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110 MINIMA TIMINGS OF ULTRA-SHORT ORBITAL PERIOD ECLIPSING BINARIES

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Observatory and telescope:
T1: 0.4m, f/8 Cassegrain telescope, located at the University of Athens Observatory, at Zografos, Athens, Greece. **T2**: 1.2m, f/13 Cassegrain telescope of the National Observatory of Athens, located at the Kryoneri Astronomical Station, at Korinth, Greece.

Detector:	**C1**: ST-10XME CCD camera, KAF-3200ME chip, $16'\times11'$and $25'\times17'$ (using an f/6.3 focal reducer) field of view (FoV) with T1. **C2**: AP47p CCD camera, Marconi 47-10 chip, $2.5'\times2.5'$and $5'\times5'$ (using an f/6.3 focal reducer) FoV with T2. All CCDs have a Peltier-type cooling system and are equipped with a set of *UBVRI* filters (Bessell specifications).

Method of data reduction:
Differential photometry

Method of minimum determination:
Kwee & van Woerden (1956).

Table 1: Times of minima of eclipsing binaries

System	HJD	Error	Type	Filters	Remark
1SWASP J004050.63+071613.9	2456562.3011	0.0010	I	BVRI	T2+C2
	2456562.4156	0.0010	II	BVRI	T2+C2
	2456562.5283	0.0009	I	BVRI	T2+C2
	2456563.3340	0.0006	I	VRI	T2+C2
	2456563.4471	0.0004	I	VRI	T2+C2
	2456563.5602	0.0006	I	VRI	T2+C2
	2456564.3627	0.0009	I	VRI	T2+C2

Table 1: cont.

System	HJD	Error	Type	Filters	Remark
1SWASP J004050.63+071613.9	2456564.4794	0.0008	I	VRI	T2+C2
	2456564.5954	0.0007	I	VRI	T2+C2
1SWASP J052036.84+030402.1	2456343.2294	0.0005	I	BVRI	T1+C1
	2456343.3429	0.0023	II	VR	T1+C1
	2456347.2777	0.0017	II	BVRI	T1+C1
	2456575.5610	0.0002	I	VRI	T2+C2
	2456576.4871	0.0003	I	VRI	T2+C2
	2456576.6022	0.0003	II	BVRI	T2+C2
	2456577.5277	0.0007	II	VI	T2+C2
	2456577.6400	0.0007	I	VI	T2+C2
	2456578.4540	0.0003	II	VR	T2+C2
	2456578.5695	0.0006	I	BVR	T2+C2
	2456679.4611	0.0006	I	BVRI	T1+C1
	2456680.3864	0.0006	I	BVRI	T1+C1
	2456687.3292	0.0004	I	BVRI	T1+C1
	2456687.4440	0.0005	II	BVRI	T1+C1
	2456689.4113	0.0008	I	VRI	T1+C1
	2456699.2449	0.0005	II	BVRI	T1+C1
	2456699.3619	0.0004	I	BVRI	T1+C1
	2456700.2878	0.0006	I	BVRI	T1+C1
	2456700.4015	0.0007	II	BVRI	T1+C1
	2456702.2528	0.0007	II	BVRI	T1+C1
	2456702.3700	0.0009	I	BVRI	T1+C1
	2456703.2921	0.0096	I	BR	T1+C1
	2456703.4023	0.0040	II	VI	T1+C1
	2456705.2613	0.0006	II	BVRI	T1+C1
	2456705.3787	0.0004	I	BVRI	T1+C1
	2456706.3047	0.0004	I	BVRI	T1+C1
	2456707.2296	0.0004	I	BVRI	T1+C1
	2456707.3438	0.0005	II	BVRI	T1+C1
1SWASP J055418.43+442549.8	2456348.3579	0.0007	I	BVRI	T1+C1
	2456352.4002	0.0005	I	BVRI	T1+C1
	2456353.3832	0.0004	II	BVRI	T1+C1
	2456355.3502	0.0005	II	BVRI	T1+C1
	2456355.4582	0.0006	I	BVRI	T1+C1
	2456364.4171	0.0005	I	BVRI	T1+C1
	2456371.3001	0.0004	II	BVRI	T1+C1
	2456375.3423	0.0004	I	BVRI	T1+C1
1SWASP J093012.84+533859.6 (EW)	2456305.6174	0.0002	II	BVRI	T1+C1
	2456306.2982	0.0003	II	BVRI	T1+C1
	2456306.4124	0.0002	I	BVRI	T1+C1
	2456307.4382	0.0002	II	BVRI	T1+C1
	2456307.5512	0.0002	I	BVRI	T1+C1
	2456307.6654	0.0004	II	BVRI	T1+C1
	2456313.4721	0.0003	I	BVRI	T1+C1
	2456313.5870	0.0003	II	BVRI	T1+C1
	2456314.6099	0.0002	I	BVRI	T1+C1

Table 1: cont.

System	HJD	Error	Type	Filters	Remark
1SWASP J093012.84+533859.6 (EW)	2456317.4571	0.0003	II	BVRI	T1+C1
	2456317.5703	0.0004	I	BVRI	T1+C1
	2456317.6854	0.0003	II	BVRI	T1+C1
	2456322.4674	0.0003	II	BVRI	T1+C1
	2456322.5811	0.0003	I	BVRI	T1+C1
	2456322.6936	0.0005	II	BVRI	T1+C1
	2456323.6062	0.0003	II	BVRI	T1+C1
	2456324.4020	0.0003	I	BVRI	T1+C1
	2456324.5173	0.0004	II	BVRI	T1+C1
	2456324.6290	0.0003	I	BVRI	T1+C1
	2456325.3124	0.0002	I	BVRI	T1+C1
	2456325.4277	0.0002	II	BVRI	T1+C1
	2456325.5399	0.0002	I	BVRI	T1+C1
	2456329.5265	0.0002	II	BVRI	T1+C1
	2456329.6393	0.0002	I	BVRI	T1+C1
	2456330.5502	0.0002	I	BVRI	T1+C1
1SWASP J093012.84+533859.6 (EA)	2456305.6603	0.0003	II	BRVI	T1+C1
	2456313.4923	0.0005	II	BVRI	T1+C1
	2456322.6328	0.0004	II	BVRI	T1+C1
	2456324.5903	0.0002	I	BVRI	T1+C1
1SWASP J133105.91+121538.0	2456332.6199	0.0002	II	BVRI	T1+C1
	2456333.6008	0.0002	I	BVRI	T1+C1
	2456335.5632	0.0002	I	BVRI	T1+C1
	2456335.6720	0.0002	II	BVRI	T1+C1
	2456347.4454	0.0002	II	BVRI	T1+C1
	2456347.5542	0.0002	I	BVRI	T1+C1
	2456347.6626	0.0003	II	BVRI	T1+C1
	2456348.5354	0.0006	II	BVRI	T1+C1
	2456348.6439	0.0003	I	BVRI	T1+C1
	2456350.4978	0.0005	II	BVRI	T1+C1
	2456350.6060	0.0010	I	BVRI	T1+C1
	2456353.5497	0.0003	II	BVRI	T1+C1
	2456353.6581	0.0004	I	BVRI	T1+C1
1SWASP J150822.80-054236.9	2456352.4977	0.0007	II	BVRI	T1+C1
	2456352.6285	0.0004	I	BVRI	T1+C1
	2456355.4907	0.0003	I	B	T1+C1
	2456355.6192	0.0003	II	BVRI	T1+C1
	2456356.5296	0.0004	I	BVRI	T1+C1
	2456356.6594	0.0005	II	VRI	T1+C1
	2456357.5699	0.0002	I	BVRI	T1+C1
	2456362.5109	0.0003	I	BVRI	T1+C1
	2456362.6406	0.0007	II	BVRI	T1+C1
	2456364.5913	0.0009	I	BVRI	T1+C1
	2456368.5089	0.0007	I	R	T1+C1
	2456374.4738	0.0004	I	BVRI	T1+C1
	2456374.6034	0.0003	II	BVRI	T1+C1
	2456375.5143	0.0002	I	BVRI	T1+C1

Table 1: cont.

System	HJD	Error	Type	Filters	Remark
1SWASP J150822.80-054236.9	2456375.6436	0.0004	II	BVRI	T1+C1
1SWASP J173003.21+344509.4	2456832.3657	0.0004	I	BRI	T2+C2
	2456832.4780	0.0009	II	BVRI	T2+C2
	2456833.3720	0.0006	II	BVRI	T2+C2
	2456833.4849	0.0007	I	BVRI	T2+C2
	2456834.3814	0.0008	I	B	T2+C2
	2456834.4915	0.0013	II	BVRI	T2+C2
	2456836.3934	0.0009	I	B	T2+C2
	2456836.5035	0.0005	II	B	T2+C2

Explanation of the remarks in the table:

T1, T2, C1, and C2 refer to the instrumentation (telescope and CCD camera) used for each case.

Remarks:

The majority of the above observations were performed utilizing the robotic and remotely controlled telescope at the University of Athens: (http://observatory.phys.uoa.gr) (Gazeas 2016). Note that the system 1SWASP J093012.84+533859.6 is a double-eclipsing quintuple or a quintuple system (Lohr et al. 2013 and Koo et al. 2014), showing eclipses in both contact binary member (EW) and Algol-type member (EA), both included in the above list.

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