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Strömgren photometry of the δ Scuti star 67 UMa

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Abstract.   We present preliminary results derived from the data obtained during five observing campaigns in 2001, 2003, 2004, 2006 and 2007, of the δ Sct-type variable star 67 UMa, at Sierra Nevada Observatory, Spain. The analysis of the data was performed by means of the Fourier Transform method, and results are shown. The intrinsic b-y, m_1, c_1 values are derived and the physical parameters are determined.

1. Introduction

67 UMa (SAO 44002, HIP 58684, m_v = 5.22 mag) is a low amplitude variable star discovered by Kurtz [1] [2] and classified as δ Sct-type variable. With five nights of observation it was not possible for him to determine a significant frequency throughout its data set. The spectral type is listed as A7m. With these additional observations, we have been able to confirm its variability and to derive its pulsational contents with better accuracy.

2. Observations

The observations were carried out during 2001, 2003, 2004, 2006 and 2007, using the 90 cm telescope at Sierra Nevada Observatory, Spain. The telescope is equipped with a six channel $uvby\beta$ photometer for simultaneous measurements in $uvby$ or in the Hβ channels respectively [3]. The comparison stars were C1 = SAO 43963 (m_v = 6.60 mag, F6V) and C2 = SAO 43946 (m_v = 6.99 mag, A1 spe), the same used by Kurtz [1].

3. Analysis

The analysis of this star was carried out with the Fourier Transform method. We found four frequencies present in the data. There is further frequency content, but due to the low amplitude and observations from only one observatory it was not possible to determine more frequencies. Fig. 1 shows the light curves of the observed data for five campaigns in the b filter. The points represent the observations while the solid lines represent the fit for the frequencies listed in Table 1. Further observations are needed to obtain a more detailed pulsational spectrum of this star.

The color-magnitude diagram shown in the Figure 2 has been constructed using the measured Strömgren data. Our results give following values: V = 5.240, (b-y) = 0.157, m_1 = 0.198, c_1 = 0.761. Hβ = 2.770 is taken from [4]. The stellar fundamental parameters of 67 UMa have been determinated by applying TempLogG [5], giving Mv = 2.39M$_\odot$, log T$_{eff}$ = 3.871, log g = 4.06 and [Me/H] = 0.14.
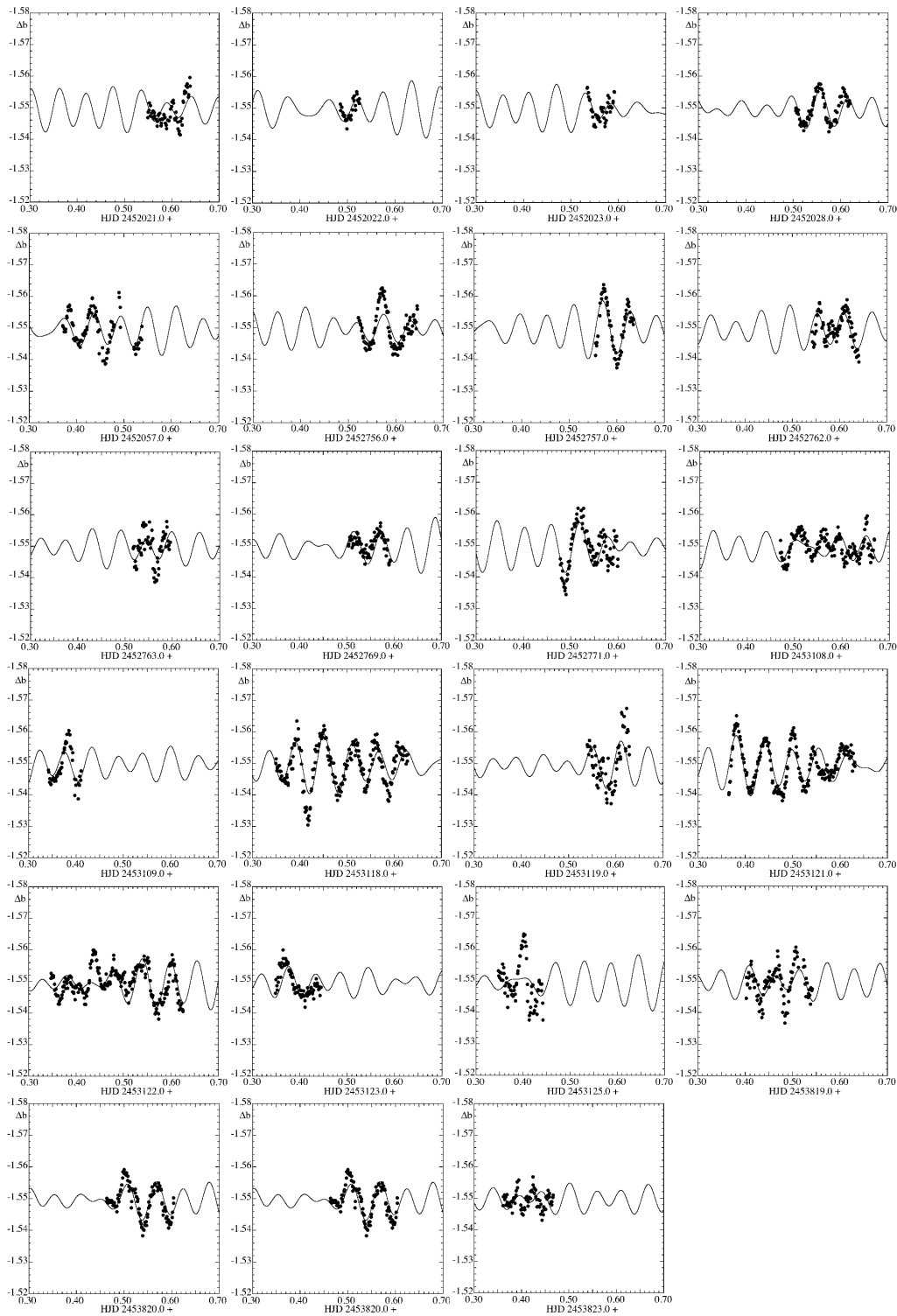
Figure 1. Light curves of 67 UMa obtained during the 2001 to 2007 campaigns. Δb are the observed magnitude differences (Var - C1) in the b narrow-band of the *uvby* system. The fit of the frequencies solution derived is shown as a solid curve.

Table 1. Results of the Fourier analysis of the b data. T_0=2452021.0.

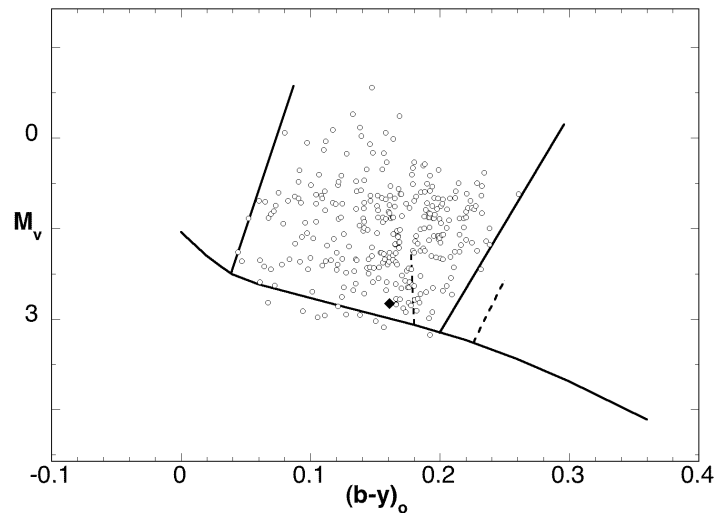| Frequency (c/d)	A (mag)	Phase (rad)
18.0724	0.0038	0.969
16.4123	0.0023	0.103
15.6925	0.0021	0.376
11.9764	0.0017	1.246

Figure 2. The black dot gives the position of 67 UMa in the HR diagram.

The Figure 2 shows the location of 67 UMa (star) in the HR diagram together with the sample of δ Sct-type pulsators [6]. The observational γ Dor edges (dashed lines) are from [7].

Acknowledgments

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