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Asteroseismology of Close Binary Stars: Tides and Mass Transfer

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ABSTRACT

Please see the following table, which contains the stellar/orbital and pulsaitonal parameters of 22 heartbeat binaries.

REFERENCES

Guo, Z. 2021, Frontiers in Astronomy and Space Sciences

Table 1. Heartbeat Binaries with TEOs (A-, F-type)

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
KIC9016693	26.3680271	25.6°	24	0.19238	0.275	m=0
7262 K, -	0.0379247	0.596				
≈ 1.6, $\approx 1.6 M_{\odot}$		108.4°				
KIC8719324	10.2326979	73.54°	26	0.64472	0.26	m=0
7750 K, 4.5	0.0977259	0.6	29	0.0789	0.87	m=2
-, -		-17.1°				
KIC4248941	8.6445976	68.3°	5	0.48790	0.545	m=2
6750 K, 4.5	0.1156792	0.423				
-, -		-50.5°				
KIC 5034333	6.9322800	49.88°	18	0.1760	0.58	m=
9250 K, 4.5	0.1442527	0.58	13	0.1500	0.677	m=
-, -		-17.1°	20	0.1465	0.858	m=
			27	0.0878	0.294	m=
			19	0.0802	0.258	m=
			66	0.0723	0.948	m=
			4	0.0613	0.76	m=
			12	0.0602	0.239	m=
HD209295	3.10575	40-45°		B, V (filter)		m=
7750 K, 4.3	0.32198	0.352	8	18.3, 13.2	0.185	m=
1.84, 0.6-1$M_{\odot}$		31.1°	7	8.4, 6.6	0.006	m=
			3	7.0, 6.2	0.891	m=
			5	4.6, 3.9	0.550	m=
			9	4.5, 3.5	0.131	m=
KIC 3749404	20.3063852	62°	21	0.0807	0.88	m=
8000/6900 K, 4.4/4.1	0.04924567	0.659	20	0.0670	0.93	m=
1.78, 1.32$M_{\odot}$		123.2°	26	0.0374	0.067	m=
			22	0.0491	0.87	m=
			19	0.0266	0.92	m=
			7	0.021	0.05	m=
			24	0.0347	0.65	m=
			23	0.0344	0.71	m=
			5	0.0121	0.22	m=
			17	0.0096	0.79	m=
			27	0.0091	0.92	m=
KIC 4142768	13.9958015	75.81°	9	0.995	0.0304	m=2
7327/7383 K, 3.81/3.95	0.071449999	0.582	8	1.129	0.8681	m=2
2.05, 2.05$M_{\odot}$		328.2°	17	0.325	0.5515	m=2

Table 1—Continued

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
2.96,2.51$R_\odot$			14	0.332	0.5757	m=2
			13	0.304	0.5657	m=2
			12	0.252	0.5796	m=2
			10	0.251	0.0533	m=2
			18	0.105	0.5394	m=2
			20	0.096	0.5063	m=2
			24	0.078	0.4800	m=2
KIC 3230227	7.0471062	73.42°	13.88	0.338	0.1647	m=
8000/8180 K, 4.10/4.23	0.141902	0.60	21	0.194	0.8681	m=2
1.84, 1.73$M_\odot$		293.0°	15	0.198	0.8920	m=2
2.01,1.68$R_\odot$			17	0.177	0.3867	m=
			19	0.154	0.3569	m=
			12.12	0.192	0.3419	m=
			18	0.124	0.8654	m=
			9.88	0.179	0.9722	m=
			20	0.073	0.3470	m=
			13	0.085	0.3183	m=
			22	0.043	0.3299	m=
			12	0.069	0.4935	m=
			24.12	0.033	0.3161	m=
			23	0.031	0.3312	m=
			26	0.024	0.3187	m=
			13	0.042	0.5133	m=
			31	0.016	0.0207	m=
			28	0.017	0.3246	m=
			16	0.027	0.4319	m=
			27	0.017	0.3228	m=
			10	0.036	0.5079	m=
			5	0.065	0.6236	m=
			14.13	0.025	0.2494	m=
			40	0.010	0.8318	m=
			30	0.009	0.4460	m=
			16.13	0.014	0.0677	m=
			11	0.018	0.8303	m=
KIC 11494130	18.9554	79.2°	53	0.03	-	m=0
6600 K, 4.2	0.052755	0.66				
1.4, 0.5$M_\odot$		263°				

Table 1—Continued

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
KIC 5790807	79.996246	85.82°	48	0.017	-	m=2
$\approx 6466K, 3.42$	0.01250	0.855	107	0.015	-	m=2
1.74, $0.44M_\odot$		155.6°				
KIC 8164262	87.45717	65°	229	10.1	0.4526	m=
6890/3500 K, 3.9/-	0.01143417	0.886	241	0.353	0.723	m=
1.70, $0.36M_\odot$		84.79°	123	0.229	0.601	m=
			158	0.152	0.331	m=
			124	0.151	0.852	m=
			132	0.133	0.840	m=
			194	0.123	0.196	m=
			128	0.118	0.419	m=
			317	0.095	0.384	m=
			129	0.083	0.889	m=
			125	0.069	0.922	m=
			137	0.068	0.366	m=
			114	0.064	0.761	m=
			264	0.056	0.507	m=
			22	0.056	0.729	m=
KIC 4544587	2.189 094	87.9°			rad,notTperi	m=
8600/7750 K, 4.24/4.33	0.456810	0.275	4	0.593	0.3822	m=
1.98, $1.61M_\odot$		328.9°	3	0.520	0.3514	m=
			97	0.134	0.776	m=
			10	0.116	0.532	m=
			8	0.106	0.055	m=
			9	0.093	0.813	m=
KOI54=KIC8112039	41.8050	5.5°				
8500/8800 K, 4.12/4.08	0.023921	0.8335	90	0.294	0.2865	m=0
2.33, $2.39M_\odot$		36.7°	91	0.227	0.8139	m=0
			44	0.0958	0.9116	
onlyA$\geq 2\mu mag$			40	0.0826	0.6626	
			72	0.0297	0.8036	
			27	0.0013	0.3235	
			53	0.0144	0.2699	
			47	0.0134	0.6279	
			39	0.0112	0.2310	
			60	0.0068	0.9278	
			37	0.0103	0.1727	

Table 1—Continued

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
			71	0.0110	0.2348	
			75	0.0104	0.0435	
			27	0.0084	0.0754	
			43	0.0085	0.9820	
			45	0.0088	0.0337	
			36	0.0063	0.3958	
			52	0.0071	0.6981	
			33	0.0057	0.2535	
			29	0.0044	0.8189	
			48	0.0059	0.5982	
			78	0.0051	0.5579	
			49	0.0051	0.1353	
			32	0.0047	0.9288	
			57	0.0045	0.3559	
			46	0.0043	0.5158	
			31	0.0042	0.3690	
			26	0.0041	0.8731	
			42	0.0040	0.0634	
			51	0.0040	0.1753	
			55	0.0036	0.2478	
			35	0.0034	0.3227	
			50	0.0034	0.6736	
			25	0.0030	0.2808	
			38	0.0029	0.3940	
			22	0.0028	0.7832	
			34	0.0026	0.7702	
			30	0.0025	0.9400	
			24	0.0025	0.7270	
			23	0.0021	0.4992	
			127	0.0021	0.9778	
			54	0.0020	0.6138	
			aharmonic:			
			22.419	0.00787	0.5181	
			68.582	0.00490	0.1187	
			63.076	0.00246	0.7570	
			57.577	0.00157	0.5055	
			25.846	0.00112	0.1672	

Table 1—Continued

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
			35.844	0.00090	0.3692	
			60.419	0.00059	0.3859	
			42.106	0.00066	0.8551	
			59.969	0.00057	0.0866	
			41.417	0.00041	0.9145	
			49.589	0.00036	0.1480	
			25.076	0.00030	0.1305	
			24.844	0.00029	0.8995	
			44.078	0.00029	0.6138	
			93.197	0.00029	0.5309	
			80.087	0.00021	0.5274	
			72.088	0.00020	0.8363	
			27.581	0.00020	0.0812	
			-	-	-	
p Vel A	10.2437	32.72°	5	0.1346	-	m=
-/- K, -/-	0.09762	0.3528	8	0.0458	-	m=
F5 IV, F1 V		169.4°	11	0.0562	-	m=
			18	0.0235	-	m=
θ^1 **Cru**	24.5314	26.12°			-	m=
-/- K, -/-	0.04076	0.707	4	0.1184	-	m=
A3-A8		119.96°	7	0.1999	-	m=
			9	0.0836	-	m=
			10	0.1536	-	m=
			13	0.1255	-	m=
			14	0.1029	-	m=
			15	0.0593	-	m=
ζ^1 **UMa**	20.5351	44.66°	3	0.0394	-	m=
-/- K, -/-	0.048697	0.621	5	0.0140	-	m=
A2,A2		114.5°	6	0.0181	-	m=
$\approx 2.2, 2.2 M_\odot$			8	0.0111	-	m=
			10	0.0101	-	m=
			17	0.0103	-	m=
			27	0.0063	-	m=
			36	0.0078	-	m=
HD158013	8.21675	50.97°	7	0.0468	-	m=
-/- K, -/-	0.12170	0.3327	9	0.2078	-	m=
Am		129.57°	18	0.0229	-	m=

Table 1—Continued

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
14 Peg	5.30824	17.32°	8	0.040	-	m=
-/- K, -/-	0.18839	0.5333	17	0.041	-	m=
A1V,A1V		310.9°				

Table 2. Heartbeat Binaries with TEOs (O,B-type)

Name; $T_{\rm eff}$, logg; $M_{1,2}$,	$P_{\rm orb}$ & $f_{\rm orb}$ (d, d^{-1})	i, e, ω	TEO(N=f/f_{orb})	TEO, A/10^{-3}	TEO,$\phi/(2\pi)$	remark
ι **Ori**	29.13376	62.86°		Red/Blue	Red/Blue	m=
31, 18.3 (10^3K), -	0.034324	0.7452	23	0.92/0.97	0.734/0.382	m=
3.89, 4.18		122.15°	25	0.44/-	0.452/-	m=
23.18, 13.94$M_\odot$			27	0.66/0.78	0.504/0.869	m=
9.10, 4.94$R_\odot$			33	0.58/0.7	0.211/0.09	m=
MACHO	32.83	44.9°	8	3	0.010	m=
80.7443.1718	0.0305	0.565	10	6	0.177	m=
$\approx 25(10^3$K)		61.1°	17	9	0.078	m=
$\approx 30M_\odot$			25	14	0.395	m=
QX Car	4.47948	34.77°	5	0.156	-	m=
-/- K, -/-	0.22324	0.2677	7	0.221	-	m=
B2V, B2V		174.7°	10	0.131	-	m=
			12	0.137	-	m=
V1294 Sco	5.6010	46.2°	7	1.14	-	m=
-/- K, -/-	0.17854	0.2578			-	m=
O9IV,O9.7V		130.8°			-	m=
HD174884	3.65705	73.35°	8	0.120	0.349	m=
13140/12044K	0.27344	0.2939	13	0.111	0.822	m=
4.04,2.72$M_\odot$		51.31°	3	0.091	0.570	m=
3.77,2.04R_{odot}			4	0.097	0.840	m=