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FIRST SYNTHETIC SOLUTION FOR THE W UMa SYSTEM PP LACERTAE

Variability of PP Lac was discovered by W.J. Miller on photographic plates taken in 1948-1955 at the Castel Gandolfo Observatory (Rome). Miller and Wachmann (1971) proposed a type EW or RR for this star, and found a photographic amplitude of 0.9 magnitudes (11.1 to 12.0).

Figer and Rolland (1976-1977), on the basis of visual observations, classified this star as an EW-type eclipsing variable and found a period of 0.4011 days.

Recently Dumont and Maraziti (1990) were able to obtain photoelectric photometry of this star at the Jungfraujoch Observatory confirming the EW type as well as the photometric period (see Maraziti (1990) and Dumont and Maraziti (1990) for further details).

I have processed their B and V photoelectric observations in order to obtain the first orbital solution of this binary system. The light curve solution was obtained in time domain making use of a light curve synthesis computer code written by the author, fitting classical Roche model on the observations by optimization techniques. Any trial light curve was computed by direct numerical integration using a method similar to the procedure described in Rucinski (1973) and Lucy (1968). The adopted optimization procedure is of pattern search type (like the classical Hooke-Jeewes algorithm) with some stochastic step-correction rules adopted in order to increase computational efficiency. Such (more modern) optimizing procedure performs better than classical differential correction methods both in convergence speed and in robustness.

Despite the non-complete coverage of the light curve, the amount of information included in the available observations was sufficient to ensure a very fast convergence of the optimization procedure as well as a stable photometric solution in both colours. The two distinct photometric solutions, reported in Table I, are in excellent agreement with each other confirming the good quality of the available data.

The obtained model shows a W UMa type binary system with nearly equal

Table 1: Model for PP Lac

	B colour	V colour
Mass ratio q :	.61 + .01	.60 + .01
Fill-Out parameter f :	.57 + .02	.62 + .02
Orbital Inclination i :	86.0 + .2	82.4 + .3 (degrees)
Radius of the primary star r1:	.459 + .004	.455 + .005
Radius of the secondary star r2:	.373 + .003	.367 + .004
Fractional Luminosity L1 :	.626	.627
Fractional luminosity L2 :	.374	.373
Temperature Ratio T2/T1 :	.985	.987

temperature, a mass ratio q=.6 and fill-out parameter also about .6, only the orbital inclination results for the solution of the B and V light curve are in slight disagreement.

The final average RMSs of the optimal solutions (intensities) are .0086 an .010 for the B and V light curve respectively.

The present solution is the first one and must be regarded as preliminary.

This star is a very interesting binary system needing accurate additional photometry, therefore additional observing efforts are planned at the GEOS in the near future.

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