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**HD 130484: A NEW  $\delta$  Sct VARIABLE IN VIRGO**

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During an observational program on the  $\delta$  Sct-type pulsating star IP Vir, HD 129727 ( $V = 9^m5$ ) was used as main comparison star and HD 130484 ( $V = 8^m8$ ) as a check star. These two comparison stars have not been reported as variable before in any catalogue, however our observations showed that while HD 129727 kept a constant brightness HD 130484 presents a slight  $\delta$  Sct-type photometric variability every night with a luminosity amplitude of about  $0^m01$  and a period of about 3 hours. Figure 1 shows the light curves in the  $v$  filter corresponding to six nights of observations as magnitude differences HD 130484–HD 129727 versus the Heliocentric Julian Day.

The observations were collected through the springs of 1995 and 1996 at the observatories of San Pedro Mártir, México (1.5 m telescope) and Sierra Nevada, Spain (0.9 m telescope). These observations consisted of simultaneous  $uvby$  data into the Strömngren photometric system. Additionally, some  $H\beta$  data were collected in order to derive the physical parameters of these stars. Both telescopes are equipped with identical six-channel  $uvby\beta$  spectrograph photometers for simultaneous measurements in  $uvby$  or in the narrow and wide  $H\beta$  channels, respectively, using uncooled EMI 9789 QA photomultipliers. To transform our data into the standard system we have used the same procedure described in Rodríguez et al. (1997). This way, we have derived for HD 130484 the following values:  $V = 8^m786$ ,  $b - y = 0^m188$ ,  $m_1 = 0^m172$ ,  $c_1 = 0^m946$  and  $\beta = 2^m771$ .

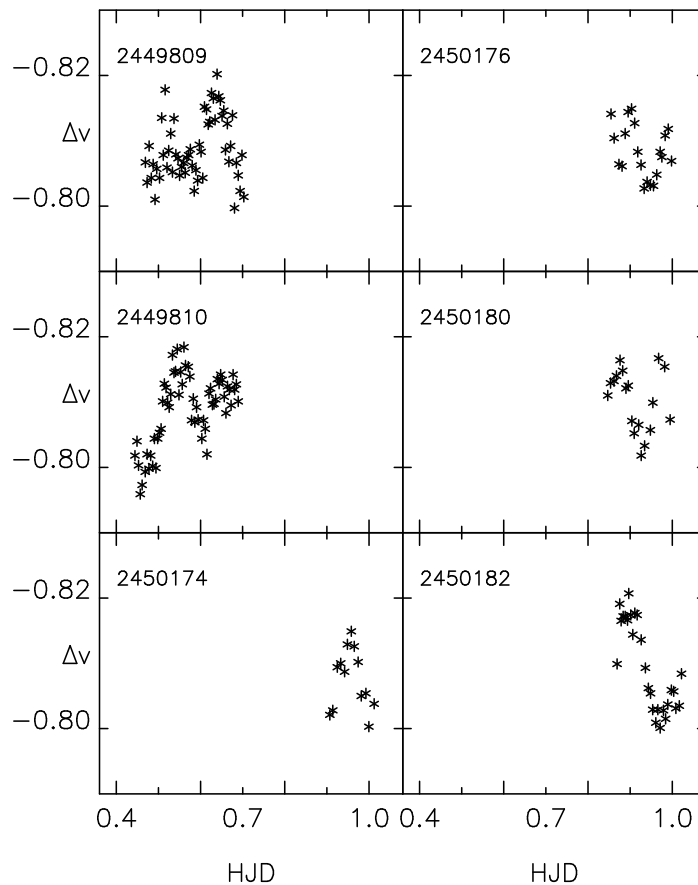
An analysis of frequencies was carried out on our data using the method described in Rodríguez et al. (1998) where single-frequency and multiple-frequency techniques are combined using both Fourier and multiple least squares algorithms. The analysis was made on all the four  $uvby$  filters and the results show that there is a main peak at  $\nu = 7.804 \text{ cd}^{-1}$ , that is, a period of  $P = 0^d1281$ . After prewhitening for this frequency, the resulting periodograms suggest that other periodicities may be present in the light curves of this star, however the noise level is too high and the possible secondary frequencies cannot be confirmed. The multiperiodicity is also suggested from the light curves shown in Figure 1. The corresponding amplitudes (as determined by means of the Fourier analysis, i.e., semiamplitudes) obtained for the main frequency  $\nu = 7.804 \text{ cd}^{-1}$  are of  $0^m0045 (\pm 0.0008)$ ,  $0^m0040 (\pm 0.0003)$ ,  $0^m0037 (\pm 0.0003)$  and  $0^m0031 (\pm 0.0004)$  for  $u$ ,  $v$ ,  $b$  and  $y$ , respectively, which agree well with a  $\delta$  Sct type pulsation. Figure 2 shows the power spectra in the filter  $b$  before and after prewhitening the frequency  $\nu$ .

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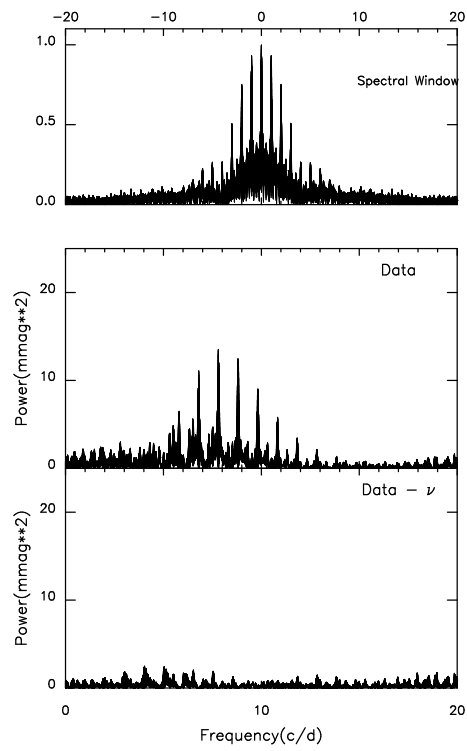
<sup>†</sup>Deceased

In order to derive the physical parameters of this star, the photometric Strömgren indices obtained before were used. Intrinsic indices were derived using the reference lines of Philip & Egret (1980) with the appropriate corrections for gravity and metallicity (Crawford 1975a,b; Philip et al. 1976). Thus, colour excess of  $0^m036$ ,  $0^m012$  and  $0^m007$  were found for  $b - y$ ,  $m_1$  and  $c_1$ , respectively. Then, deviations from the ZAMS's values of  $\delta m_1 = 0^m009$  and  $\delta c_1 = 0^m217$  are obtained. This means this star is a normal  $\delta$  Sct star with nearly solar abundance. In fact, a value of  $[Me/H] = -0.01$  is obtained using the Smalley's (1993) calibration for metal abundance. In addition, using the relations by Crawford (1975b) for luminosity, Code et al. (1976) for bolometric correction and the grids by Lester et al. (1986) with  $[Me/H] = 0.0$  for temperature and gravity, we obtain the following values for  $M_{bol} = 1^m07$ ,  $T_e = 7560$  K and  $\log g = 3.62$ . These results place HD 130484 in the middle part of the instability strip corresponding to the  $\delta$  Sct region as can be seen in Figure 3. This figure shows the sample of  $\delta$  Sct stars and the observational edges of the instability strip in the  $\delta$  Sct region from Rodríguez et al. (1994). Finally, using the relation by Petersen & Jørgensen (1972), a value of  $Q = 0^d028 (\pm 0.005)$  is found for the pulsation constant. This suggests that HD 130484 is pulsating in the fundamental mode or first overtone radial order.

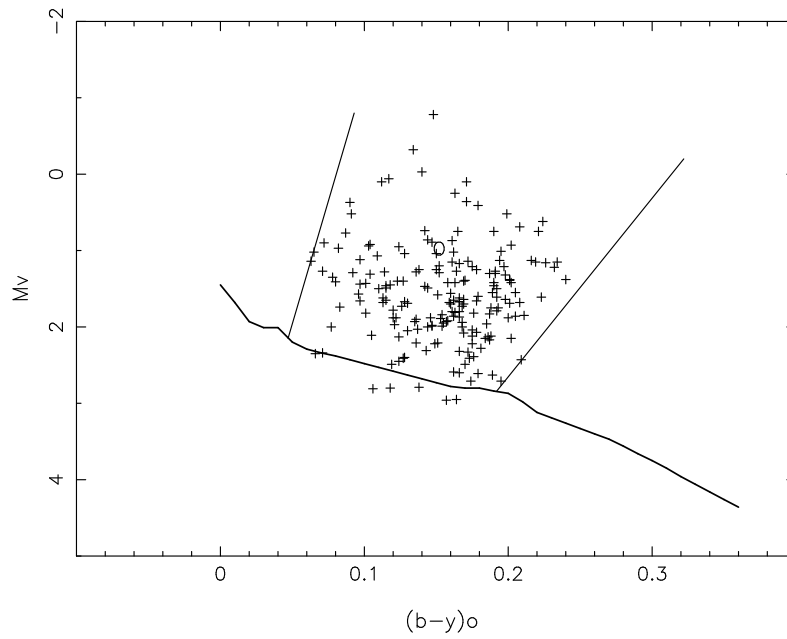
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**Figure 1.** Differential light curves HD 130484–HD 129727 in the  $v$  filter versus Heliocentric Julian Day



**Figure 2.** Power spectra of HD 130484 in the filter  $b$  before and after prewhitening the frequency  $\nu = 7.804 \text{ cd}^{-1}$  to our data



**Figure 3.** Position of the  $\delta$  Sct stars in the H-R diagram. HD 130484 is shown with the symbol O

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