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CLOSE BINARIES WITH H AND K EMISSION

In 1970 a list was published (1) of 22 close binaries showing H and K emission outside eclipse in at least one component and with the primary (hotter) star a main-sequence or subgiant star. Since that time 5 more binaries have been found to belong to this group, and sufficient spectroscopic material, published and unpublished, is on hand to obtain provisional minimum masses for 21 of them. Each of these systems that has been investigated adequately shows irregularities in its light curve. Hα emission is absent or weakly present with variable intensity. AR Lac and RS CVn may be considered prototypes of this group of close binaries.

The purpose of this Bulletin is to inform interested persons of the present state of knowledge, as it is known to me, of this group of systems. The accompanying Table gives a summary of pertinent data. While most of the entries in the Table (except almost all of the periods) are from my own material, data published by others have been included without bibliographical references. With the exceptions of WW Dra and AR Lac, the provisional minimum masses are based on my spectrographic material obtained at the Mount Wilson and (primarily) Lick Observatories. The minimum masses should approximate the actual values in all cases except UX Ari. The spectrographic observations are continuing, and I expect to obtain minimum masses of moderate accuracy for all the systems listed except WY Cnc, for which no lines of the secondary component have been found. The more recent spectrographic material has been concentrated in the region of the D lines, made accessible with relatively short exposure times by the use of an electrostatically focussed Varo image tube at the focus of the 50 mm camera of the coude spectrograph attached to the 3 m Lick reflector.

While all the systems for which provisional radii are available are detached systems, photometry is required to establish

the status of the others. UX Ari is a non-eclipsing member of this group. Another bright potential non-eclipsing member, in the southern sky, is HD 155555. UX Ari, AR Lac, and RT Lac have been detected as variable radio emitters. RS CVn is the system best studied photometrically. Light curves at one or two epochs have been published for several other systems, but a great deal more photometry is needed. Unpublished observations obtained at Kitt Peak show that UX Com and LX Per should be added to the list of systems with complete (total and annular) eclipses.

It will be noted that, in most of the systems, the more massive component appears to be the more evolved one in the conventional sense, as is expected in detached systems. There are, on the other hand, several exceptions, at least one of which, Z Her, is typical of members of the group in other respects. A suggestion on a possible mode of evolution of these systems has been presented (2). In the framework of this suggestion, TY Pyx, with two equal components, not subgiants, yet somewhat evolved, would be considered a system in transition between its main-sequence phase and the phase of typical members of the group, such as AR Lac and LX Per.

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References:

1. D.M. Popper, I.A.U. Colloq. No. 6, 25
2. R.K. Ulrich, D.M. Popper, Bull.Amer.Astron.Soc.6,461,1974

System	V_{max}	P	Emission pri.or sec.	Sp. type pri.	B-V or sp.type sec.	$M_{pri.}$ ≥	$M_{sec.}$ ≥	$R_{pri.}$	$R_{sec.}$
UX Ari*	$6^m.5$	$6^d.4$	sec	G5		0.63	0.71		
CQ Aur	9.0	10.6	sec?	G0					
SS Boo	10.3	7.6	sec	G2	+1.01	1.00	1.00		
SS Cam	10.0	4.8	sec	G2	+1.0				
RU Cnc	10.1	10.2	sec	F8	+1.01				
WY Cnc	9.6	0.83	pri	G5					
RS CVn	8.4	4.8	sec	F4	+0.91	1.35	1.40	1.7:	4.0:
AD Cap	9.8	3.0	both	G5		0.5:	1.1:		
UX Com	10.0	3.6	sec	G2	+1.04	0.95	1.12		
RT CrB	10.2	5.1	sec	G0		1.27	1.34		
WW Dra	8.8	4.6	sec	G2	+1.0	1.4	1.4	2.3:	3.9:
RZ Eri	7.7	39.3	sec	Am	G8	2.2	1.7		
Z Her	7.3	4.0	sec	F4	+0.91	1.22	1.10	1.6	2.6
AW Her	9.7	8.8	sec	G0	K2	1.38	1.36		
MM Her	9.5	8.0	sec	G2-5		1.20	1.24	1.5:	2.8:
PW Her	9.9	2.9	sec	G0		1.4	1.6		
GK Hya	9.4	3.6	sec	G0	+0.81	1.2:	1.3:		
RT Lac	10.0	5.1	both	G8	K1	0.6	1.5		
AR Lac	6.9	2.0	both	G2	+0.93	1.30	1.30	1.8	3.1
RV Lib	9.0	10.7	both	G2-5		2.2	0.4		
VV Mon	9.4	6.0	sec	G2					
LX Per	8.1	8.0	sec	G2	+0.93	1.23	1.32	1.6:	2.8:
SZ Psc	7.3	4.0	sec	F8	K1	1.33	1.65	1.6:	4.0:
UV Psc	9.1	0.86	both	G2	+0.91	1.2	0.9		
TY Pyx	6.9	3.2	both	G2-5	+0.69	1.20	1.22	1.6:	1.6:
RW UMa	10.2	7.3	sec	F8	+1.08	1.50	1.45	2.0:	3.8:
RS UMi	10.1	6.2	sec	F8					

*Not eclipsing