

First Results of the 17th DSN Campaign: Photometry of XX Pyx

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Abstract. We present the first results from multi-site observations of the δ Scuti star XX Pyx (CD-24°7599). The observations were carried out as the 17th run of the Delta Scuti Network. We collected 583 hr of B, V time-series photometry, resulting in a detection level (4σ) in the amplitude spectrum of 0.5 mmag. We detect 6 new pulsation frequencies, bringing the total number of frequencies known in this star up 19.

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1. Introduction

The purpose of multi-site network observations of δ Scuti stars is to obtain detailed information on the often very complicated frequency spectrum found in this type of star, and to use the detected frequencies for asteroseismology. XX Pyx is an unevolved main sequence δ Scuti star, which means that it has a simple predicted frequency spectrum. The star has been observed extensively with the Whole Earth Telescope (WET, Nather et al. 1990), and 13 pulsation frequencies were known before this campaign (Handler et al. 1997). XX Pyx is very interesting for asteroseismological purposes, since it is predicted to have mainly p modes excited, but also one (and just one) g mode, containing information about the stellar core (Dziembowski & Pamyatnykh 1991).

2. Observations and Data Reduction

The observations were carried out from 1998 January 15 – April 6, using 13 telescopes at 9 different sites around the globe. Both CCDs and PMTs were used, and the data were taken through the Johnson *V* (CCD) and *B* (PMT) filters. Two filters were used in order to obtain information on the nature of the detected modes (mode-identification). We collected 583 hr of time-series photometry, corresponding to a total coverage of 25%. During one week the coverage was 82%. The CCD frames were reduced using MOMF (Kjeldsen & Frandsen 1992), and the PMT measurements were reduced using the star SAO 176755 as a comparison star. The quality of the data is good and very homogeneous, σ_{rms} in the light curves is 2–3 mmag (CCD) and 3–4 mmag (PMT).

3. Results

The present detection level (4σ) in the amplitude spectrum is about 0.5 mmag, which allows us to detect 6 new frequencies in the spectrum. This brings the total number of frequencies known in this star to 19. Three new linear combination frequencies have also been detected. The detection level is higher than what can be expected from the dataset, which could be due to amplitude and frequency variations, seemingly present on a time scale shorter than the duration of the campaign. Such effects require a detailed nonlinear analysis, which will be presented later. We have evidence for at least 5 additional frequencies, but they are not detected in the present (linear) analysis. The frequencies and other results from the campaign will be published by Handler et al. (1999).

References

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