914	2.962	159.791	13.80	14.91							0.61	C	2017.792			iT24 1x60s. Touching star disks
KOI 315 AB	19 49 05.25	+43 19 59.9	4.1	214	10.80	15.50	-26	-58							2012			WDS 19491+4320, WDS data as middle of Oct 2017.
	297.271839	43.333255					-25.50	-56.50	1.70				0.20	Eu	2003.385			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	297.271727	43.333072	3.967	213.778	13.67	17.90							1.80	C	2011.865			Pan-STARRS release 1 (PS1) Survey. M1 and M2 are PS1 gmags
	297.271726	43.333073	3.978	213.721	12.83	17.15	-25.04	-52.23	5.13				0.96	Hg	2015.000			Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	297.271721	43.333064	3.948	213.802	13.29	17.40	-25.09	-56.35	0.06	-3.50	-7.74	0.22	0.96	Hg	2015.500	ADAB	**5**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	297.271696	43.333042			13.23								0.61	C	2017.792			iT24 1x60s. No resolution of B, has to be fainter than 19mag

Table 1 concludes on the next page.

Table 1 (conclusion). Results for selected KOI and DEA objects including other WDS objects found by chance in the same images

Name	RA	Dec	Sep	PA	M1	M2	pmRA1	pmDec1	e_pm1	pmRA2	pmDec2	e_pm2	Ap	Me	Date	CPM Rat	CPM %	Source/Notes
KOI 5414 AB	19 49 01.15	+43 18 32.3	3.1	165	13.90	16.50	-17	1							2010			WDS 19490+4319, WDS data as middle of Oct 2017.
	297.254803	43.308997					-3.90	-7.80	6.72						2003.387			UCAC5. PM data from UCAC5. Secondary not identified by UCAC5.
	297.254786	43.308972	3.114	165.164	15.45	18.08	-5.10	-1.63	5.13									Gaia DR1. M1 and M2 are Gaia DR1 Gmags. PM data for primary calculated from position comparison with 2MASS, secondary not identified by 2MASS.
	297.254785	43.308971	3.114	165.115	15.72	18.32	-4.25	-5.84	0.08	0.16	-5.32	0.35	0.96	Hg	2015.500	DDBB	**0**	Gaia DR2. M1 and M2 are GBR Vest mags. PM data from Gaia DR2.
	297.254779	43.308969	4.137	169.665	15.74	19.74							0.61	C	2017.792			iT24 1x60s. SNR B<5
KOI 6907 AB	19 48 57.69	+43 23 51.6	3.4	103	13.80	13.60	+0	+0							2010			WDS 19490+4324, WDS data as middle of Oct 2017.
	297.240353	43.397765	3.613	104.902			22.30	-14.90	19.89	12.50	4.00	7.85			2003.383	CCCB	**6**	UCAC5. PM data from UCAC5. Unusually high error rates for both components.
	297.240452	43.397717	3.451	101.860	16.21	15.92	6.36	6.81	5.13	7.99	7.02	5.13			2015.000	BCCB	**25**	Gaia DR1. M1 and M2 are visual estimates from Gaia DR1 Gmags and 2MASS J, H, and K mags. PM data calculated from position comparison with 2MASS.
	297.240454	43.397718	3.452	101.786	15.93	15.64	7.92	2.49	0.03	9.20	7.79	0.09	0.96	Hg	2015.500	DDAB	**0**	Gaia DR2. M1 and M2 are Gaia DR2 Gmags. PM data from Gaia DR2.
	297.240550	43.397700	3.007	101.898	16.17	15.93							0.61	C	2017.792			iT24 1x60s

Explanations regarding the content of the Notes column:

- "Touching star disks" indicates that the rims of the star disks are touching and that the measurement results might be a bit less precise than with clearly separated star disks
- "Touching/Overlapping star disks" indicates that the star disks overlap to the degree of an elongation and the measurement result is probably less precise than with clearly separated star disks
- "SNR <20" indicates that the measurement result might be a bit less precise than desired due to a low SNR value but this is already included in the calculation of the magnitude error range estimation
- "SNR <10" indicates that the measurement result is probably a bit less precise than desired due to a very low SNR value but this is already included in the calculation of the magnitude error range estimation
- "Image quality questionable" or similar indicates rather large average errors for the reference stars used for plate solving for different reasons (mostly atmospheric influences). But this is at least to some degree already included in the calculation of the error range estimation

KOI Objects in the WDS Catalog

Table 2. Assessment of selected objects for potential gravitational relationship

Name	neg Plx	Dup	Plx 1	e_Plx 1	Plx 2	e_Plx 2	Best Case Dist	Realistic Case Dist	Worst Case Dist	Plx Dist	Plx Err	Plx Rat	Plx Score
KOI 18 AG	1	0	1.0829	0.0202	0.192	0.1295	447,484,498	883,839,930	3,113,315,696	D	C	DC	1
BRT 2248 AB	0	0	0.5859	0.0431	2.0249	0.037	224,169,520	250,188,854	279,971,077	D	A	DA	1
DEA 105 AB	0	0	7.829	0.0328	7.6138	0.1317	173,187	744,679	1,331,464	C	A	CA	20
KOI 103 AC	1	0	3.248	0.0252	-0.2493	0.5763							
DEA 332 AB	0	0	2.2002	0.2872	2.112	0.1565	6,265	3,915,141	22,555,933	C	C	CC	16
KOI 108 AD	1	0	1.9923	0.0236	0.0162	0.5988							
KOI 108 AE	0	0	1.9923	0.0236	1.8985	0.603	4,435	5,115,310	56,898,595	C	D	CD	13
KOI 108 AF	0	0	1.9923	0.0236	0.4535	0.0653	292,814,638	351,305,050	429,026,471	D	A	DA	1
ALI 1110 AB	0	0	4.9821	0.0314	0.7588	0.0287	220,264,417	230,433,922	241,379,013	D	A	DA	1
KO 116 AG	1	0	2.2223	0.0303	-0.4056	0.7858							
KO 116 AI	1	0	2.2223	0.0303	-0.4056	0.7858							
KO 116 AJ	0	0	2.2223	0.0303	0.9781	0.2724	70,848,445	118,069,710	200,720,756	D	B	DB	1
KOI 4724 AB	1	0	0.192	0.07	-0.0423	0.1346							
KOI 4724 AC	1	0	0.192	0.07	0.6214	0.0488	427,054,260	742,375,796	1,382,958,088	D	C	DC	1
KOI 123 AD	0	0	2.0773	0.0233	0.6065	0.079	200,480,042	240,800,751	292,836,190	D	A	DA	1
KOI 123 AE	0	0	2.0773	0.0233	0.5535	0.1783	181,442,303	273,366,546	451,562,475	D	B	DB	1
KOI 148 AB	0	0	3.2313	0.0191									
KO 148 AC	0	0	3.2313	0.0191	0.5432	0.0546	280,832,773	315,894,904	358,703,980	D	A	DA	1
KOI 148 AF	1	0	3.2313	0.0191	0.2556	0.1313	468,918,647	743,165,014	1,595,986,340	D	A	DA	1
KOI 148 AG	0	0	3.2313	0.0191	0.5267	0.1128	258,333,223	327,790,744	434,895,380	D	A	DA	1
KOI 244 AB	0	0	4.0822	0.0236	4.0898	0.0139	2,051	93,920	558,550	B	A	BA	80
KOI 244 AC	0	0	4.0822	0.0236	2.4194	0.4673	20,632,264	34,727,403	55,426,774	D	B	DB	1
KOI 245 AB	0	1	15.6155	0.029	0.5232	0.0471	348,451,477	381,036,028	420,062,725	D	A	DA	1
KOI 246 AB	0	0	6.9076	0.0208	1.0061	0.0549	164,458,740	175,157,333	187,079,946	D	A	DA	1
KOI 720 AC	0	0	2.5671	0.0189	0.5683	0.1228	217,517,963	282,607,146	383,242,130	D	A	DA	1
KOI 2426 AB	0	0	1.8209	0.0148	0.5331	0.057	235,342,525	273,645,231	320,882,113	D	A	DA	1
KOI 2453 AC	0	0	6.3459	0.0346	6.3829	0.0897	1,838	188,428	814,464	B	A	BA	80
KOI 2803 AB	0	1	3.4762	0.0226	1.5072	0.0404	73,557,402	77,518,314	81,671,010	D	A	DA	1
KOI 2803 AC	0	1	3.4762	0.0226	1.5072	0.0404	73,557,402	77,518,314	81,671,010	D	A	DA	1
KOI 2803 AD	0	1	3.4762	0.0226	0.9579	0.1949	119,202,978	155,997,191	211,385,372	D	A	DA	1
KOI 2833 AB	0	0	2.0777	0.0256	0.6511	0.1012	173,668,556	217,523,372	277,033,699	D	A	DA	1
KOI 2904 AC	0	0	1.329	0.0535	0.3682	0.0411	342,239,564	405,003,215	481,399,514	D	B	DB	1
KOI 2904 AD	0	0	1.329	0.0535	0.3884	0.0475	311,486,580	375,867,707	455,872,161	D	B	DB	1
KOI 2915 AC	1	0	2.028	0.0163	0.2816	0.1186	412,880,385	630,779,199	1,164,555,160	D	B	DB	1
KOI 2939 AB	0	0	0.7962	0.0151	1.5048	0.0606	111,419,324	121,992,866	132,307,508	D	A	DA	1
KOI 2939 AE	0	0	0.7962	0.0151									
DEA 60 AE	0	1	18.4137	0.0295	18.2414	0.0893	32,917	105,862	179,386	A	A	AA	100
DEA 61 AB	0	0	14.2468	0.1339	13.8204	0.1249	175,719	446,722	717,634	C	A	CA	20
DEA 62 AB	0	1	10.5371	0.0377	10.6202	0.0492	1,730	153,182	313,030	B	A	BA	80
DEA 89 AB	0	0	21.0832	0.0476	20.2797	0.5149	113,646	387,635	674,647	C	A	CA	20
DEA 106 AB	0	0	0.8178	0.0215	0.8083	0.0165	7,516	2,964,419	14,743,316	C	A	CA	20
DEA 215 AB	0	0	2.3351	0.0254	1.1889	0.0184	81,546,002	85,161,605	88,839,434	D	A	DA	1
DEA 323 AB	0	0	1.8784	0.0195	2.503	0.0811	23,514,514	27,402,318	31,140,580	D	A	DA	1
DEA 469 AB	0	0	3.3256	0.0159	3.3238	0.0219	12,441	35,841	740,434	B	A	BA	80

Table 2 concludes on the next page.

KOI Objects in the WDS Catalog

Table 2 (conclusion). Assessment of selected objects for potential gravitational relationship

Name	neg Plx	Dup	Plx 1	e_Plx 1	Plx 2	e_Plx 2	Best Case Dist	Realistic Case Dist	Worst CasDist	Plx Dist	Plx Err	Plx Rat	Plx Score
KOI 489 AB	1	0	0.5045	0.038	0.118	0.31							
KOI 1132 AB	1	0	0.6877	0.0186	0.3543	0.2223	49,455,012	282,247,212	1,270,603,129	D	D	DD	1
KOI 7020 AB	0	0	0.6265	0.0149	0.6609	0.0229	4,947	17,137,043	35,610,237	C	A	CA	20
ES 85 AB	1	1	-3.1408	1.1437	0.6376	0.0494							
ES 85 AC	1	1	-3.1408	1.1437	0.731	0.0252							
ES 85 AD	1	1	-3.1408	1.1437	0.6092	0.0189							
KOI 3831 AB	1	0	0.093	0.133	0.0979	0.0925							
KOI 2676 AB	0	0	0.709	0.0197	0.4167	0.0724	122,487,670	204,076,652	316,032,559	D	B	DB	1
DEA 397 AB	0	0	3.6004	0.039	3.5699	0.0522	5,653	489,505	1,960,822	C	A	CA	20
KOI 1579 AB	1	0	0.981	0.0145	1.1589	0.4182	2,506	32,277,153	82,628,516	C	D	CD	13
DEA 326 AB	0	0	0.9993	0.0176	1.1348	0.1635	13,360	24,646,677	51,237,899	C	B	CB	19
STF 2619 AB	0	1	18.4137	0.0295	18.4056	0.0297	223	4,935	40,961	A	A	AA	100
STF 2619 AC	0	1	18.4137	0.0295	0.5461	0.0278	348,196,592	366,511,177	386,788,451	D	A	DA	1
STF 2619 AD	0	1	18.4137	0.0295	0.6784	0.0167	285,527,507	292,850,438	300,542,037	D	A	DA	1
ES 2713 AB	0	1	4.6076	0.0301	4.5203	0.1043	3,777	864,591	2,232,898	C	A	CA	20
ES 1995 AB	0	0	0.9669	0.0169	0.4366	0.0547	202,718,140	259,113,820	330,447,224	D	B	DB	1
CHE 428 AB	0	1			1.4742	0.024							
BKO 666 AB	0	0	0.9446	0.0306	0.2608	0.0444	450,171,670	572,542,605	741,669,833	D	B	DB	1
CHE 419 AB	0	0	2.8894	0.034	0.6614	0.0349	223,997,747	240,479,228	258,682,478	D	A	DA	1
BKO 667 AB	0	0	0.5811	0.0258	0.4544	0.0313	53,228,927	98,974,123	147,645,286	D	B	DB	1
BKO 667 AC	0	0	0.5811	0.0258	0.7175	0.0335	38,310,287	67,480,119	96,796,011	D	A	DA	1
KOI 4797 AB	0	0	1.2079	0.3204	0.9907	0.0803	3,296	37,438,714	91,603,396	C	D	CD	13
DEA 202 AB	0	0	2.3921	0.0218	2.4081	0.1276	4,061	572,943	5,676,343	C	A	CA	20
KOI 5426 AB	0	0	0.8773	0.0182	1.01	0.0298	19,903,863	30,891,263	41,725,242	D	A	DA	1
KOI 315 AB	1	0	5.0879	0.0253	0.2236	0.1006	595,496,668	881,950,533	1,636,644,298	D	A	DA	1
KOI 5414 AB	1	0	0.3325	0.033	0.2912	0.1431	8,521	87,983,508	828,421,462	C	D	CD	13

Description of Table 2 contents

1. Name = WDS Discoverer code
2. neg Plx = Marker for either negative parallax value or Plx < 3*e_Plx
3. Dup = Marker for Gaia DR2 duplicity issue
4. Plx 1 = Parallax for first component
5. e_Plx 1 = Parallax error for first component
6. Plx 2 = Parallax for second component
7. e_Plx 2= Parallax error for second component
8. Best Case Dist = Smallest possible distance between the two components in AU considering e_Plx favorable
9. Realistic Case Dist = Distance between the two components using the given Plx values
10. Worst Case Dist = Distance between the two components in AU considering e_Plx working unfavorable
11. Plx Dist = Rating for distance between the components
12. Plx Err = Rating for the relationship e_Plx to Plx
13. Plx Rat = Combined Plx rating
14. Plx Score = Transformation of the combined Plx rating into an estimated probability for gravitational relationship

KOI Objects in the WDS Catalog

(Continued from page 131)

5. Acknowledgements

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- 2MASS catalog
- 2MASS images
- AAVSO VPhot
- Aladin Sky Atlas v9.0
- Astrometrica v4.10.0.427
- AstroPlanner v2.2
- iTelescope
- iT24: 610mm CDK with 3962mm focal length. Resolution 0.625 arcsec/pixel. V-filter. No transformation coefficients available. Located in Auberry, California. Elevation 1405m
- Gaia DR1 catalog
- Gaia DR2 catalog
- MaxIm DL6 v6.08
- POSS images
- SIMBAD
- UCAC4 catalog
- UCAC5 catalog
- URAT1 catalog
- VizieR
- Washington Double Star Catalog

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Appendix A

Description of the CPM rating scheme according to Knapp/Nanson 2017 with extensions:

Four rating factors are used: Proper motion vector direction, proper motion vector length, size of position error in relation to proper motion vector length and relationship separation to average proper motion speed:

- Proper motion vector direction rating: “A” for within the error range identical direction, “B” for similar direction within the double error range and “C” for outside
- Proper motion vector length rating: “A” for within the error range identical length, “B” for similar length within the double error range and C for outside
- Error size rating: “A” for error size of less than 5% of the proper motion vector length, “B” for less than 10% and “C” for a larger error size
- Rating for relation separation to average proper motion speed: “A” for less than 100 years, “B” for 100 to 1000 years and “C” for above.

To compensate for (depending on the selected objects and available catalogs) excessively large position errors resulting an “A” rating despite rather high deviations absolute upper limits are applied regardless calculated error size:

- Proper motion vector direction: Max. 2.86° difference for an “A” and 5.72° for a “B”
- Proper motion vector length: Max. 5% difference for an “A” and 10% for a “B”

The higher precision of Gaia DR2 proper motion data allows for a more rigid assessment scheme:

- Proper motion vector direction: Max. 1° difference for an “A”
- Proper motion vector length: Max. 1% difference for an “A”

Description of the Plx rating procedure (according to Knapp 2018):

- "A" for worst case distance, "B" for realistic case distance and "C" for only best case distance less than 200,000 AU (means touching Oort clouds for two stars with Sun-like mass) and “D” for above
- "A" for Plx error less than 5% of Plx, "B" for less than 10%, "C" for less than 15% and “D” for above

The letter based scoring is then transformed into an estimated probability for being potentially gravitationally bound.

KOI Objects in the WDS Catalog

Appendix B

For our measurements given in Table 1 we provide in Table 3 astrometry measurement errors, signal to noise ratio and photometry measurement errors:

Table 3. Image processing measurement errors

Name		RA	Dec	dRA	dDec	Err Sep	Err PA	Err Mag	SNR	dmag	Date	Notes
BRT 2248	A	19 57 36.702	43 58 50.24	0.08	0.08	0.113	1.131	0.070	186.22	0.07	2017.773	iT24 1x60s
	B	19 57 37.084	43 58 46.26					0.070	152.76			
DEA 105	A	19 57 46.793	43 57 23.47	0.08	0.08	0.113	1.201	0.070	228.25	0.07	2017.773	iT24 1x60s. SNR B <10
	B	19 57 46.296	43 57 22.89					0.232	4.43			
KOI 103	A	19 26 43.992	37 45 05.22	0.07	0.07	0.099		0.060	259.65	0.06	2017.773	iT24 1x60s. No resolution of B and also C, both have to be fainter than 19mag
	B											
DEA 332	A	19 26 50.160	37 44 30.04	0.07	0.07	0.099		0.061	104.13	0.06	2017.773	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	B											
DEA 469	A	19 59 44.150	45 23 15.15	0.07	0.08	0.106	0.147	0.080	218.30	0.08	2017.792	iT24 1x60s
	B	19 59 47.037	45 23 43.49					0.080	220.44			
DEA 479	A	19 49 02.308	44 13 53.60	0.06	0.07	0.092	0.095	0.060	319.45	0.06	2017.792	iT24 1x60s
	B	19 49 04.495	44 13 03.02					0.060	243.10			
KOI 108	A	19 15 56.290	40 03 52.13	0.08	0.08	0.113	0.683	0.060	239.19	0.06	2017.773	iT24 1x60s. No resolution for D and E, both have to be fainter than 19mag
	F	19 15 56.132	40 04 01.45					0.077	21.91			
ALI 1110	A	19 16 21.628	39 54 12.12	0.08	0.08	0.113	0.485	0.060	231.60	0.06	2017.773	iT24 1x60s. A too bright for reliable measurement
	B	19 16 20.969	39 54 23.12					0.060	255.91			
KOI 116	A	20 03 27.364	44 20 15.21	0.05	0.06	0.078		0.060	229.74	0.06	2017.773	iT24 1x60s. No resolution of G neither of other components, all have to be fainter than 19mag
	G											
KOI 4724	A	20 03 42.877	44 21 23.41	0.06	0.06	0.085	1.608	0.077	21.72	0.06	2017.773	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	C	20 03 42.866	44 21 20.39					0.065	41.75			
KOI 123	A	19 21 34.240	40 17 05.72	0.06	0.06	0.085	0.502	0.060	273.79	0.06	2017.773	iT24 1x60s. No resolution of E, has to be fainter than 19mag
	D	19 21 33.966	40 16 56.55					0.074	24.74			
KOI 148	A	19 56 33.436	40 56 56.14	0.06	0.06	0.085	1.193	0.071	123.76	0.07	2017.773	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	C	19 56 33.178	40 56 53.30					0.089	19.37			
KOI 148	A	19 56 33.436	40 56 56.14	0.06	0.06	0.085	0.453	0.071	123.76	0.07	2017.773	iT24 1x60s. SNR G <20
	G	19 56 32.670	40 56 49.81					0.100	14.67			
KOI 148	A	19 56 33.436	40 56 56.14	0.06	0.06	0.085	0.611	0.071	123.76	0.07	2017.773	iT24 1x60s. SNR F <5
	F	19 56 32.784	40 56 53.17					0.532	1.60			
KOI 153	A	19 11 59.487	50 56 39.06	0.06	0.06	0.085		0.060	171.92	0.06	2017.773	iT24 1x60s. No resolution of D and C, both have to be fainter than 19mag
	D											
KOI 244	A	19 06 33.205	39 29 16.49	0.08	0.09	0.120	0.825	0.070	368.77	0.07	2017.773	iT24 1x60s. No resolution of C
	B	19 06 32.526	39 29 19.33					0.071	128.74			
KOI 245	A	18 56 14.211	44 31 06.11	0.08	0.08	0.113	0.795	0.060	364.01	0.06	2017.773	iT24 1x60s. SNR B<20. Primary saturated, astrometry and photometry results questionable
	B	18 56 14.002	44 30 58.27					0.085	17.45			
KOI 246	A	19 24 07.763	49 02 24.87	0.12	0.11	0.163	0.929	0.061	114.85	0.06	2017.773	iT24 1x60s. SNR B<10
	B	19 24 08.303	49 02 16.35					0.122	9.75			
KOI 720	A	19 46 37.148	46 50 06.95	0.10	0.10	0.141	0.894	0.071	108.92	0.07	2017.773	iT24 1x60s. SNR C<10. More guessing than resolution
	C	19 46 37.994	46 50 09.54					0.183	5.94			
KOI 2426	A	18 59 36.729	43 57 14.65	0.08	0.07	0.106	0.669	0.060	151.88	0.06	2017.773	iT24 1x60s
	B	18 59 37.143	43 57 06.72					0.069	30.53			
KOI 2453	A	19 37 52.416	44 45 17.61	0.07	0.08	0.106	0.491	0.064	47.49	0.06	2017.773	iT24 1x60s. SNR C<20
	C	19 37 51.929	44 45 06.33					0.112	11.05			

Table 3 continues on the next page.

KOI Objects in the WDS Catalog

Table 3 (continued). Image processing measurement errors

Name		RA	Dec	dRA	dDec	Err Sep	Err PA	Err Mag	SNR	dmag	Date	Notes
KOI 2803	A	19 39 28.050	46 47 25.82	0.12	0.12	0.170	1.932	0.071	82.13	0.07	2017.773	iT24 1x60s. Image quality questionable. Overlapping star disks with hint of elongation. No resolution of other components, have to be fainter than 18.5mag
	B	19 39 28.509	46 47 27.58					0.082	24.74			
KOI 2833	A	19 52 51.620	45 24 24.42	0.11	0.12	0.163	1.008	0.071	102.13	0.07	2017.773	iT24 1x60s. SNR C<10. More guessing than resolution
	B	19 52 52.177	45 24 31.58					0.276	3.58			
KOI 2904	A	19 41 30.583	39 02 53.18	0.12	0.12	0.170	2.467	0.081	81.80	0.08	2017.773	iT24 1x60s. SNR C<10. More guessing than resolution
	C	19 41 30.853	39 02 55.55					0.175	6.51			
KOI 2904	A	19 41 30.583	39 02 53.18	0.12	0.12	0.170	1.260	0.081	81.80	0.08	2017.773	iT24 1x60s. SNR D<10
	D	19 41 30.850	39 03 00.24					0.137	9.25			
KOI 2915	A	19 19 40.185	40 49 42.53	0.12	0.13	0.177	1.062	0.071	74.52	0.07	2017.773	iT24 1x60s. SNR C<10
	C	19 19 39.535	40 49 48.58					0.247	4.11			
KOI 2939	A	19 52 36.005	40 39 22.44	0.13	0.13	0.184		0.094	40.89	0.09	2017.773	iT24 1x60s. Image quality questionable.No resolution of B or any other compo- nents, have to be fainter than 18.5mag
	B											
KOI 1489	A	19 26 09.839	37 48 59.67	0.07	0.07	0.099		0.061	121.54	0.06	2017.773	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	B											
KOI 1132	A	20 04 04.007	44 14 01.69	0.06	0.06	0.085		0.061	124.71	0.06	2017.773	iT24 1x60s. No resolution of B, no elongation - might be bogus or has to be fainter than 18.5mag
	B											
KOI 5512	A	20 04 13.238	44 18 22.38	0.06	0.06	0.085		0.068	33.08	0.06	2017.773	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	B											
KOI 7020	A	20 04 05.008	44 13 55.84	0.06	0.06	0.085	1.619	0.060	141.58	0.06	2017.773	iT24 1x60s
	B	20 04 05.120	44 13 58.59					0.063	61.27			
ES 85	A	20 03 52.441	44 11 30.96	0.06	0.06	0.085	2.159	0.060	145.75	0.06	2017.773	iT24 1x60s
	B	20 03 52.556	44 11 32.84					0.061	116.17			
ES 85	A	20 03 52.441	44 11 30.96	0.06	0.06	0.085	0.456	0.060	145.75	0.06	2017.773	iT24 1x60s
	C	20 03 53.428	44 11 32.01					0.060	239.01			
ES 85	A	20 03 52.441	44 11 30.96	0.06	0.06	0.085	0.431	0.060	145.75	0.06	2017.773	iT24 1x60s
	D	20 03 51.615	44 11 37.92					0.060	212.69			
Koi 6600	A	19 56 27.556	40 44 55.52	0.06	0.06	0.085		0.070	384.04	0.07	2017.773	iT24 1x60s. No resolution of B. Might be bogus
	B											
KOI 3831	A	19 56 19.008	40 49 43.31	0.06	0.06	0.085		0.077	32.47	0.07	2017.773	iT24 1x60s. No resolution of B. Might be bogus
	B											
KOI 2676	A	19 55 55.289	40 52 19.34	0.06	0.06	0.085	1.417	0.070	163.36	0.07	2017.773	iT24 1x60s
	B	19 55 55.465	40 52 22.13					0.087	20.43			
KOI 839	A	19 55 50.658	40 51 45.68	0.06	0.06	0.085		0.071	95.66	0.07	2017.773	iT24 1x60s. No resolution of B. Might be bogus
	B											
DEA 397	A	19 47 01.013	46 53 48.37	0.10	0.10	0.141	0.397	0.077	34.04	0.07	2017.773	iT24 1x60s. SNR B<20
	B	19 46 59.131	46 53 55.02					0.090	18.70			
KOI 1579	A	19 39 19.259	46 44 03.50	0.12	0.12	0.170		0.071	81.17	0.07	2017.773	iT24 1x60s. No resolution of B
	B											

Table 3 continues on the next page.

KOI Objects in the WDS Catalog

Table 3 (continued). Image processing measurement errors

Name		RA	Dec	dRA	dDec	Err Sep	Err PA	Err Mag	SNR	dmag	Date	Notes
DEA 327	A	19 53 02.083	40 32 58.61	0.13	0.13	0.184		0.092	54.08	0.09	2017.773	iT24 1x60s. No resolution of B
	B											
DEA 60	A	20 01 01.451	48 15 26.24	0.07	0.08	0.106	0.098	0.071	80.29	0.07	2017.792	iT24 1x60s. SNR E<10. A too bright for reliable measurements
	E	20 01 02.125	48 16 27.71					0.139	8.57			
STF 2619	A	20 01 01.451	48 15 26.24	0.07	0.08	0.106	1.126			0.07	2017.792	iT24 1x60s. A and B too bright for reliable measurements
	B	20 01 00.973	48 15 23.70									
STF 2619	A	20 01 01.451	48 15 26.24	0.07	0.08	0.106	0.302			0.07	2017.792	iT24 1x60s. A too bright for reliable measurements
	C	20 01 01.187	48 15 46.26					0.070	211.12			
STF 2619	A	20 01 01.451	48 15 26.24	0.07	0.08	0.106	0.412			0.07	2017.792	iT24 1x60s. A too bright for reliable measurements
	D	20 01 01.238	48 15 40.86					0.071	120.08			
DEA 61	A	21 34 46.786	38 32 05.37	0.09	0.10	0.135	0.115			0.08	2017.792	iT24 1x60s. A far too bright for reliable measurements, SNR B <10
	B	21 34 45.272	38 31 00.92					0.135	9.50			
ES 2713	A	21 35 10.625	38 38 48.49	0.09	0.10	0.135	0.435	0.080	184.26	0.08	2017.792	iT24 1x60s. A too bright for reliable measurements
	B	21 35 12.123	38 38 46.14					0.080	191.73			
ES 1995	A	21 35 26.592	38 34 03.03	0.09	0.10	0.135	3.305	0.080	178.28	0.08	2017.792	iT24 1x60s. Overlapping star disks
	B	21 35 26.716	38 34 04.85					0.084	43.68			
DEA 62	A	22 10 28.772	30 48 36.45	0.09	0.09	0.127	0.394			0.07	2017.792	iT24 1x60s. A far too bright for reliable measurements
	B	22 10 27.529	30 48 27.18					0.074	46.55			
DEA 63	A	22 46 18.949	33 19 15.87	0.12	0.12	0.170				0.08	2017.792	iT24 1x60s. A far too bright for reliable measurements. No resolution of C
	C											
CHE 428	A	22 46 18.949	33 19 15.87	0.12	0.12	0.170	0.308			0.08	2017.792	iT24 1x60s. A far too bright for reliable measurements
	B	22 46 19.533	33 18 45.17					0.081	88.34			
BKO 666	A	22 45 57.805	33 16 05.09	0.12	0.12	0.170	1.053	0.081	87.99	0.08	2017.792	iT24 1x60s
	B	22 45 57.227	33 15 59.37					0.083	50.05			
CHE 419	A	22 45 46.092	33 19 57.24	0.12	0.12	0.170	0.549	0.080	196.87	0.08	2017.792	iT24 1x60s
	B	22 45 46.844	33 19 42.24					0.081	97.78			
BKO 667	A	22 46 13.142	33 08 38.54	0.12	0.12	0.170	2.159	0.082	56.39	0.08	2017.792	iT24 1x60s
	B	22 46 13.099	33 08 34.07					0.083	47.97			
BKO 667	A	22 46 13.142	33 08 38.54	0.12	0.12	0.170	1.179	0.082	56.39	0.08	2017.792	iT24 1x60s
	C	22 46 13.746	33 08 41.77					0.082	65.66			
DEA 89	A	21 51 07.787	30 46 07.36	0.04	0.04	0.057		0.050	154.69	0.05	2017.792	iT24 1x60s. No resolution of B - has to be fainter than 18.8
	B											

Table 3 concludes on the next page.

KOI Objects in the WDS Catalog

Table 3 (conclusion). Image processing measurement errors

Name		RA	Dec	dRA	dDec	Err Sep	Err PA	Err Mag	SNR	dmag	Date	Notes
DEA 106	A	19 55 23.976	47 26 40.03	0.08	0.08	0.113	1.061	0.072	64.44	0.07	2017.795	iT24 1x60s
	B	19 55 23.800	47 26 45.87					0.071	117.64			
DEA 215	A	19 59 12.433	45 16 04.40	0.07	0.08	0.106	0.658	0.081	118.32	0.08	2017.792	iT24 1x60s
	B	19 59 12.428	45 15 55.14					0.080	141.33			
DEA 323	A	19 49 19.597	43 21 34.48	0.07	0.08	0.106	0.433	0.060	164.37	0.06	2017.792	iT24 1x60s. SNR B<10
	B	19 49 20.461	43 21 24.03					0.142	7.97			
KOI 4797	A	19 49 23.590	43 25 16.39	0.07	0.08	0.106	1.795	0.063	59.32	0.06	2017.792	iT24 1x60s
	B	19 49 23.844	43 25 14.43					0.075	23.70			
DEA 202	A	19 49 13.912	43 25 58.67	0.07	0.08	0.106		0.060	233.73	0.06	2017.792	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	B											
KOI 5426	A	19 49 09.690	43 28 04.49	0.07	0.08	0.106	2.055	0.060	141.62	0.06	2017.792	iT24 1x60s. Touching star disks
	B	19 49 09.784	43 28 01.71					0.064	48.06			
KOI 315	A	19 49 05.207	43 19 58.95	0.07	0.08	0.106		0.060	203.42	0.06	2017.792	iT24 1x60s. No resolution of B, has to be fainter than 19mag
	B											
KOI 5414	A	19 49 01.147	43 18 32.29	0.07	0.08	0.106	1.472	0.062	79.55	0.06	2017.792	iT24 1x60s. SNR B<5
	B	19 49 01.215	43 18 28.22					0.398	2.29			
KOI 6907	A	19 48 57.732	43 23 51.72	0.07	0.08	0.106	2.024	0.064	51.23	0.06	2017.792	iT24 1x60s
	B	19 48 58.002	43 23 51.10					0.063	59.41			

Description of Table 3 contents:

- dRA and dDec = average RA and Dec plate solving errors in arcseconds
- Err_Sep = separation error estimation in arcseconds calculated as SQRT(dRA^2+dDec^2)
- Err_PA = position angle error estimation in degrees calculated as arctan (Err_Sep/Sep) assuming the worst case that Err_Sep points perpendicular to the separation vector
- dmag as average Vmag plate solving error
- Err_Mag = magnitude error estimation calculated as SQRT(dVmag^2+(2.5*LOG10(1+1/SNR))^2)
- SNR as signal to noise ratio for the given object
- Date is Julian observation epoch