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VARIABILITY OF THE DOUBLE STAR HD 41824 AND ITS MULTIPLICITY

Several measurements in the Geneva photometric system with the P7 photoelectric photometer attached to the 70 cm reflecting Swiss telescope at La Silla Observatory in Chile confirm the variability of the double star HD 41824 (HR 2162, CoD -48° 2124, CPD -48° 777, SAO 217708, NSV 2827). Coordinates in the New Catalogue of Suspected Variables (NSV) by Kholopov et al. (1982) for 1950.0 are: R.A.= 6h 03m 29s, Dec. = -48° 27'.2. The star also figures in the Worley-Heintz (1983) catalogue of orbits of visual binary stars. Its period is 463.5 years and the present separation is 2.5". The variability of this star has been announced by Alexander (1970) indicating the amplitude of variation as 0.1 mag. The spectral type given in the Michigan Spectral Catalogue is G6V.

The 43 measurements made in the Geneva photometric system (Table 1) do not allow us to propose a model of the observed fluctuations. We note variations of m = 0.05 in 0.1 day and of at least 0.1 over a longer period (= 400 days). No periodicity has been detected. The values of colour index [B2-V1] are weakly correlated with the magnitudes [V]. The star becomes redder as it becomes fainter (see Fig. 1). The photometric measurements refer to the component stars A and B taken simultaneously. Taking into account the magnitude difference of the components A and B of about 0.3, then the interpretation of magnitudes and colours allows an estimation of the absolute luminosities and the distance (r=23 pc). The resulting photometric parallax confirms the dynamical parallax. Associated with the proper motion, this fact, combined with an estimation of the metallicity suggests that these stars belong to a relatively young population.

Observations of the components of this binary have been done on two occasions with the spectrovelocimeter CORAVEL mounted on the Danish 1.5m telescope at La Silla. They show that the component B has a stable radial velocity of 14.1±0.2 km/s and v.sin(i) estimated at 2.33±1.66 km/s. In contrast, the velocity of the component A is variable and its lines are broader. At the present time we have the following observations:

HJD 2444628.7607 V_r(A) = 12.10 km/s
HJD 2444983.7813 V_r(A) = 32.22 km/s

with a v.sin(i) of 7.99±0.75 km/s

Thus the component A itself is double. Further observations should be carried out to try to distinguish Aa and Ab. As there is no evidence for an eclipse, the variability of the combined system may arise if one of the three components is a "spotted star". Additional photometric measurements and radial velocities are therefore necessary.

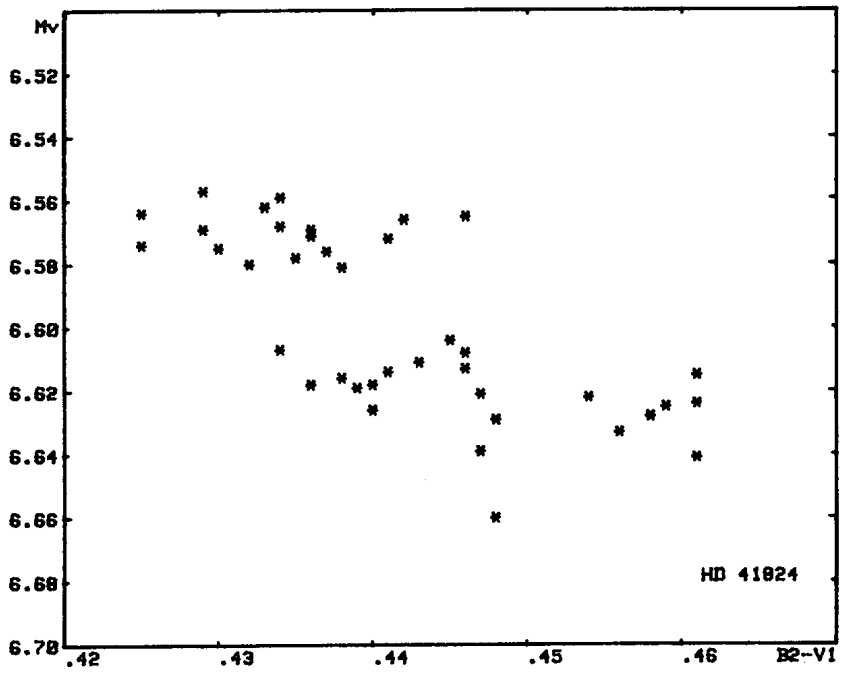

Fig. 1. Individual measurements of HD 41824 showing colour [B2-V1] versus apparent magnitude. Unreliable measurements of weight 0 are not included. It should be noted that both components of the visual double were measured together.

Table I.

No	Time (JD) 24...	P	U-B	V-B	B1-B	B2-B	V1-B	G-B	Q	V
1	43211.534	3	1.469	.092	1.124	1.290	.850	1.117	3	6.626
2	43447.789	3	1.449	.074	1.122	1.268	.832	1.100	3	6.618
3	43568.607	3	1.466	.075	1.115	1.270	.822	1.086	3	6.629
4	45706.741	1	1.468	.071	1.126	1.270	.822	1.087	1	6.660
5	45706.758	1	1.475	.067	1.132	1.266	.819	1.080	1	6.639
6	45706.770	1	1.486	.067	1.131	1.277	.823	1.081	1	6.622
7	45706.784	1	1.479	.067	1.125	1.270	.814	1.075	1	6.633
8	45706.794	1	1.481	.071	1.126	1.283	.822	1.088	1	6.615
9	45706.804	1	1.476	.067	1.129	1.275	.816	1.082	1	6.625
10	45706.814	1	1.487	.062	1.137	1.276	.818	1.082	1	6.628
11	45706.824	1	1.469	.058	1.130	1.275	.814	1.078	1	6.624
12	45706.839	1	1.484	.061	1.130	1.273	.812	1.078	1	6.641
13	45712.806	0	1.462	.067	1.131	1.276	.816	1.084	0	6.657
14	45713.623	2	1.481	.071	1.127	1.280	.822	1.093	2	6.628
15	45719.825	1	1.506	.063	1.127	1.267	.818	1.074	0	6.592
16	45725.560	1	1.477	.064	1.124	1.259	.814	1.072	1	6.604
17	45725.585	2	1.479	.072	1.123	1.271	.825	1.084	2	6.608
18	45725.639	2	1.470	.080	1.124	1.273	.827	1.092	2	6.613
19	45725.705	2	1.468	.080	1.123	1.272	.834	1.090	2	6.616
20	45725.783	2	1.453	.075	1.131	1.271	.830	1.091	2	6.614
21	45726.717	3	1.475	.070	1.132	1.264	.817	1.087	3	6.621
22	45726.780	3	1.468	.081	1.131	1.275	.832	1.089	3	6.611
23	45727.585	2	1.487	.083	1.130	1.275	.841	1.106	2	6.607
24	45729.565	4	1.476	.074	1.129	1.270	.831	1.091	4	6.619
25	45729.718	4	1.463	.076	1.127	1.267	.827	1.087	4	6.618
26	46029.797	3	1.462	.089	1.123	1.278	.840	1.105	3	6.581
27	46047.798	3	1.455	.090	1.117	1.273	.837	1.109	3	6.571
28	46048.539	2	1.450	.071	1.124	1.268	.822	1.084	2	6.565
29	46048.578	2	1.462	.090	1.129	1.275	.833	1.106	2	6.566
30	46048.642	2	1.465	.078	1.123	1.274	.837	1.097	2	6.576
31	46048.718	2	1.470	.087	1.122	1.276	.842	1.110	2	6.559
32	46048.782	2	1.464	.083	1.120	1.265	.835	1.103	2	6.575
33	46048.846	2	1.452	.083	1.117	1.269	.833	1.099	2	6.569
34	46050.655	3	1.461	.089	1.129	1.273	.844	1.105	3	6.557
35	46063.539	3	1.460	.082	1.120	1.264	.830	1.088	3	6.568
36	46063.562	3	1.457	.088	1.119	1.272	.847	1.102	3	6.574
37	46063.635	3	1.463	.084	1.121	1.274	.845	1.107	3	6.569
38	46063.860	3	1.441	.091	1.115	1.282	.841	1.112	3	6.572
39	46067.600	3	1.467	.085	1.119	1.273	.837	1.103	3	6.571
40	46067.719	3	1.460	.091	1.125	1.280	.845	1.104	3	6.578
41	46067.824	3	1.456	.091	1.115	1.271	.839	1.103	3	6.580
42	46075.567	1	1.456	.097	1.126	1.275	.850	1.124	1	6.564
43	46076.601	3	1.451	.088	1.118	1.275	.842	1.109	3	6.562

Details on the P7 photometer can be found in Burnet and Rufener (1979), the Geneva photometric system is described by Golay (1980) and Rufener (1981), the CORAVEL technique is shown in Baranne et al. (1979).

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