FIRST BV LIGHT CURVE FOR THE ECLIPSING BINARY PP LACERTAE

PP Lac was discovered by Miller on photographic plates taken in 1948 –
1955 at Castel Gandolfo. Miller and Wachmann (1971) found an amplitude of
0.9 mag. (11.1 – 12.0 p) and a period of about $0^d.5$. The type of variation
proposed was EW or RR.

Figer and Rolland (1976 and 1977), from visual estimates made by GEOS
members, classified it as an EW-type variable, with a period of $0^d.4011$.
They could not discriminate the primary minimum from the secondary one, so
a doubt still remained on the type of variation of the star.

The GCVS (Kholopov et al., 1985) classifies the star as EW/KW, and
gives the following elements:

11.1 – 12.0 p; min II 12.0;

Min I = JD Hel 2445595.438 + $0^d.401163$ · E

Recently, Maraziti (1989) reexamined all visual observations made by
GEOS members from 1976 to 1988. Collecting 128 minima from 17 observers,
plus 18 other minima published by Locher (1977, 1978, 1979), he found the
following ephemeris:

Min I (or II) = JD Hel 2442903.235 + $0^d.40116150$ · E   (1)

                          ±2   +48

(95% level of confidence for error bars).

He was not able to distinguish between primary and secondary minimum.

In order to check this result by means of photoelectric measures, PP
Lac was selected as one of the targets of GEOS missions at Jungfraujoch Ob-
servatory. Four missions were performed in 1985, 1986, 1988 and 1989,
though most of observations were made during the last one. The GEOS members
who took part in the different missions were M. Dumont, J. Remis, J.C.
Misson, S. Ferrand, P. Louis, Ph. Rousselot, E. Joffrin, R. Boninsegna, R.
Lecocguen.

The observations were made using a photometer attached to the 76 cm
telescope. B and V filters of the Geneva system were used, and the B-V val-
ues were turned into Johnson and Morgan system. 132 measures in each colour
were obtained in 4 nights.

Table I

PP Lac - photoelectric observations

JD (hel) 2440000+	V	B-V	phase (1)	JD (hel) 2440000+	V	B-V	phase (1)
6266.4390	11.576	0.769	0.666	7775.4154	11.591	0.745	0.184
6266.4626	11.496	0.775	0.725	7775.4390	11.523	0.734	0.243
6266.4939	11.536	0.758	0.803	7775.4411	11.529	0.728	0.248
6266.5195	11.660	0.781	0.867	7775.4425	11.522	0.743	0.252
6266.5550	12.045	0.780	0.955	7775.4453	11.541	0.733	0.259
6266.5793	12.186	0.839	0.016	7775.4467	11.550	0.724	0.262
7378.5694	12.017	0.754	0.942	7775.4480	11.547	0.730	0.266
7378.5721	12.077	0.762	0.949	7775.4494	11.547	0.728	0.269
7378.5735	12.061	0.795	0.952	7775.4529	11.542	0.743	0.278
7378.5742	12.108	0.775	0.954	7775.4543	11.534	0.752	0.281
7378.5756	12.097	0.795	0.957	7775.4557	11.556	0.726	0.285
7378.5763	12.146	0.773	0.959	7775.4571	11.570	0.707	0.288
7378.5791	12.168	0.789	0.966	7775.4585	11.554	0.736	0.292
7378.5812	12.161	0.851	0.971	7775.4779	11.616	0.747	0.340
7378.5937	12.193	0.848	0.003	7775.4793	11.621	0.750	0.344
7378.5951	12.199	0.812	0.006	7775.4807	11.622	0.757	0.347
7383.4603	11.617	0.741	0.134	7775.4821	11.632	0.744	0.351
7383.4652	11.628	0.743	0.146	7775.4855	11.655	0.767	0.359
7383.4673	11.622	0.752	0.151	7775.4869	11.653	0.758	0.363
7383.4694	11.612	0.748	0.156	7775.4883	11.658	0.769	0.366
7383.4714	11.594	0.750	0.161	7775.4897	11.666	0.764	0.370
7383.4888	11.508	0.735	0.205	7775.4911	11.677	0.760	0.373
7383.4909	11.504	0.733	0.210	7775.4925	11.695	0.748	0.377
7383.4930	11.508	0.732	0.215	7775.4953	11.712	0.745	0.384
7383.4971	11.500	0.728	0.226	7775.4967	11.709	0.759	0.387
7383.4999	11.504	0.719	0.232	7775.4980	11.728	0.752	0.390
7383.5020	11.508	0.727	0.238	7775.4994	11.749	0.744	0.394
7383.5069	11.518	0.725	0.250	7775.5008	11.746	0.766	0.397
7383.5096	11.514	0.740	0.257	7775.5043	11.776	0.769	0.406
7383.5124	11.521	0.736	0.264	7775.5057	11.772	0.774	0.410
7383.5152	11.520	0.739	0.271	7775.5071	11.789	0.779	0.413
7383.5201	11.520	0.734	0.283	7775.5085	11.808	0.769	0.416
7383.5221	11.535	0.736	0.288	7775.5098	11.819	0.773	0.420
7775.3779	11.775	0.758	0.091	7775.5112	11.849	0.765	0.423
7775.3828	11.735	0.752	0.103	7775.5126	11.907	0.750	0.427
7775.3855	11.724	0.751	0.110	7775.5175	11.936	0.755	0.439
7775.3897	11.696	0.744	0.120	7775.5189	11.949	0.765	0.442
7775.3911	11.698	0.743	0.124	7775.5203	11.966	0.755	0.446
7775.3925	11.682	0.743	0.127	7775.5217	11.984	0.763	0.449
7775.3939	11.680	0.735	0.131	7775.5230	12.005	0.760	0.453
7775.3980	11.626	0.759	0.141	7775.5244	12.016	0.775	0.456
7775.3994	11.629	0.751	0.145	7775.5272	12.123	0.740	0.463
7775.4008	11.626	0.752	0.148	7775.5286	12.107	0.781	0.467
7775.4022	11.623	0.741	0.152	7775.5300	12.116	0.779	0.470
7775.4036	11.614	0.756	0.155	7775.5314	12.112	0.792	0.474
7775.4050	11.623	0.745	0.158	7775.5328	12.111	0.791	0.477
7775.4092	11.603	0.746	0.169	7775.5369	12.169	0.788	0.487
7775.4105	11.597	0.741	0.172	7775.5390	12.167	0.787	0.493
7775.4119	11.597	0.745	0.176	7775.5439	12.125	0.784	0.505
7775.4133	11.596	0.749	0.179	7775.5460	12.104	0.799	0.510

Table I (cont.)

| JD (hel) 2440000+	V	B-V	phase (1)	JD (hel) 2440000+	V	B-V	phase (1)
7775.5480	12^{m}.081	0^{m}.789	0.515	7775.5897	11^{m}.675	0^{m}.748	0.619
7775.5494	12.071	0.787	0.518	7775.5918	11.648	0.760	0.624
7775.5598	11.920	0.805	0.544	7775.5932	11.643	0.756	0.628
7775.5619	11.897	0.799	0.550	7775.5973	11.625	0.761	0.638
7775.5633	11.884	0.792	0.553	7775.5987	11.626	0.745	0.641
7775.5647	11.872	0.785	0.557	7775.6001	11.609	0.755	0.645
7775.5696	11.828	0.778	0.569	7775.6154	11.538	0.766	0.683
7775.5710	11.796	0.776	0.572	7775.6168	11.531	0.759	0.686
7775.5723	11.781	0.786	0.576	7775.6189	11.548	0.744	0.692
7775.5744	11.769	0.762	0.581	7775.6210	11.530	0.752	0.697
7775.5779	11.747	0.769	0.589	7775.6251	11.521	0.753	0.707
7775.5793	11.721	0.774	0.593	7775.6272	11.526	0.744	0.712
7775.5814	11.716	0.765	0.598	7775.6286	11.527	0.741	0.716
7775.5828	11.688	0.776	0.602	7775.6307	11.524	0.748	0.721
7775.5842	11.673	0.770	0.605	7775.6328	11.527	0.747	0.726
7775.5876	11.686	0.745	0.614	7775.6342	11.528	0.743	0.730

PP Lac V
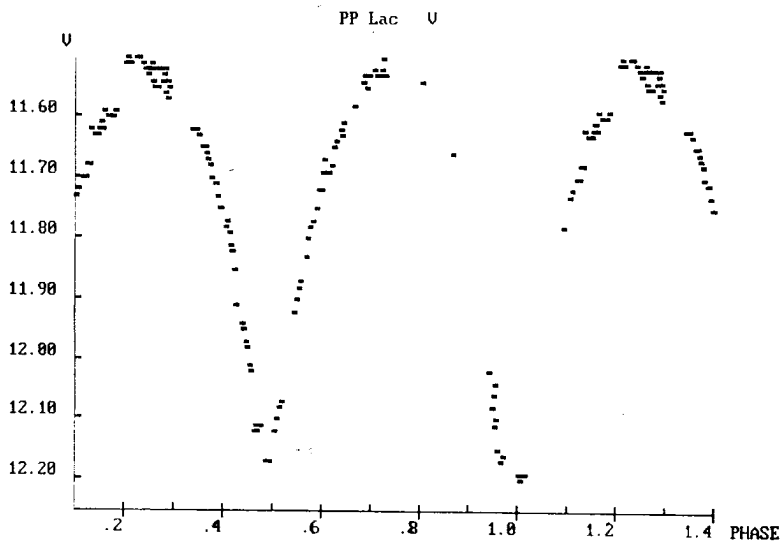
Figure 1a.

All observations are listed in Table I. Figure 1 shows the V and B-V
light curves obtained according to ephemeris (1). One can note a good a-
greement with this ephemeris.

The shape of light curves is typical of an EW-type variable, with near-
ly equal minima and quasi-constant B-V index. One can note a slight increase
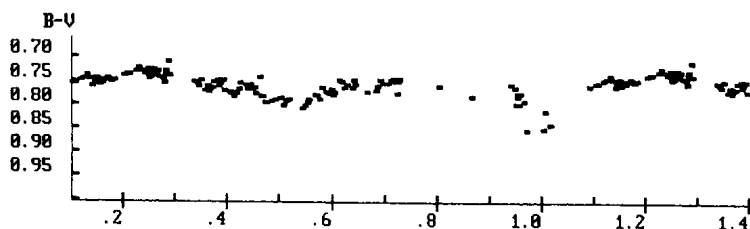
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Figure 1b.

of B-V index during both minima. This might be due to the disappearance, during minima, of the contact zone between the two stars, which has a higher temperature than the rest of their surfaces.

It is apparent a slight difference in the V magnitude between the two minima: min I is 12.20 while min II is 12.17. This difference, however, is too small to be considered significant. More precise observations are needed to establish the magnitudes of minima.

The mean B-V, not corrected for reddening, is 0.76.

On the night of September 5, 1989, it was possible to observe a complete secondary minimum, at JD Hel 2447775.5380 $\pm$ 0.0010; the time of minimum was calculated using the technique described by Gaspani (1988).

The O-C calculated from (1) is $-0\overset{d}{.}0042$, which is a further confirmation of the above GEOS ephemeris (1).

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