

Abstract

Breger et al. (1972) identified two pre-main sequence (PMS) that showed δ Scuti pulsations in the young open cluster NGC 2264. In the following years, the growing interest in the Herbig Ae/Be (HAeBe) stars led to the discovery of periodic pulsations in such stars, e.g. HR 5999 (Kurtz & Marang 1995), HD 104237 (Donati et al. 1997, Kurtz & Müller 1999) and HD 142666 (Kurtz & Müller 2001).

Combining theoretical models of PMS stars and non-linear pulsations, Marconi & Palla (1998, 2003) were able to determine the instability strip for the intermediate mass PMS stars, in a similar fashion to the post-MS objects. Since the instability strip covers the evolutionary tracks in both the PMS and post-MS stages the detection of pulsations on intermediate mass objects cast some doubt on their evolutionary status.

In this work we present an preliminary analysis of uvby Strömgren photometry for the HAeBe candidate star HD 144432 (PDS078), in an attempt to detect pulsational variations.

Introduction

In the last decade, the growing interest in HAeBe stars allowed the discovery of periodic pulsations in these objects, e.g.:

- HR 5999 (Kurtz & Marang 1995);
- HD 104237 (Kurtz & Müller 1999).
- HD 142666 (Kurtz & Müller 2001).

Marconi & Palla (1998,2003), determined the instability strip for intermediate mass PMS stars and confirmed the presence of HR 5999 in this strip (Fig. 1). Since the instability strip covers the evolutionary tracks in both the PMS and post-MS stages the detection of pulsations on intermediate mass objects cast some doubt on their evolutionary status.

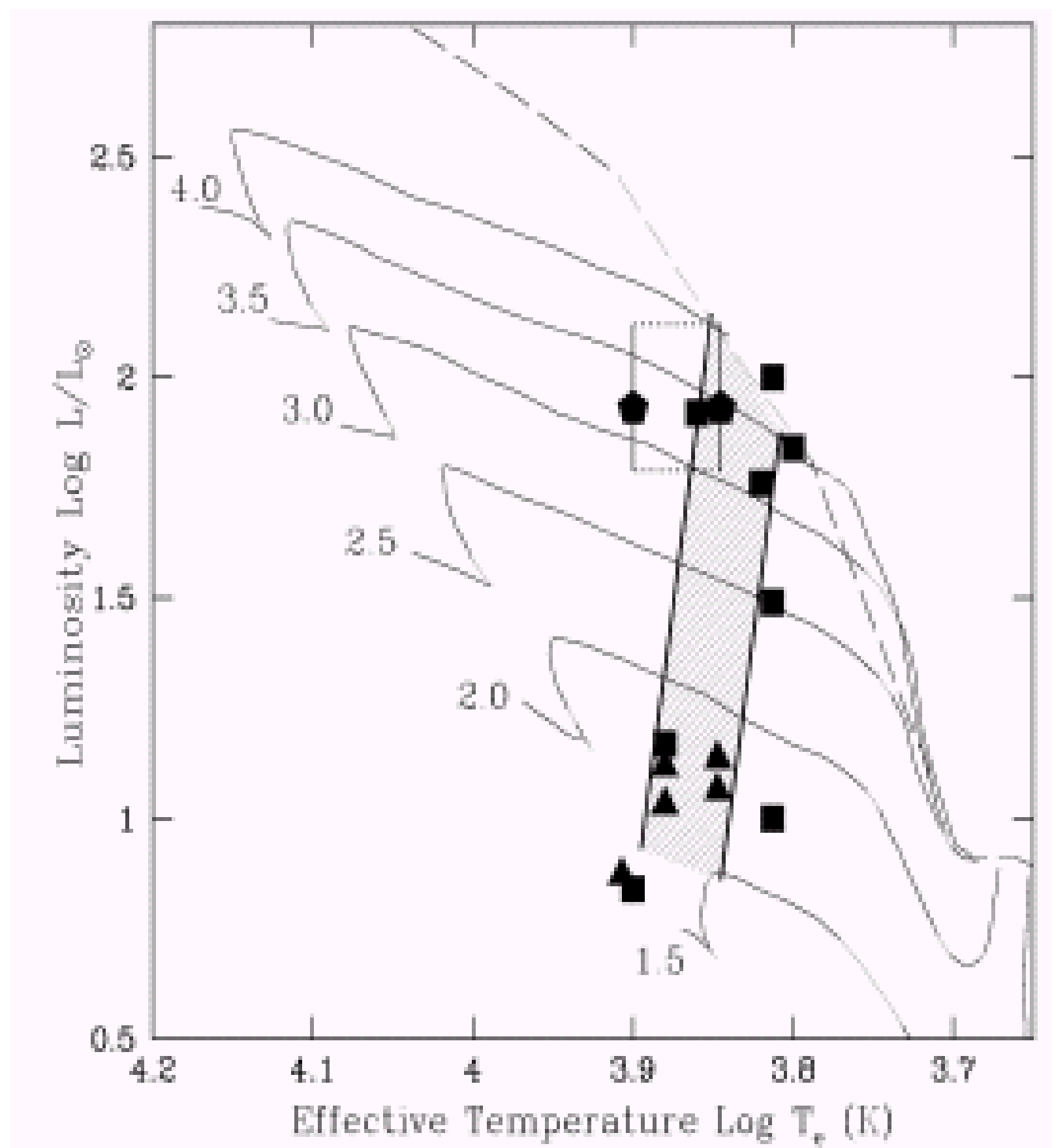


Figure 1: Instability Strip and the location of HR 5999 (hexagon) (Palla, 1998).

Vieira et al. (2003) identified 131 HAeBe candidate stars in Pico dos Dias Survey (PDS) Gregorio-Hetem et al.(1992). Using the instability strip a set of candidates was selected, in order to search for periodic pulsations (Fig. 2).

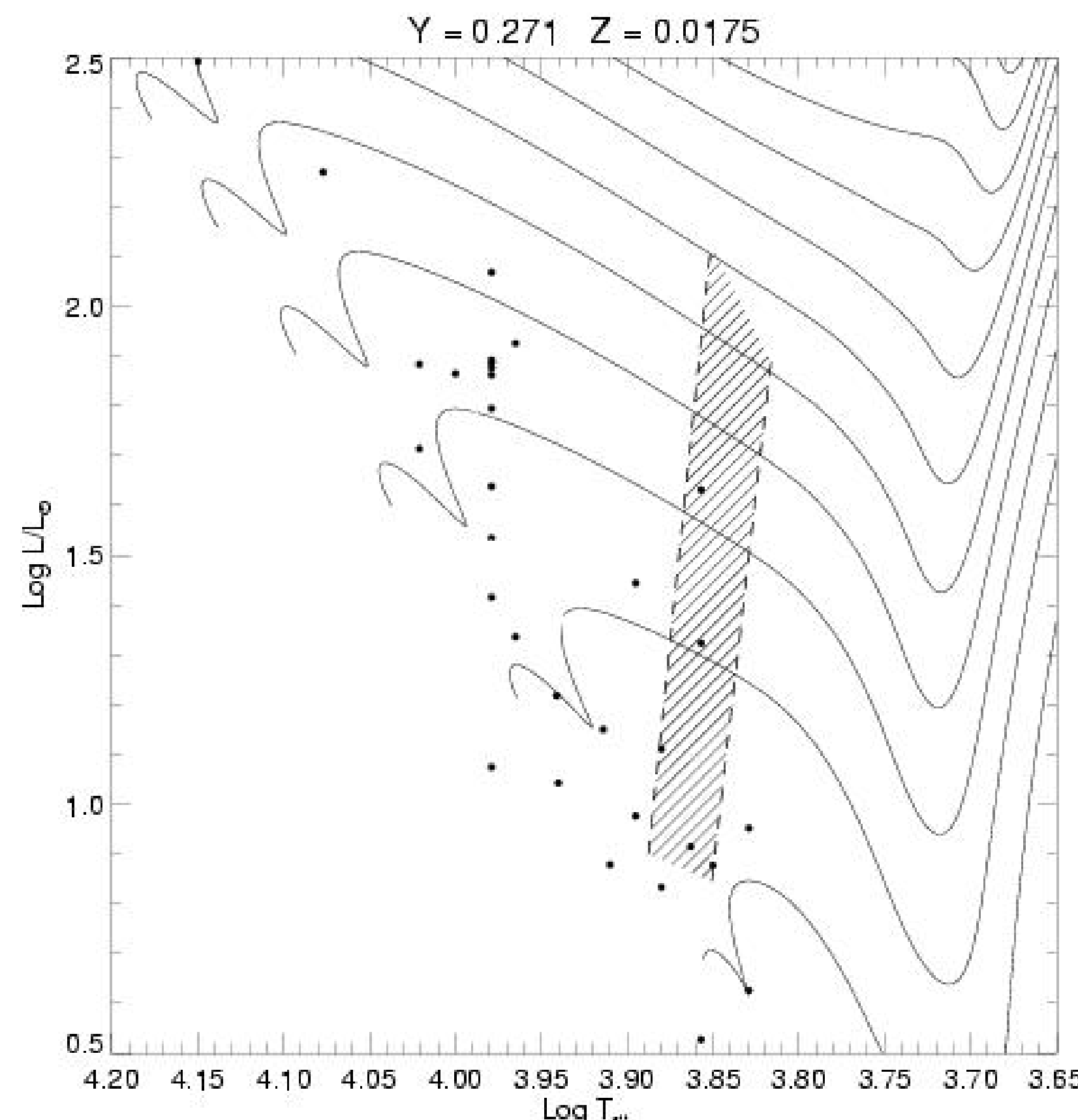


Figure 2: Instability strip superimposed on evolutionary tracks from Vieira (2003) and PDS HAeBe stars.

In this work we present an preliminary analysis of uvby Strömgren photometry for two HAeBe candidate stars HD 144432 and HD 142666, in an attempt to detect pulsational variations.

Observations

The data were collected during four nights in April and May in 2004 using the IAG 60 cm telescope from Laboratório Nacional de Astrofísica (LNA, Brasil) together with a 1024×1024 CCD and uvby filters.

The stars PDS 076 (HD 142666) and PDS 078(HD 144432) were observed during four consecutive nights at least three times in the same night, in different time intervals, because the periods expected cover a range from hours until weeks. The observation log is in Table 1.

Table 1: Observation log for candidate stars and comparison.

OBJECT	R.A.(2000)	DEC.(2000)	V
PDS 076	15 56 40.02	-22 01 40.0	9.3
GSC06199-00552	15 56 25.42	-22 02 37.8	10.6
PDS 078	16 06 57.96	-27:35:08	8.18
CD-2710787	16 04 31.00	-27 41 06	9.32
HD144349	16 06 29.26	-27 42 31.3	9.50
HD144256	16 06	-27 42	9.80

Results

The data reduction was performed in an standard way using the IRAF package. An image of the Strömgren y filter for HD144432 is shown in Figure 3 together with the numbering scheme.

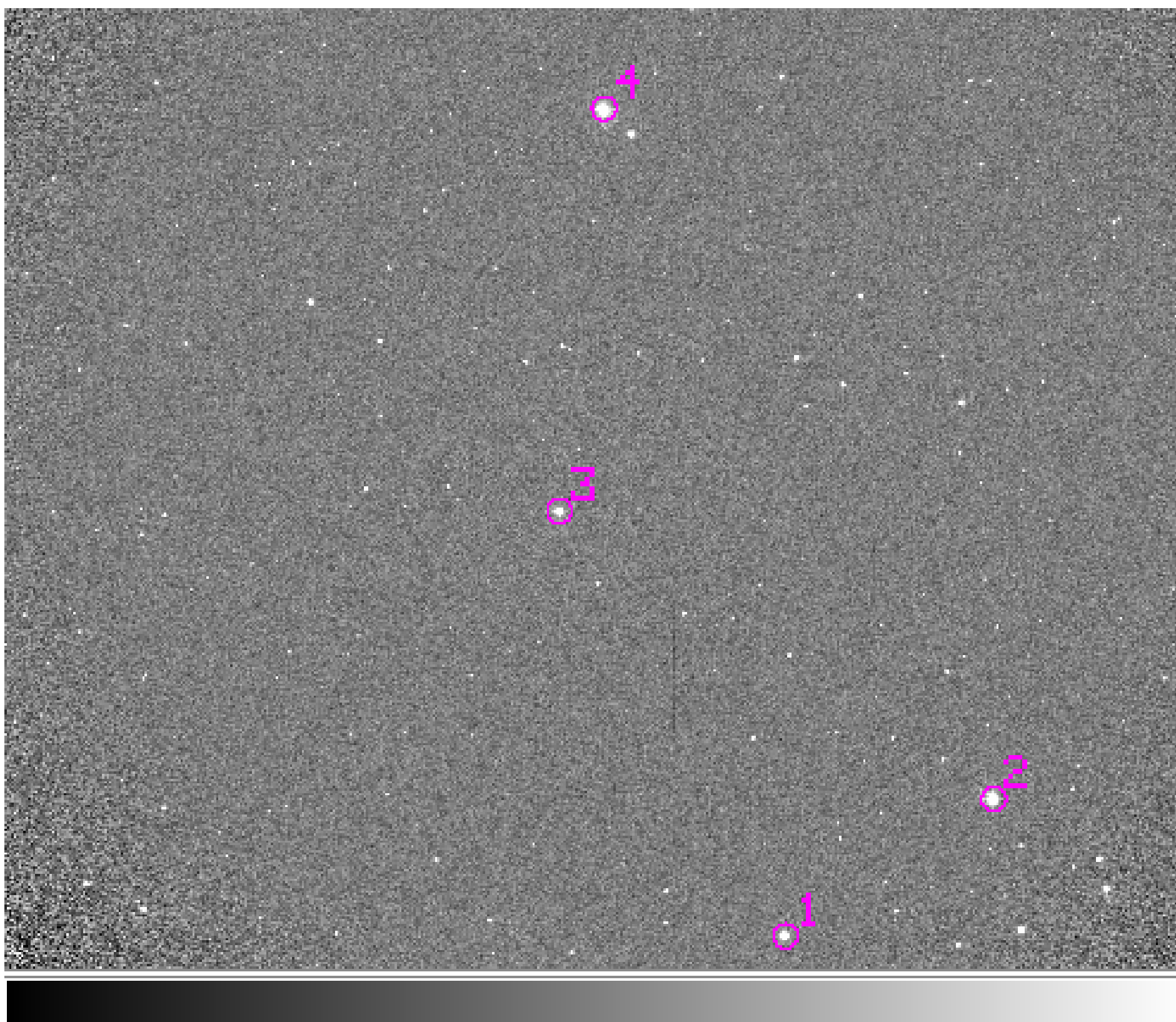


Figure 3: Strömgren y filter for HD144432 (#4) together with the numbering scheme

Figure 4 shows the light curves for the HD144432 and its comparison stars for the nights 29/04/2004, 30/04/2004 and 01/05/2004. As can be seen, star CD-2710787 (#1) and HD144256 (#2) seem to be the best comparison stars. Star HD144349 (#3) shows great variations in this period, specially in May 01st. An inset of the night 01/05/2004 is also given in the lower panel of Figure 4.

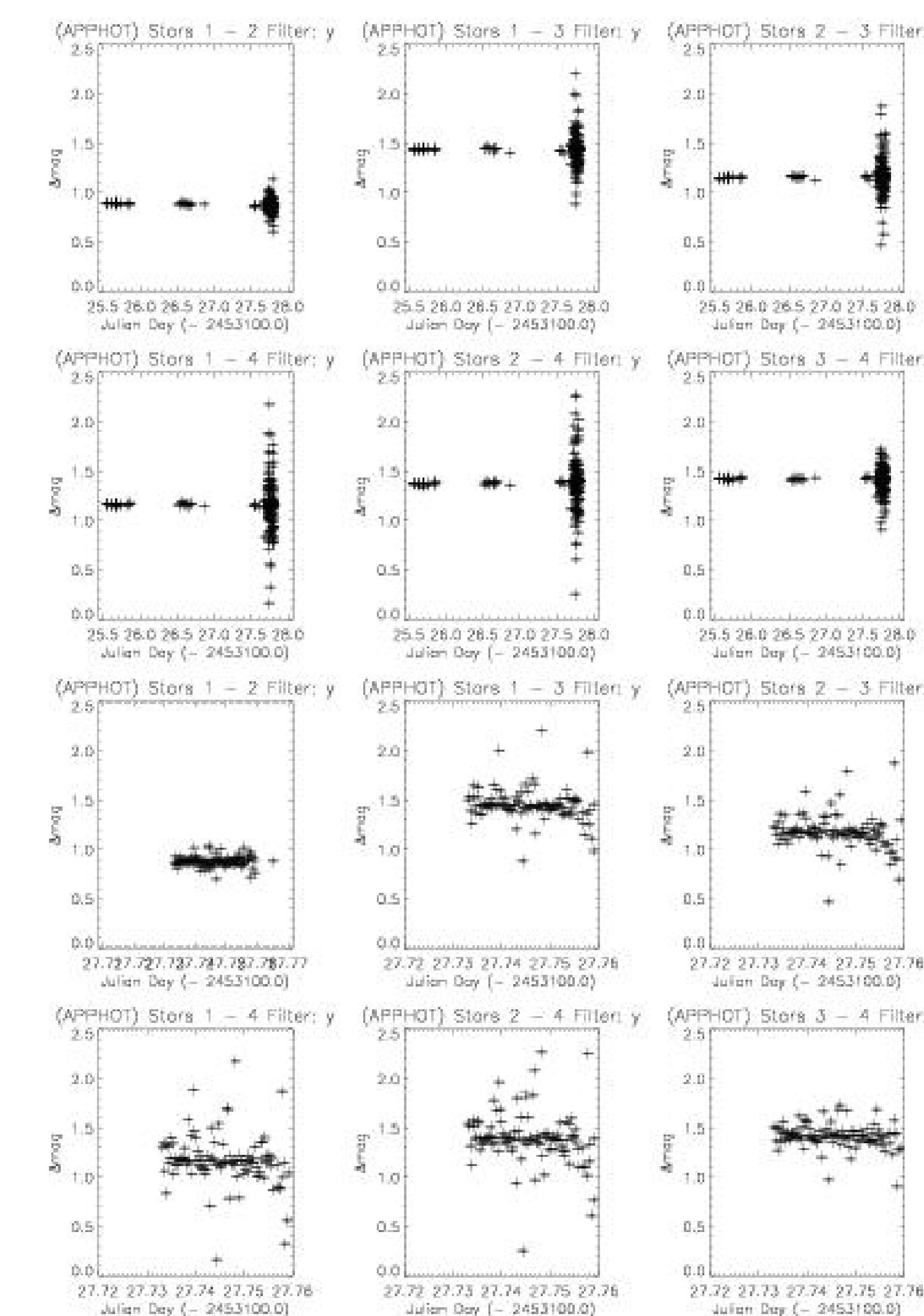


Figure 4: (upper panel) Light curves for HD144432 and its comparison stars for the nights 29/04/2004, 30/04/2004 and 01/05/2004. (lower panel) Inset of the light curve for the night 01/05/2004

HD144432 (#4) presents brightness variations, and we intend to search for pulsational period in the near future. In the case of a positive detection we hope to:

- Contribute to the pulsational PMS stars database;
- Use these data to constrain pulsational theoretical models;
- Estimate physical parameters, such as mass, luminosity and distance, based on their HR diagram positions;

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References

- Kurtz, D. W.; Müller, M. (2001) MNRAS325, 1341
Marconi, M., Palla, F. (1998) AJ507, L141
Marconi, M., Palla, F. (2003) ApJ552, 245
Vieira, S.L.A., Corradi W.J.B., Alencar S.H.P., Mendes L.T.S., Torres C.A., Guimarães M.M., Quast G., da Silva L., (2003) AJ126, 2971
Breger, M. & Pamyatnykh, A.A., (1972) A&A332, 958
Kurtz, D. W.; Marang, F. (1995) MNRAS276, 191