

The STACC 1998 Campaign on Praesepe: The Photometry

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Abstract. This is a preliminary report on the CCD (mainly) photometry of the two δ Scuti stars, BN Cnc and BV Cnc, in the Praesepe open cluster.

1. Introduction

δ Scuti stars offer a unique opportunity to test stellar models with masses close to $2.0 M_{\odot}$. Some of them present us with a rich spectrum of radial and nonradial oscillation modes. Extensive efforts have been spent on observing and analysing such stars in the Praesepe open cluster, where further constraints on the stellar parameters are available such as a common age, common distance and metallicity for the variables (Hernández et al. 1999, and papers cited there). The stars observed in this project have been the target of several observing campaigns (see Arentoft et al. 1998).

A major problem in the study of δ Scuti stars is the identification of modes (Viskum et al. 1998; Breger et al. 1999). The stars rotate rapidly and the frequencies of the modes are strongly affected. Matching model frequencies to the observed ones does not give unique answers for the parameters for the modes (the ‘quantum’ numbers n, ℓ, m). The current project is an attempt to obtain more data that could lead to unique solutions.

2. Observations

The campaign consisted of photometric as well as spectroscopic observations. The list of photometric sites, with telescope size indicated, included:

1. Uttar Pradesh State Observatory, India, $D = 1$ m
2. Konkoly Observatory, Piskéstető, Hungary, $D = 1$ m, $D = 0.6$ m
(Schmidt telescope)
3. Białków Observatory, Poland, $D = 0.6$ m
4. Osservatorio del Teide, Canary Islands, $D = 0.8$ m
5. Sutherland Observatory, South Africa, $D = 1$ m
6. Dutch Telescope, La Silla, Chile, $D = 0.8$ m
7. APT, Fairborn Observatory, Arizona, USA (photoelectric), $D = 0.8$ m

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8. JKT, La Palma, Canary Islands, $D = 1$ m
9. Observatoire de Haute Provence, France, $D = 0.8$ m
10. Odessa Astronomical Observatory, Ukraine, $D = 0.5$ m

Except for one site, differential CCD photometry was used, which allows simultaneous observations of two stars, BN and BV Cnc. The observing season was not good and less data were acquired than foreseen. An example of a light curve for BN Cnc is shown in Fig. 1.

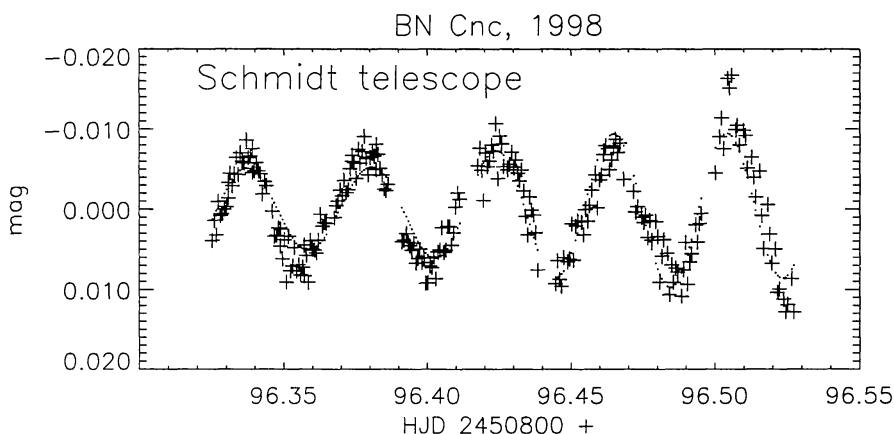


Figure 1. Light curve obtained with the Schmidt telescope at Konkoly Observatory

3. Technical Details

The target presents some difficulties: the reference stars are fainter and fairly close to the variable stars. Defocusing is needed to get a decent duty cycle. The data merging is difficult due to the use of different filters and detectors. There is a large range in data quality among datasets.

The analysis of the time series is still not complete. A number (> 5) of modes are detected in each δ Scuti star, most known already, down to a detection level around 0.5 mmag. The highest amplitudes are 2–3 mmag. A more detailed description will appear later.

We conclude that two extensive time series have been obtained for BN and BV Cnc, which characterise the mode spectrum to very low amplitudes.

References

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