

Double Star Measurements Using a CMOS Camera, Annual Report of 2018

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Abstract: This report shows the results on 213 double star measurements from 2018; minimum separation is 0.43 as (STF1909), maximum separation is 167 as (SMR 40AO). The mean value of all measurements is about 14 as.

213 double stars were measured in 2018. Observations were done with a 12-inch Newtonian telescope in combination with a CMOS QHY5L II Color camera. Reproduction scale is about 0.52" per pixel. In cases of separation < 3" focal length was magnified with different Barlow lenses. As in the previous years, especially double stars with large magnitude differences were of interest (Schlimmer 2017, Schlimmer 2018). Figure 1 shows the 213 measurements sorted by separation. In 162 cases (76%) the separation is smaller or equal than 7.5". Figure 2 shows the differences in magnitudes of the measured double star components. In 100 cases (47%) the difference is more or equal than 2 magnitudes.

Notes to WDS20281+3820 and WDS20282+3821 (TDT2304)

Next to ES 206 are 3 stars in line, TYC3152-00864-1, TDT2304 and TYC3152-00892-1. Figure 3a shows the stars from Digitized Sky Survey (SIMBAD database), Figure 3b shows the same field from author's observation.

The first of them on left hand side is not of interest. The second star, TDT2304 is also marked as double star in SIMBAD database and in the planetary software Redshift 7, which is used for telescope control. TDT2304 was only observed one time in 1991. Although the star was clearly identified, but relative brightness of companion (12.49 mag), position angle (139 degree) and distance (2.4 as) are different to my observation (199 degree, 5.4 as). The proper motion for primary and secondary star is equal, so the difference of both measurements from 1991 and 2018 can't be clarified.

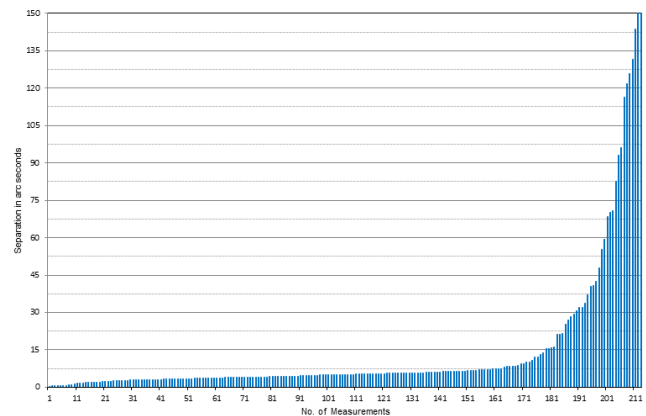


Figure 1. The 213 measurements sorted by separation

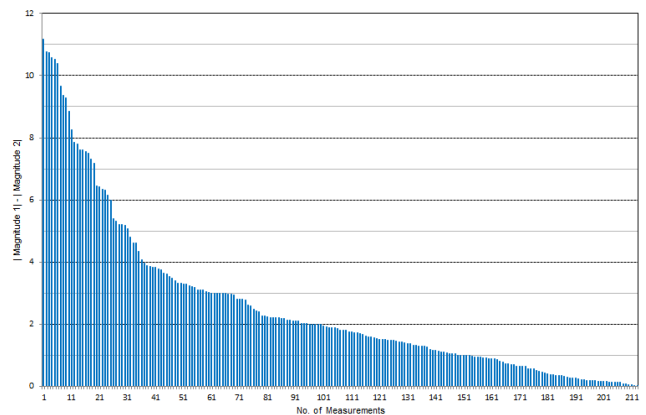


Figure 2. Differences in magnitudes of the measured double star components.

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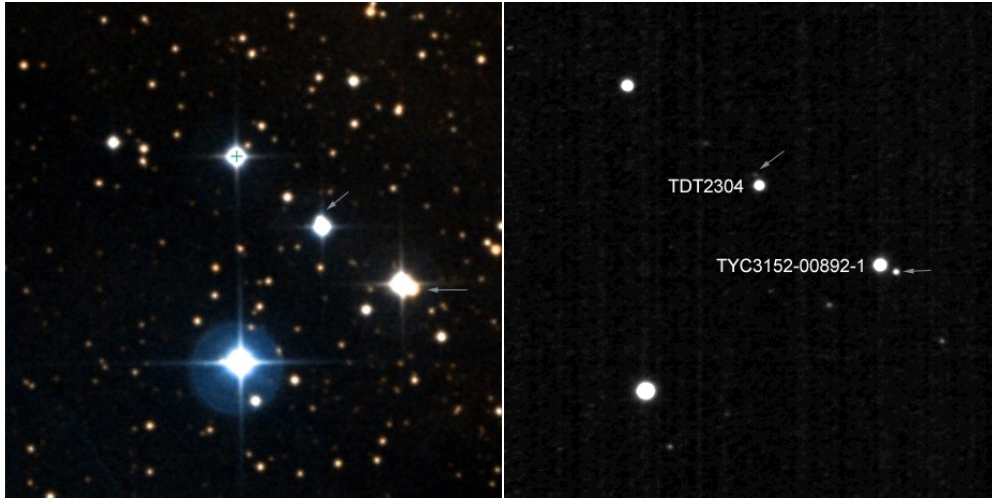


Figure 3a (left). WDS20281+3820 and WDS20282+3821 from Digitized Sky Survey (SIMBAD database, 2018) Figure 3b. WDS20281+3820 and WDS20282+3821 from author

The last star TYC3152-00892-1 on the right hand side looks like an optical double star but isn't yet listed in the WDS catalog or marked as double star in SIMBAD database or in Redshift 7 software. A distance of 8.43" and a position angle of 64.6° were found.

Table 1 shows the measurements of separation and position angle of 213 components from 2018. Brightness and coordinates are taken from Washington Dou-

ble Star catalog (Mason, 2017). Date is given in Besselian years.

Acknowledgements

This research has made use of the Washington Double Star Catalog maintained at the U.S. Naval Observatory.

(Text continues on page 543)

Table 1. Measurements of 213 Components from 2018.

RA+DEC	Name	Mags	PA	Sep	Date	N
00286+3905	ES 1939	8.44, 12.4	280.6	6.40	2018.039	1
00530+1806	A 2207	9.19, 12.30	168.3	3.65	2018.039	1
00550+5530	ES 939	10.60, 12.5	343.3	6.44	2018.039	1
01097+5438	ES 156	8.55, 11.8	218.5	5.91	2018.039	1
01180+5355	ES 119AB	8.22, 11.02	115.7	4.97	2018.039	1
01204+5652	ES 1809	9.48, 10.8	119.1	6.03	2018.039	1
01226+1245	BU 1360	9.62, 11.76	23.7	5.65	2018.039	1
01354+4123	ES 1494	10.64, 10.9	7.0	5.64	2018.039	1
01379+2554	A 2007	8.78, 10.45	220.8	4.57	2018.039	1
02473+3835	ES 2083AB	9.79, 11.9	334.8	6.48	2018.039	1
02494+5159	ES 873	9.74, 12.0	99.2	4.82	2018.039	1
02497+5356	ES 120	8.99, 12.60	72.4	4.27	2018.039	1
02497+3721	ES 2553	10.6, 13.9	177.8	6.24	2018.039	1
02511+4807	ES 557	9.58, 12.9	324.2	5.84	2018.039	1
02515+5314	ES 766	9.08, 11.3	302.0	4.46	2018.039	1
03007+5700	KR 15	9.43, 11.54	111.8	4.23	2018.039	1
03082+4057	BU 526AB	2.11, 12.7	155.8	59.36	2018.039	1
03082+4057	BU 526AC	2.11, 12.5	146.7	68.60	2018.039	1
03082+4057	BU 526AD	2.11, 11.47	193.1	82.61	2018.039	1
03082+4057	BU 526BC	12.7, 12.5	103.6	13.66	2018.039	1

Table 1 continues on the next page.

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Table 1 (continued). Measurements of 213 Components from 2018.

RA+DEC	Name	Mags	PA	Sep	Date	N
03082+4057	BU 526DE	10.5, 12.5	121.0	10.91	2018.039	1
03212+3019	COU 684	10.29, 12.4	126.5	4.37	2018.039	1
03362+2959	BU 1040	7.66, 11.5	338.1	3.21	2018.039	1
03372+4905	ES 54	9.77, 12.2	250.7	4.59	2018.039	1
03388+5055	ES 953	10.49, 13.6	245.7	4.42	2018.039	1
03416+3942	ES 166	8.95, 12.48	3.1	4.69	2018.039	1
03458+2309	STF 444AB	6.91, 10.09	337.5	3.42	2018.039	1
06106+3132	ES 416	10.00, 12.6	207.0	6.69	2018.266	1
06116+4843	STF 845	6.16, 6.86	357.1	7.55	2018.266	1
06144+5110	STF 865	8.12, 10.26	69.1	5.21	2018.263	1
06295+3414	HDS 885AB	9.32, 12.53	256.1	4.15	2018.263	1
06408+4815	STF 944AB	8.45, 10.17	57.8	6.39	2018.266	1
06431+5004	ES 1076	8.98, 12.76	263.0	5.70	2018.263	1
06469+4825	ES 1237	9.32, 11.5	0.5	5.00	2018.266	1
07007+5456	A 1574	9.72, 12.2	166.9	3.60	2018.263	1
07026+5039	ES 1079AB	8.21, 11.7	323.4	6.16	2018.263	1
07081+5915	A 1325	9.08, 11.3	311.1	2.93	2018.263	1
07324+1822	A 2871	7.98, 11.83	114.8	4.39	2018.266	1
07372+4802	ES 1143	9.03, 12.0	290.0	3.50	2018.263	1
07490+2834	STF1144AB	7.94, 10.33	358.4	8.39	2018.266	1
07523+2842	ES 421	10.00, 13.0	217.9	6.47	2018.279	2
08054+0812	STF1181	8.28, 9.26	140.4	5.20	2018.291	1
08056+2732	STF1177	6.69, 7.41	349.3	3.53	2018.291	1
08058+3435	ES 423	9.3, 11.2	303.9	3.02	2018.291	1
08088+2729	STF1186	7.06, 10.08	211.7	3.28	2018.263	1
08109+4439	A 1744	9.59, 11.5	302.0	3.66	2018.291	1
08131+4133	ES 592	9.23, 10.98	330.9	2.99	2018.291	1
08160+4946	STF1200	9.16, 9.33	181.0	8.39	2018.291	1
08165+0911	BU 1065AB	3.52, 14.3	294.3	29.38	2018.291	1
08165+0911	DAL 42AC	3.68, 14.2	38.5	70.20	2018.291	1
08181+3050	STF1212	8.63, 10.1	241.3	5.40	2018.291	1
08190+4927	HU 1124AB	8.55, 12.3	34.2	6.24	2018.263	1
08201+3219	HU 626	8.72, 12.00	154.1	3.23	2018.263	1
08235+2311	STF1218	9.76, 11.3	268.0	4.06	2018.291	1
08268+2656	STF1223	6.16, 6.21	219.6	5.21	2018.291	1
08298+5112	STF1225	9.60, 9.75	193.3	3.65	2018.291	1
08404+1940	SMR 30AE	6.52, 12.5	155.6	15.87	2018.266	1
08415+0649	A 2963	9.34, 10.86	264.3	3.22	2018.332	1
08447+1809	HJ 457AB	3.94, 12.2	71.1	40.91	2018.266	1
08467+2846	STF1268	4.13, 5.99	306.8	30.84	2018.279	1

Table 1 continues on the next page.

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Table 1 (continued). Measurements of 213 Components from 2018.

RA+DEC	Name	Mags	PA	Sep	Date	N
08515+1208	STF1287AB	8.28, 10.17	92.8	2.07	2018.291	1
08554+1208	BAR 35	10.21, 13.2	326.0	2.55	2018.291	1
08585+1151	HJ 110	4.25, 11.8	320.8	10.26	2018.279	1
09013+1516	STF1300AB	9.47, 9.73	179.8	4.94	2018.265	2
09051+3931	AG 160	9.97, 9.83	58.8	3.86	2018.332	1
09071+3037	AG 162	9.78, 10.09	106.8	4.09	2018.332	1
09088+1625	HDS1328AB	9.54, 11.78	143.0	4.11	2018.263	1
09268+0105	AG 166	9.1, 11.1	73.5	3.56	2018.332	1
09425+4058	STT 205	7.99, 12.6	202.2	12.02	2018.332	1
09427+4018	ES 301	9.8, 11.8	243.2	6 5.02	2018.298	2
09564+1040	STF1396AB	8.79, 10.42	131.1	3.94	2018.332	1
10019+4248	A 2141	9.1, 10.5	175.2	5.06	2018.332	1
10170+1007	STF1419	8.87, 9.86	225.8	4.47	2018.332	1
10241+4034	ES 1394	9.00, 10.1	143.6	6.75	2018.340	1
10256+0847	STF1431	7.76, 9.07	76.8	3.22	2018.332	1
10334+0705	A 2767	8.63, 12.28	53.3	5.37	2018.332	1
10339+4158	ES 1396AB	9.91, 13.0	190.2	5.58	2018.340	1
10406+4209	STF1460	8.72, 8.90	161.1	3.80	2018.340	1
10425+0640	LDS2877	9.75, 11.55	273.7	5.58	2018.340	1
10433+0445	STF1466AB	6.23, 7.13	240.5	6.93	2018.340	1
10453+4458	STF1467	8.58, 10.76	288.4	3.94	2018.266	1
10596+2527	AG 342	8.57, 9.22	116.3	5.30	2018.345	1
11004+5237	ES 722	9.95, 11.4	102.9	8.41	2018.345	1
11007+0606	BU 598	4.99, 12.6	219.1	40.32	2018.266	1
11050+0720	KUI 54AB	4.66, 11.0	267.9	4.92	2018.266	1
11080+5249	STF1510	7.65, 9.03	328.1	5.63	2018.345	1
11174+3430	ES 305	10.0, 11.3	31.7	3.90	2018.345	1
11182+3132	STF1523AB	4.33, 4.80	159.5	1.96	2018.347	3
11185+3306	STF1524AB	3.64, 10.1	149.3	7.45	2018.340	1
11256+1627	HJ 4433AB	5.62, 10.84	6.2	55.37	2018.348	1
11268+0301	STF1540AB	6.55, 7.50	150.0	28.37	2018.381	1
11285+0750	WLF 1AB	10.34, 10.51	336.4	116.35	2018.381	1
11291+3920	STF1543AB	5.35, 10.67	354.0	5.07	2018.348	1
11317+1422	STF1547AB	6.33, 9.14	331.5	15.5	2018.381	1 Wolf 401
11329+5525	A 1593	8.95, 10.53	255.4	4.06	2018.348	1
11347+1648	STF1552AB	6.26, 7.31	208.9	3.05	2018.348	1
11385+4405	ES 1153	9.78, 12.74	261.2	5.76	2018.266	1
11396+2657	STF1564	8.81, 9.33	87.4	5.04	2018.348	1
11443+3900	STF1569	8.83, 10.59	322.0	3.61	2018.348	1
11468+5951	KR 40	9.92, 10.64	273.0	3.01	2018.348	1

Table 1 continues on the next page.

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Table 1 (continued). Measurements of 213 Components from 2018.

RA+DEC	Name	Mags	PA	Sep	Date	N
11527+5647	ES 1826	8.95, 12.8	214.6	5.58	2018.348	1
11578+4518	A 1778	9.6, 11.8	225.1	2.91	2018.266	1
12089+2147	LDS 930AB	9.45, 14.63	39.3	15.54	2018.419	1
12244+2535	STF1639AB	6.74, 7.83	322.8	1.79	2018.419	1
12269+2816	SMR 58	4.4, 12.	206.7	16.12	2018.343	2
12272+2701	STF1643AB	9.03, 9.45	3.7	2.68	2018.419	1
12291+3123	STT 251	8.35, 9.27	54.8	0.67	2018.419	1
12324+1211	LDS 937	11.02, 12.45	122.1	42.33	2018.381	1 Wolf 418
12417-0127	STF1670AB	3.48, 3.53	359.8	2.73	2018.384	2
12481+0327	BU 459	8.06, 11.05	294.3	4.35	2018.381	1
13119+2753	STT 578	4.30, 12.1	179.9	131.51	2018.422	1
14220+5107	A 148	8.32, 8.96	194.1	0.53	2018.419	1
14380+5135	STF1863	7.71, 7.80	63.2	0.62	2018.419	1
14515+4456	STT 287	8.40, 8.62	5.7	0.54	2018.419	1
15038+4739	STF1909	5.20, 6.10	90.7	0.43	2018.503	2
15151+3318	SMR 32AB	12.76, 11.21	335.7	26.86	2018.545	1
15151+3318	SMR 32AC	12.76, 12.90	72.0	36.94	2018.545	1
15151+3318	SMR 32BC	11.21, 12.90	105.8	47.99	2018.545	1
15155+3319	SMR 31AC	3.56, 14.30	4.8	93.19	2018.545	1
15209+1057	HDS2158	9.73, 13.55	201.4	4.48	2018.545	1
15264+4400	STT 296AB	7.83, 9.09	274.1	2.01	2018.586	1
15348+1032	STF1954AB	4.17, 5.16	172.9	3.97	2018.545	1
15348+1032	STF1954CD	13.9, 14.6	341.1	4.03	2018.545	1
15405+1840	A 2076	8.28, 8.44	187.3	0.75	2018.589	1
15498+4431	BU 621	7.94, 9.37	26.5	0.60	2018.589	1
15514+2921	COU 617	9.53, 12.53	98.3	4.72	2018.545	1
15554+2932	HO 399	7.68, 10.49	114.9	3.43	2018.545	1
15568+1229	STF1988	7.59, 7.84	249.2	1.72	2018.534	1
16009+1316	STT 303AB	7.69, 8.06	174.6	1.38	2018.589	1
16030+1359	STF2000	8.42, 9.22	227.8	2.41	2018.540	1
16089+4521	STF2015AB	8.24, 9.52	160.0	3.00	2018.540	1
16124+2626	HO 551	8.01, 12.8	80.2	7.07	2018.545	1
16231+1350	STF2040	8.11, 10.14	313.1	7.08	2018.545	1
16232+2341	J 399	10.1, 12.3	50.7	5.10	2018.545	1
16246+3632	HO 405AB	9.5, 12.5	346.9	4.18	2018.575	1
16246+3632	HO 405AC	9.5, 12.5	339.1	13.02	2018.575	1
16254+1402	BU 625AC	4.58, 11.76	87.3	25.42	2018.575	1
16315+3331	BU 816	7.12, 12.2	220.6	4.87	2018.545	1
16231+1350	STF2040	8.11, 10.14	313.2	7.01	2018.575	1
16254+1718	STF2043	8.03, 11.44	85.2	10.02	2018.594	1

Table 1 continues on the next page.

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Table 1 (continued). Measurements of 213 Components from 2018.

RA+DEC	Name	Mags	PA	Sep	Date	N
16289+1825	STF2052AB	7.69, 7.91	118.3	2.45	2018.594	1
16316+1917	STF2057AB	10.49, 10.63	268.0	5.03	2018.594	1
16317+1919	STF2058AB	10.37, 10.55	352.3	1.80	2018.594	1
16321+4014	ES 1646	10.69, 13.3	120.5	4.63	2018.545	1
16326+4007	STT 313	7.97, 8.31	128.2	0.88	2018.567	2
16442+2331	STF2094AB	7.48, 7.87	76.1	1.01	2018.540	1
16496+1316	STF2103AB	5.93, 10.0	43.1	4.87	2018.575	1
16538+2110	STF2109	7.52, 10.30	312.4	5.88	2018.575	1
16579+4523	ES 1254	10.85, 13.9	133.6	4.41	2018.575	1
16582+2520	STT 320	8.47, 11.79	251.6	5.76	2018.575	1
17010+1636	A 2085AB	7.29, 13.7	353.1	6.26	2018.575	1
17053+5428	STF2130AB	5.66, 5.69	359.6	2.54	2018.540	1
17255+5130	HU 672	9.16, 10.97	58.1	3.96	2018.594	1
17290+5052	STF2180	7.79, 8.06	259.9	2.95	2018.594	1
17386+5546	STF2199	8.03, 8.60	54.7	1.88	2018.540	1
17386+5546	STF2199	8.03, 8.60	53.9	1.95	2018.594	1
17414+2111	STF2195	11.68, 11.75	286.0	21.56	2018.589	1
17416+2111	STF2196	10.2, 12.2	257.3	3.26	2018.589	1
17420+2127	STF2197	10.64, 10.99	356.1	8.05	2018.589	1
18171+4015	STF2304	8.75, 9.75	100.0	5.55	2018.742	1
17541+3928	HLM 9	9.05, 10.85	284.7	5.27	2018.742	1
17566+5129	BU 633AB	2.23, 13.4	152.3	21.08	2018.540	1
17566+5129	BU 633AE	2.23, 11.9	234.8	96.01	2018.540	1
17566+5129	BU 633AF	2.38, 11.67	114.4	125.99	2018.540	1
17566+5129	BU 633AG	2.38, 11.23	27.5	143.60	2018.540	1
18055+0230	STF2272AB	4.22, 6.17	123.7	6.65	2018.534	1
18171+4015	STF2304	8.75, 9.75	69.3	5.18	2018.742	1
18201+2532	STF2309	9.31, 9.95	351.7	3.38	2018.742	1
18210+3630	ES 2110	9.3, 10.8	96.2	6.43	2018.742	1
18438+5654	BU 465	9.2, 11.2	289.1	2.69	2018.742	1
18443+3940	STF2382AB	5.15, 6.10	345.6	2.16	2018.594	1
18443+3940	STF2383CD	5.25, 5.38	75.0	2.40	2018.594	1
19365+2500	STF2548	8.47, 9.85	99.5	9.38	2018.742	1
19435+3450	AG 236AB	9.78, 10.16	148.6	4.21	2018.742	1
19452+2055	STF2577AB	8.43, 9.56	261.8	5.94	2018.742	1
19486+2458	STF2586AB	7.56, 9.28	227.3	3.33	2018.781	1
19503+2240	BU 361AB	9.37, 9.93	348.4	3.57	2018.781	1
19524+2551	STT 388AB	8.32, 8.45	138.3	3.72	2018.781	1
19524+2551	STT 388AC	8.32, 9.49	129.3	31.89	2018.781	1
19552+2230	STF2600	8.75, 9.93	55.0	2.87	2018.781	1

Table 1 concludes on the next page.

Double Star Measurements Using a CMOS Camera, Annual Report of 2018

Table 1 (conclusion). Measurements of 213 Components from 2018.

RA+DEC	Name	Mags	PA	Sep	Date	N
19581+5355	ARG 35	9.00, 9.92	227.0	7.42	2018.781	1
20000+1736	SMR 7	10.1, 11.4	264.6	3.60	2018.789	1
20026+2859	ES 496	9.9, 11.0	280.9	2.79	2018.740	1
20030+1528	D 21	8.68, 10.95	210.5	21.30	2018.740	1
20034+1528	STF2618	9.41, 9.77	115.9	5.55	2018.740	1
20104+2532	AG 400	9.72, 11.24	12.3	5.54	2018.789	1
20104+4949	STF2648	8.11, 9.59	117.2	6.71	2018.789	1
20105+4923	ES 1099	10.0, 11.0	185.0	4.61	2018.789	1
20111+4946	ES 2691	9.01, 12.9	313.7	9.53	2018.789	1
20114+2910	A 1200	7.39, 13.7	197.0	5.36	2018.789	1
20117+4943	ES 500	9.97, 10.91	345.3	5.37	2018.789	1
20124+2923	AG 401	9.41, 10.20	305.6	4.02	2018.789	1
20246+3212	AG 254AB	9.13, 10.17	343.0	5.43	2018.805	1
20251+3159	ES 2433	9.13, 10.6	266.8	8.63	2018.805	1
20281+3820	new	10.06, 12	64.6	8.43	2018.805	1 TYC3152-00892-1
20282+3821	TDT2304	10.47, 12.49	198.5	5.43	2018.805	1 see text
20288+3810	ES 206	9.85, 10.49	124.5	3.95	2018.805	1
20293+3731	WEI 35AB	8.35, 8.81	213.9	4.01	2018.805	1
20293+3731	WEI 35CD	9.40, 10.55	201.5	12.14	2018.805	1
20302+4343	AG 407	9.94, 10.13	230.8	7.02	2018.805	1
20314+4403	ES 1443	9.8, 11.4	303.7	2.49	2018.805	1
20329+3515	ES 2306	9.76, 14.1	328.4	7.39	2018.805	1
20336+4719	ES 665	9.91, 10.80	129.0	5.72	2018.805	1
20356+3510	STF2702	8.70, 8.99	208.4	3.14	2018.805	1
20377+3322	STF2705AB	7.48, 8.54	266.5	3.09	2018.805	1
20456+3043	STF2726	4.33, 9.53	72.4	5.90	2018.781	1
21069+3845	STF2758AB	5.20, 6.05	153.1	31.96	2018.773	2
21069+3845	STF2758AH	5.35, 9.97	266.5	121.80	2018.740	1
21069+3845	SMR 1AI	5.35, 10.74	237.2	33.71	2018.740	1
21069+3845	SMR 40AO	5.35, 12.65	278.8	166.91	2018.740	1
21069+3845	SMR 40AP	5.35, 12.84	287.7	158.72	2018.740	1
21069+3845	SMR 40AQ	5.35, 13.19	306.7	70.98	2018.740	1
21110+0933	STF2765AB	8.47, 8.50	81.7	2.85	2018.789	1

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This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France

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