A MAGYAR
TUDOMÁNYOS AKADÉMIA
CSILLAGVIZSGÁLÓ
INTÉZETÉNEK
KÖZLEMÉNYEI

MITTEILUNGEN
DER
STERNWARTE
DER UNGARISCHEN AKADEMIE
DER WISSENSCHAFTEN

BUDAPEST-SZABADSÁGHEGY

Nr. 56

KATALIN BARLAI AND B. SZEIDL

VZ PEGASI

BUDAPEST, 1965

VZ PEGASI

by

KATALIN BARLAI and B. SZEIDL

Two-color photoelectric observations of the Bailey type "c" RR Lyrae star VZ Pegasi are presented.

The variable VZ Pegasi ($\alpha = 23^h37^m14^s$, $\delta = +24°22'.2$, 1900.0; $l^{II} = 103°.6$, $b^{II} = -35°.3$) discovered by Applegate (1921) was considered by later observers as eclipsing system. Sigeru Kaho (1958) basing on photographic observations revealed the RR Lyrae character of the star and gave the following elements:

$$\text{Max. hel.} = \text{J.D.}2435478.004 + 0^d.3064865E.$$

PHOTOELECTRIC OBSERVATIONS

Observations were carried out on three consecutive nights by the authors and K. Gefferth in October, 1963 utilizing the 24 inch reflector of the Konkoly Observatory. An EMI 9052B multiplier was attached to the telescope at the Newtonian focus. Measurements were made in blue and yellow through filters Schott BG 12 + GG 13 and GG 11 respectively. Ultraviolet measurements could not be obtained for the variable because of the faintness of the star.

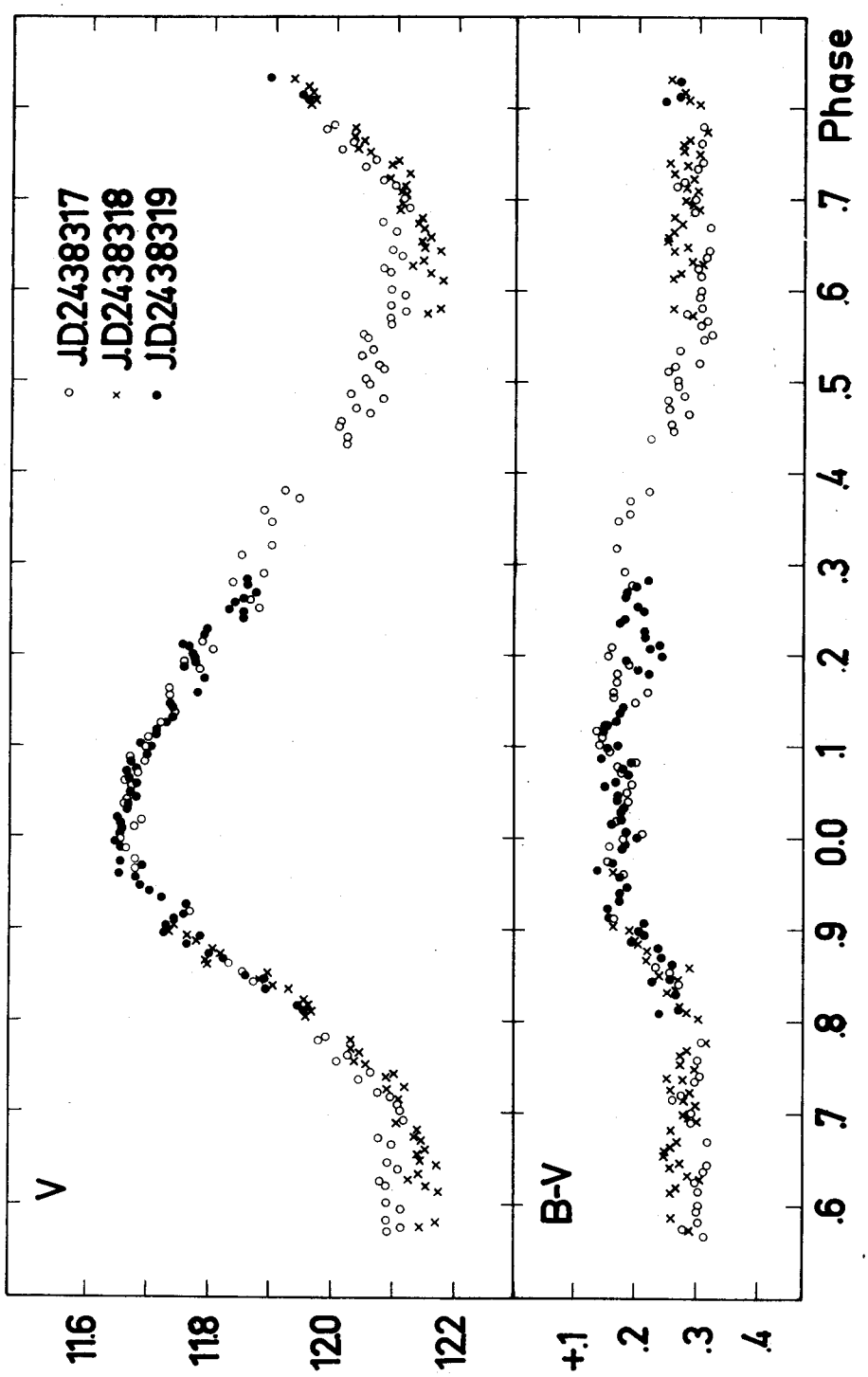
As comparison star we used the star "b" in the identification chart given by Kaho. Transformation to the standard U, B, V system was accomplished on four nights using Johnson and Morgan's stars from Ap. J., *117*, 313. 1953. We obtained for the comparison star

$$V = 11.82, \qquad B - V = +0.61, \qquad U - B = +0.01$$

and for the color equations by which the observations have been transformed to the U, B, V system:

$$V = V_{Bp} + 0.145\,(B - V) + c$$
$$(B - V) = +0.596 + 1.110\,(B - V)_{Bp}$$
$$(U - B) = -1.359 + 1.152\,(U - B)_{Bp}$$

where V_{Bp}, $(B - V)_{Bp}$ and $(U - B)_{Bp}$ are the extra-terrestrial instrumental magnitude and colors. The $B - V$, $U - B$ colors of the comparison star fit well the standard $B - V$, $U - B$ relation for main sequence stars. According to the Sp, $B - V$ relation the star is of spectral type G0V. Table 2 contains the photoelectric observations of VZ Peg in the standard system.


JD2438317
JD2438318
JD2438319
V
B-V
11.6
11.8
12.0
12.2
+.1
.2
.3
.4
.6
.7
.8
.9
0.0
.1
.2
.3
.4
.5
.6
.7
Phase

The variations in V and $B - V$ are plotted against phase in Figure 1 using the new ephemeris

$$\text{Max. hel.} = \text{J.D.}2438317.2930 + 0^{d}.3064863E.$$

The light curve shows on two consecutive nights a deviation in the depth of the minimum amounting to about 0.05 mag in V and 0.03 mag in $B - V$. Further observations are required to determine whether these variations represent cyclic phenomena or irregular departures from the average.

COMPARISON WITH T SEX AND DH PEG

The obtained light- and color-curves of VZ Pegasi show clearly the features of an RRc star. A comparison with T Sex (Tifft and Smith, 1958) and DH Peg (Tifft, 1964) is given in Table 1. The hump on the rising branch is comparatively short but well pronounced in the yellow and blue light curves. The star is bluest at phase $0^{p}.12$.

TABLE 1

	T Sex	VZ Peg	DH Peg
Period	$0^{d}.325$	$0^{d}.306$	$0^{d}.256$
$\varepsilon = M - m$	$0^{p}.40$	$0^{p}.36$	$0^{p}.40$
$\varepsilon^* = M - m_{\text{hump}}$	$0^{p}.13$	$0^{p}.10$	$0^{p}.11$
V max	9.875	11.66	9.28
V min	10.305	12.13	9.77
V amp	0.43	0.47	0.49
$B - V$ max	0.175	0.16	0.21
$B - V$ min	0.30	0.30	0.34
$B - V$ amp	0.125	0.14	0.13

The period of VZ Peg lies between those of T Sex and DH Peg. The light amplitude and color of these three variables exhibit a good agreement. The similarity in color with T Sex and in amplitude with DH Peg is especially remarkable. The interstellar reddening in case of VZ Peg cannot be significant, since the star lies at galactic latitude $-35°$.

These similar features suggest that VZ Peg belongs to the homogeneous group of RRc stars mentioned by Tifft (DH Peg, T Sex, AU Vir and SX UMa).

The authors thank Prof. Dr. L. Detre for directing their attention to this star and for his valuable advice.

Remark: $\varepsilon^* = M - m_{\text{hump}} =$ time from hump to maximum expressed in period.

REFERENCES:

Applegate, 1921, Harvard Circ. 225 (announcement by S. I. Bailey)
Kaho, S. 1958, Tokyo Astronomical Bulletin Ser. II. No 110
Tifft, W. G. 1964, Ap. J. *139*. 451
Tifft, W. G. and Smith, H. J. 1958, Ap, J. *127*. 591

TABLE 2

t⊙	phase		Δ V	B—V	t⊙	phase		Δ V	B—V
	d	P				d	P		
2438317+					2438317+				
0.2676	.2811	.9172	—.051		0.3990	.1060	.3459		+.169
.2680	.2815	.9185		+.167	.3995	.1065	.3475	+.077	
.2822	.2957	.9648	—.142		.4018	.1088	.3550		+.190
.2853	.2988	.9749		+.152	.4023	.1093	.3566	+.065	
.2857	.2992	.9762	—.142		.4063	.1133	.3697		+.187
.2886	.3021	.9857		+.158	.4068	.1138	.3713	+.128	
.2891	.3026	.9873	—.158		.4087	.1157	.3775		+.222
.2919	.3054	.9965	—.165		.4093	.1163	.3795	+.099	
.2925	.3060	.9984		+.180	.4252	.1322	.4314	+.201	
.2964	.0034	.0111	—.143		.4269	.1339	.4369		+.222
.2970	.0040	.0131		+.214	.4273	.1343	.4382	+.201	
.2985	.0055	.0180	—.125		.4305	.1375	.4486		+.269
.2990	.0060	.0196		+.170	.4308	.1378	.4496	+.186	
.3041	.0111	.0362	—.163		.4318	.1388	.4529		+.258
.3051	.0121	.0395	—.157		.4322	.1392	.4542	+.189	
.3055	.0125	.0408		+.191	.4354	.1424	.4646		+.288
.3085	.0155	.0506	—.149		.4357	.1427	.4656	+.236	
.3090	.0160	.0522		+.188	.4367	.1437	.4689		+.251
.3106	.0176	0574	—.162		.4370	.1440	.4699	+.214	
.3112	.0182	0594		+.195	.4402	.1472	.4803		+.248
.3144	.0214	.0698	—.136		.4405	.1475	.4813	+.261	
.3148	.0218	.0711		+.177	.4415	.1485	.4846		+.308
.3162	.0232	.0757	—.124		.4419	.1489	.4858	+.207	
.3167	.0237	.0773		+.170	.4450	.1520	.4960		+.291
.3178	.0248	.0809		+.197	.4454	.1524	.4973	+.238	
.3183	.0253	.0826	—.152		.4465	.1535	.5008		+.292
.3220	.0290	.0946		+.157	.4468	.1538	.5018	+.230	
.3228	.0298	.0972	—.123		.4498	.1568	.5116		+.250
.3244	.0314	.1025		+.138	.4502	.1572	.5129	+.261	
.3249	.0319	.1041	—.118		.4512	.1582	.5162		+.263
.3289	.0359	.1171		+.133	.4516	.1586	.5175	+.251	
.3294	.0364	.1187	—.100		.4548	.1618	.5279		+.308
.3318	.0388	.1266		+.147	.4551	.1621	.5289	+.222	
.3322	.0392	.1279	—.077		.4568	.1638	.5345		+.268
.3382	.0452	.1475		+.199	.4572	.1642	.5358	+.241	
.3391	.0461	.1504	—.085		.4603	.1673	.5459		+.310
.3421	.0491	.1602		+.220	.4607	.1677	.5472	+.234	
.3426	.0496	.1618	—.087		.4618	.1688	.5508		+.324
.3478	.0548	.1788		+.167	.4621	.1691	.5517	+.227	
.3492	.0562	.1834	—.036		.4652	.1722	.5619		+.305
.3512	.0582	.1899		+.188	.4655	.1725	.5628	+.271	
.3516	.0586	.1912	—.063		.4665	.1735	.5661		+.315
.3542	.0612	.1997		+.152	.4669	.1739	.5674	+.269	
.3555	.0625	.2039	—.014		.4693	.1763	.5752		+.278
.3576	.0646	.2108		+.158	.4697	.1769	.5772	+.294	
.3583	.0653	.2131	—.034		.4715	.1785	.5824		+.306
.3700	.0770	.2512	+.060		.4718	.1788	.5834	+.269	
.3725	.0795	.2594	+.042		.4748	.1818	.5932		+.303
.3780	.0850	.2773		+.195	.4752	.1822	.5945	+.293	
.3787	.0857	.2796	+.014		.4769	.1839	.6000		+.304
.3810	.0880	.2871		+.181	.4773	.1843	.6013	+.271	
.3815	.0885	.2888	+.064		.4818	.1888	.6160		+.304
.3870	.0940	.3067		+.256	.4829	.1899	.6196	+.270	
.3877	.0947	.3090	+.030		.4843	.1913	.6242		+.301
.3905	.0975	.3181		+.167	.4850	.1920	.6265	+.260	
.3912	.0982	.3204	+.077		.4879	.1949	.6359		+.314

TABLE 2 (cont.)

t⊙	phase		Δ V	B—V	t⊙	phase		Δ V	B—V
	d	P				d	P		
2438317+					2438318+				
0.4884	.1954	.6376	+.290		0.4215	.2091	.6823		+.260
.4900	.1970	.6428		+.320	.4218	.2094	.6832	+.320	
.4906	.1976	.6447	+.271		.4228	.2104	.6865		+.293
.4967	.2037	.6646	+.280		.4232	.2108	.6878	+.285	
.4982	.2052	.6695		+.320	.4256	.2132	.6956		+.290
.4985	.2055	.6705	+.256		.4260	.2136	.6969	+.289	
.5045	.2115	.6901		+.294	.4270	.2146	.7002		+.280
.5050	.2120	.6917	+.301		.4274	.2150	.7015	+.294	
.5073	.2143	.6992		+.295	.4298	.2174	.7093		+.299
.5079	.2149	.7012	+.293		.4301	.2177	.7103	+.287	
.5120	.2190	.7146		+.262	.4311	.2187	.7136		+.280
.5124	.2194	.7159	+.276		.4315	.2191	.7149	+.292	
.5135	.2205	.7195		+.276	.4340	.2216	.7230		+.288
.5138	.2208	.7204	+.256		.4343	.2219	.7240	+.270	
.5180	.2250	.7341		+.299	.4353	.2229	.7272		+.258
.5187	.2257	.7364	+.228		.4357	.2233	.7286	+.303	
.5201	.2271	.7410		+.309	.4382	.2258	.7367		+.281
.5208	.2278	.7433	+.246		.4385	.2261	.7377	+.270	
.5249	.2319	.7567	+.189		.4395	.2271	.7409		+.251
.5264	.2334	.7615		+.305	.4398	.2274	.7420	+.281	
.5269	.2339	.7632	+.208		.4422	.2298	.7498		+.296
.5311	.2381	.7769	+.161		.4426	.2302	.7511	+.238	
.5325	.2395	.7814		+.309	.4436	.2312	.7544		+.275
.5328	.2398	.7824	+.174		.4440	.2316	.7557	+.218	
.5504	.2574	.8398		+.272	.4465	.2341	.7638		+.275
.5509	.2579	.8415	+.052		.4468	.2344	.7648	+.228	
.5536	.2606	.8503		+.259	.4478	.2354	.7681		+.285
.5540	.2610	.8515	+.034		.4482	.2358	.7694	+.212	
.5561	.2631	.8584		+.232	.4505	.2381	.7769		+.314
.5568	.2638	.8607	+.013		.4509	.2385	.7782	+.210	
					.4590	.2466	.8046		+.302
2438318+					.4593	.2469	.8056	+.139	
0.3964	.1760	.5743		+.285	.4603	.2479	.8089		+.283
.3968	.1764	.5756	+.329		.4607	.2483	.8102	+.145	
.3978	.1774	.5788		+.259	.4631	.2507	.8180		+.275
.3982	.1778	.5801	+.354		.4635	.2511	.8193	+.143	
.4005	.1881	.6137		+.259	.4648	.2524	.8235	+.135	
.4009	.1885	.6150	+.358		.4672	.2548	.8314		+.253
.4020	.1896	.6186		+.268	.4676	.2552	.8327	+.110	
.4023	.1899	.6196	+.337		.4686	.2562	.8359		+.266
.4048	.1924	.6278		+.305	.4690	.2566	.8372	+.085	
.4051	.1927	.6287	+.309		.4715	.2591	.8454		+.270
.4061	.1937	.6320		+.286	.4718	.2594	.8464	+.066	
.4065	.1941	.6333	+.324		.4728	.2604	.8496		+.239
.4090	.1966	.6415		+.260	.4732	.2608	.8509	+.075	
.4093	.1969	.6425	+.354		.4755	.2631	.8584		+.290
.4104	.1980	.6460		+.276	.4759	.2635	.8598	—.026	
.4107	.1983	.6470	+.326		.4770	.2646	.8633		+.235
.4130	.2006	.6545		+.247	.4773	.2649	.8643	—.028	
.4134	.2010	.6558	+.321		.4797	.2673	.8722		+.217
.4145	.2021	.6594		+.249	.4801	.2677	.8735	+.002	
.4148	.2024	.6604	+.335		.4811	.2687	.8767		+.218
.4162	.2038	.6650		+.257	.4815	.2691	.8780	—.014	
.4176	.2052	.6695	+.327		.4840	.2716	.8862		+.205
.4186	.2062	.6728		+.271	.4843	.2719	.8872	—.041	
.4190	.2066	.6741	+.315		.4853	.2729	.8904		+.200

TABLE 2 (cont.)

t⊙	phase		Δ V	B—V	t⊙	phase		Δ V	B—V
	d	P				d	P		
2438318+					2438319+				
0.4857	.2733	.8917	—.058		0.4402	.0018	.0059		+.186
.4880	.2756	.8992		+.191	.4405	.0021	.0069	—.164	
.4884	.2760	.9005	—.085		.4430	.0046	.0150		+.165
.4895	.2771	.9041		+.162	.4433	.0049	.0160	—.166	
.4898	.2774	.9051	—.082		.4443	.0059	.0193		+.171
					.4447	.0063	.0206	—.173	
					.4471	.0087	.0284		+.176
2438319+					.4475	.0091	.0297	—.154	
0.3797	.2478	.8085		+.237	.4485	.0101	.0330		+.182
.3801	.2482	.8098	+.146		.4489	.0105	.0343	—.156	
.3812	.2493	.8134		+.273	.4512	.0128	.0418		+.170
.3815	.2496	.8144	+.122		.4516	.0132	.0431	—.140	
.3868	.2549	.8317		+.269	.4526	.0142	.0463		+.172
.3871	.2552	.8327	+.072		.4530	.0146	.0476	—.149	
.3901	.2582	.8425		+.226	.4555	.0171	.0558		+.140
.3905	.2586	.8438	+.072		.4558	.0174	.0568	—.139	
.3915	.2596	.8470		+.256	.4569	.0185	.0604		+.167
.3919	.2600	.8483	+.040		.4572	.0188	.0614	—.159	
.3961	.2642	.8620		+.263	.4596	.0212	.0691		+.192
.3975	.2656	.8666	+.005		.4600	.0216	.0705	—.158	
.3985	.2666	.8699		+.244	.4610	.0226	.0737		+.178
.3989	.2670	.8711	—.020		.4613	.0229	.0747	—.139	
.4020	.2701	.8813		+.241	.4637	.0253	.0826		+.199
.4023	.2704	.8823	—.059		.4641	.0257	.0839	—.151	
.4033	.2714	.8855		+.192	.4651	.0267	.0871		+.143
.4037	.2718	.8868	—.031		.4655	.0271	.0884	—.123	
.4061	.2742	.8947		+.216	.4680	.0296	.0966		+.151
.4065	.2746	.8960	—.094		.4683	.0299	.0976	—.124	
.4075	.2756	.8992		+.207	.4693	.0309	.1008		+.169
.4079	.2760	.9005	—.085		.4697	.0313	.1021	—.134	
.4103	.2784	.9084		+.215	.4722	.0338	.1103		+.145
.4107	.2788	.9097	—.079		.4725	.0341	.1113	—.106	
.4118	.2799	.9133		+.156	.4735	.0351	.1145		+.142
.4121	.2802	.9142	—.060		.4739	.0355	.1158	—.108	
.4158	.2839	.9263		+.154	.4763	.0379	.1237		+.149
.4162	.2843	.9276	—.059		.4767	.0383	.1250	—.089	
.4172	.2853	.9309		+.176	.4777	.0393	.1282		+.171
.4176	.2857	.9322	—.098		.4780	.0396	.1292	—.079	
.4200	.2881	.9400		+.179	.4805	.0421	.1374		+.176
.4204	.2885	.9413	—.116		.4808	.0424	.1384	—.079	
.4215	.2896	.9449		+.189	.4818	.0434	.1416		+.177
.4218	.2899	.9459	—.132		.4822	.0438	.1429	—.083	
.4242	.2923	.9537		+.174	.4860	.0476	.1553		+.163
.4246	.2927	.9550	—.138		.4864	.0480	.1566	—.036	
.4255	.2936	.9580		+.182	.4889	.0505	.1648		+.137
.4259	.2940	.9592	—.172		.4892	.0508	.1658	—.019	
.4283	.2964	.9671		+.136	.4909	.0525	.1713		+.170
.4287	.2968	.9684	—.126		.4912	.0528	.1723	—.028	
.4297	.2978	.9717		+.163	.4936	.0552	.1801		+.222
.4301	.2982	.9730	—.168		.4940	.0556	.1814	—.065	
.4346	.3027	.9877		+.180	.4950	.0566	.1847		+.205
.4350	.3031	.9890	—.168		.4954	.0570	.1860	—.044	
.4360	.3041	.9922		+.185	.4979	.0595	.1941		+.184
.4364	.3045	.9935	—.175		.4982	.0598	.1951	—.048	
.4387	.0003	.0010		+.202	.4993	.0609	.1987		+.247
.4391	.0007	.0023	—.169		.4996	.0612	.1997	—.053	

TABLE 2 (cont.)

t⊙	phase		Δ V	B—V	t⊙	phase		Δ V	B—V
	d	P				d	P		
2438319+					2438319+				
0.5019	.0635	.2072		+.227	0.5145	.0761	.2483		+.217
.5023	.0639	.2085	—.057		.5148	.0764	.2493	+.009	
.5033	.0649	.2118		+.241	.5158	.0774	.2525		+.206
.5037	.0653	.2131	—.068		.5162	.0778	.2539	+.020	
.5061	.0677	.2209		+.215	.5190	.0806	.2630	+.036	
.5065	.0681	.2222	—.029		.5193	.0809	.2640		+.184
.5075	.0691	.2255		+.216	.5200	.0816	.2663		+.184
.5079	.0695	.2268	—.026		.5204	.0820	.2676	+.057	
.5103	.0719	.2346		+.175	.5228	.0844	.2754		+.196
.5107	.0723	.2359	+.035		.5232	.0848	.2767	+.041	
.5116	.0732	.2388		+.183	.5240	.0856	.2793		+.221
.5120	.0736	.2402	+.035		.5246	.0862	.2813	+.039	

A kiadásért felel: Detre László Műszaki szerkesztő: Merkly László
A kézirat nyomdába érkezett: 1964. XII. 14. — Példányszám: 700 — Terjedelem: 0,75 (A5) ív

65.60016 Akadémiai Nyomda, Budapest — Felelős vezető: Bernát György