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Multiperiodicity in the δ Scuti-type star V929 Her

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Abstract. Preliminary analysis of photometric observations carried through 2003 at the Sierra Nevada Observatory (Spain) of the δ Sct-type star V929Her is presented. The predominant frequency is in good agreement with the one listed in the Hipparcos Catalogue, more frequencies are presented in our analysis.

Key words. Stars: variables: δ Scuti – Stars: individual: V929 Her – Stars: oscillations – Techniques: photometric

1. Introduction

The star V929 Her (HD 154225, HIP 83370) was found to be a variable star by the HIPPARCOS satellite. The Variability Annex of the Hipparcos Catalogue (ESA 1997) reports V929 Her to have a period of $0^{\rm d}.1442065$ (6.934500 c/d) with Hp magnitudes ranging between $8^{\rm m}.061$ to $8^{\rm m}.110$. The spectral type it is listed as A5. In Kazarovets et al. (1999) and Rodríguez et al. (2000) is listed as a δ Scuti-type star. With these additional observations we will be able to confirm its variability and to derive its pulsational content with better accuracy.

2. Observations and results

The observations were carried out on six nights in May/June 2003, using the 90 cm telescope at Sierra Nevada Observatory (Spain). The telescope is equipped with a six-channel *uvbyβ* photometer for simultaneous measurements in *uvby* or in the H_β channels (Nielsen, 1983). The comparison stars used were C1 = SAO 46457 (V = $8^{\rm m}.015$, F8) and C2 = SAO 46427 (V = $8^{\rm m}.318$, FV). The variable and the C1 were observed with 40 s and C2 with 50 s of integration time, each one giving internal errors better than $0^{\rm m}.002$ in any of the four *uvby* filters. The frequency analysis was made in the *v* band using the Fourier transform method. A set of ten frequencies has been determined, although the frequencies content is probably more complex. The results are shown in Table 1. The observed and the synthetic light curves are shown in Figure 1.

The color-magnitude diagram shown in Figure 2 has been constructed using our Strömgren measurements. Dereddening has been calculated following Philip et al. (1976) leading to the following parameters for V929 Her, Mv = $2^{\rm m}.08$, log $T_{\rm eff}$ = 3.831, log g = 3.71 and [Me/H] = 0.61. As seen,

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Table 1. Results of the Fourier analysis of the *v* data. T_0=2452782.0.

Frequency (c/d)	A (mag)	Phase (rad)
6.93394	0.0447	5.533
6.58916	0.0195	3.650
8.19118	0.0086	3.547
6.73650	0.0076	5.358
13.07194	0.0057	1.646
11.82292	0.0043	1.552
3.80600	0.0039	5.752
14.60910	0.0036	3.827
9.98942	0.0029	4.174
1.70261	0.0023	4.534

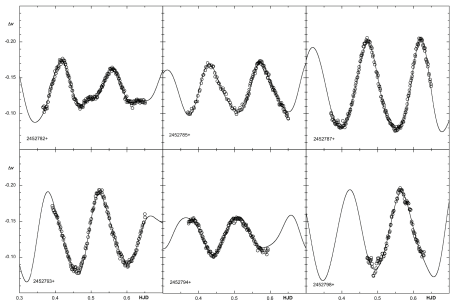

Fig. 1. Light curves of V929 Her obtained during 2003 and 2004 campaigns. Δv are the observed magnitude differences (Var-C1) in the *v* narrow-band. The fit of the frequency solution derived is shown as a solid line.

this star is overabundant in metals. Thus, the photometric calibrations might be not applicable as discussed in Rodríguez & Breger (2001) and its photometric Mv value be unreliable. Fortunately, the Hipparcos satellite (ESA 1997) measured the parallax of this star as 5.73(±0.76)mas which leads to Mv(parallax) = 1.65(±0.31)mag. Now, the star places well-inside the δ Scuti instability region. Evolutionary tracks are from Claret (1995). The main sequence has been taken

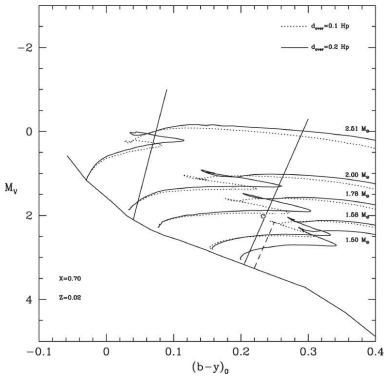

Fig. 2. The open dot give the position of V929 Her in the HR diagram.

from Philip & Egret (1980), the δ Scuti instability strip from Rodríguez & Breger (2001) and the γ Dor red border is from Handler & Shobbrook (2002).

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