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IMPROVED EPHEMERIS AND PHOTOMETRIC ELEMENTS FOR HY VIRGINIS

HY Vir (SAO 139174, HD 114125, BD $-1°2777$) was originally announced as a variable star by Rodriguez et al. (1988). Additional observations carried out at Observatorio del Teide (Instituto de Astrofisica de Canarias) by Casas and Gomez-Forrellad (1989) confirmed the variable nature of HY Vir. They also showed that the star is a detached eclipsing binary system and gave the following preliminary ephemeris:

$$\text{HJD Min.I} = 2447240.97128 + 2^{\text{d}}.73236 \times \text{E}$$
$$\pm 0.00006 \pm 0.00002$$

This ephemeris and the original physical elements were obtained during a short time interval and from a reduced number of minimum timings. As a consequence, they could be affected by inaccuracies. To test the above mentioned ephemeris and elements, we observed HY Vir during several nights in April 1995 using the 0.4-m telescope at Observatorio de Mollet equipped with a LYNXX-2 CCD camera at and the 0.4-m telescope in conjunction with a ST-4 CCD camera at Observatorio de Monegrillo (Spain). Both CCD cameras were operated in the V band. HY Vir is also a visual binary (South 647). The optical companion (PPM 178970, AGK3 $-02°0782$) was used as the comparison star.

From the original set of data obtained in 1989 and the new data gathered now, we computed a list of O$-$C residuals for one Min.I and three Min.II. Times of minima were derived using the Sliding Integration Method (Ghedini, 1982). Table 1 summarizes the resulting O$-$C values.

Table 1

HJD 2440000+	Minimum	Epoch	O$-$C
7239.6051	II	-0.5	0.0000
7627.60069	II	141.5	$+0.00047$
9813.47041	II	941.5	-0.01781
9817.56624	I	943.0	-0.02052

After performing a least-squares linear fit on the O$-$C residuals we found the following improved ephemeris for HY Vir:

$$\text{HJD Min.I} = 2447240.96964 + 2^{\text{d}}.732338 \times \text{E}$$
$$\pm 0.00009 \pm 0.000002$$

Although the observed minima during 1995 clearly indicate a shorter period for HY Vir, it is still too early to discern whether it is due to a lack of accuracy in the initial period estimate or true period changes. Therefore more timings of minima are needed.

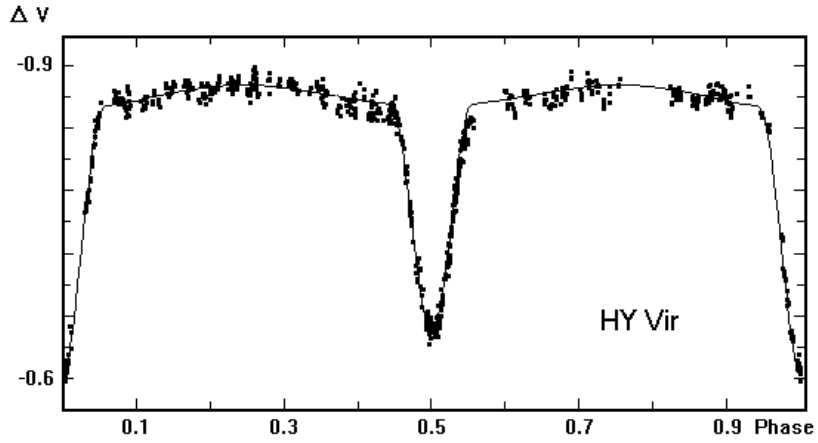

Figure 1. Synthetic light curve superimposed to observations.

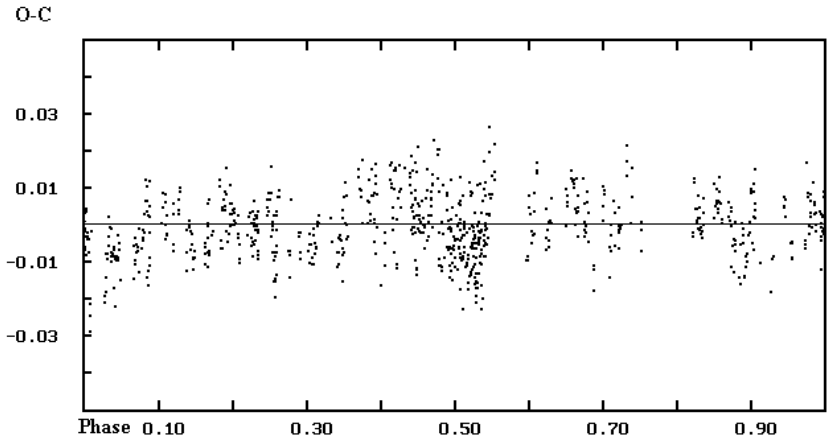

Figure 2. Computed residuals after subtracting the synthetic light curve from observations. Vertical scale is in magnitudes

Table 2

mass ratio =	0.95 ±0.05
i =	80°.6 ±0°.1
a_g = 0.230 ±0.005	a_s = 0.140 ±0.005
b_g = 0.227 ±0.004	b_s = 0.139 ±0.005
c_g = 0.224 ±0.004	c_s = 0.139 ±0.005
d_g = 0.231 ±0.006	d_s = 0.140 ±0.005
g_1 = 0.32	g_2 = 0.32
x_1 = 0.60	x_2 = 0.60
A_1 = 0.5	A_2 = 0.5
T_1 = 7200K ±40K	T_2 = 6900K ±20K
L_1 = 0.76 ±0.01	L_2 = 0.24 ±0.01

Also, from the original photoelectric observations obtained in 1989, we derived new physical elements using Binary Maker 2.0 (Bradstreet, 1993), based on a preliminary set of elements computed by Alvaro Gimenez and Casas (1990) who used the computer program EBOP developed by Etzel (Popper, 1984). Taking into account that the combined spectrum of the system is F2V, the values of 0.32, 0.6 and 0.5 were assumed for the gravity darkening, limb darkening, and reflection coefficients respectively (Figure 1). Table 2 summarizes these results.

In Figure 2 residuals are depicted after subtracting the synthetic light curve from the photometric observations.

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