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Follow-up observations of pulsating subdwarf B stars

M.D. Reed, A.-Y. Zhou, S.L. Harms, G.W. Wolf[1], D.M. Terndrup, D. An[2], D. Kilkenny[3], C.-W. Chen, W.-P. Chen, H.-C. Lin[4], S. Zola, A. Baran, W. Ogloza, M. Siwak[5], K.D. Gazeas, and P.G. Niarchos[6]

[1] Department of Physics, Astronomy, and Materials Science, Missouri State University, 901 S. National, Springfield, MO, 65804 USA
[2] The Ohio State University, 140 W. 18th Avenue, Columbus, OH 43210, USA
[3] South African Astronomical Observatory, Cape Town, South Africa
[4] Graduate Institute of Astronomy, National Central University, Chung-Li, Taiwan
[5] Mt. Suhora Observatory of the Pedagogical University, ul. Podchorążych 2, PL-30-084 KraKow, Poland
[6] Department of Astrophysics, Astronomy and Mechanics, Faculty of Physics, University of Athens, GR 157 84, Zografos, Athens, Greece

Abstract. We present follow-up observations of pulsating sdB stars as part of our efforts to resolve the pulsation spectra for use in asteroseismological analyses. This paper reports on our overall efforts, but specifically on our results for the pulsating sdB stars PG 1618+563 and EC 05217-3914.

Key words. Stars: pulsating – Stars: asteroseismology – Individual: PG1618+563 – Individual: EC05217-3914

1. Introduction

The scientific goal of this observational study is to resolve the pulsation structure of pulsating sdB stars by combining limited amounts of data from larger telescopes with data from smaller (~0.5 m) telescopes. This combination allows us a long timebase sufficient to resolve closely spaced pulsations and the increased signal-to-noise of the larger telescopes allows us to detect pulsations with low amplitudes. To date we have observed 14 different sdB pulsators over 23 separate campaigns. Though the majority of our data is from Baker, MDM, and McDonald observatories, we routinely participate in multisite collaborations, including the Whole Earth Telescope.

2. EC 05217-3914

EC 05217-3914 (hereafter EC 05217) was observed as a 2-site campaign during a Whole Earth Telescope run. 59 hours of observations were obtained in November 1999 from the CTIO 1.5 m and SAAO 1.9 m telescopes. Koen et al. (1999) detected 3 frequencies in their discovery data, while we detect 6, possibly 8. The Fourier transform (FT) is shown in Fig. 1 and frequencies detected are given in Table 1.

Send offprint requests to: M.D. Reed

Table 1. Periods, frequencies, and amplitudes for EC 05127. Formal least-squares errors are in parentheses. Periods marked with a † may be caused by amplitude variability in a nearby frequency. Periods marked with a ⋆ are near those detected in the discovery data.

Period (s)	Frequency (μHz)	Amplitude (mma)
208.455(0.005)	4797.19(0.11)	0.83(15)
209.274(0.006)	4778.41(0.13)	0.72(15)
213.964(0.005)†	4673.68(0.12)	0.98(15)
214.023(0.003)⋆	4672.39(0.08)	1.45(15)
216.012(0.001)⋆	4629.36(0.03)	3.88(17)
216.146(0.005)†	4626.48(0.11)	1.15(17)
217.629(0.001)⋆	4594.96(0.03)	2.79(15)
221.980(0.007)	4504.90(0.14)	0.69(15)

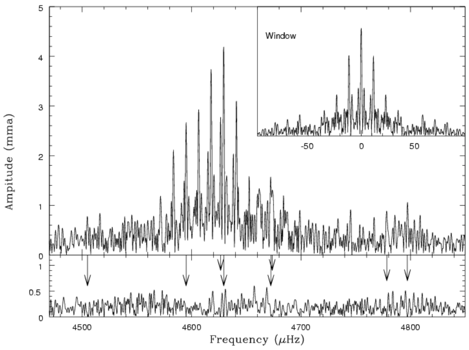

Fig. 1. FT of EC 05217 data. Window is inset and bottom panel shows residuals.

3. PG 1618+563

PG 1618+563 (hereafter PG 1618) was observed from 5 observatories (Baker, MDM, McDonald, Lulin, and Suhora) over a 45 day period in 2005. Silvotti et al. (2000) detected 2 frequencies in their discovery data while we clearly resolve 4 individual frequencies. Figure 2 shows shows an FT of the original data (window function is inset) and prewhitened data (arrows indicate frequencies removed)

Table 2. Same as Table 1 for PG 1618.

Period (s)	Frequency (μHz)	Amplitude (mma)
128.9549(0.0008)	7754.64(0.05)	1.71(0.09)
139.0571(0.0008)⋆	7191.28(0.04)	2.04(0.09)
143.9290(0.0011)⋆	6947.87(0.05)	2.22(0.10)
143.9759(0.0014)	6945.60(0.07)	1.64(0.10)

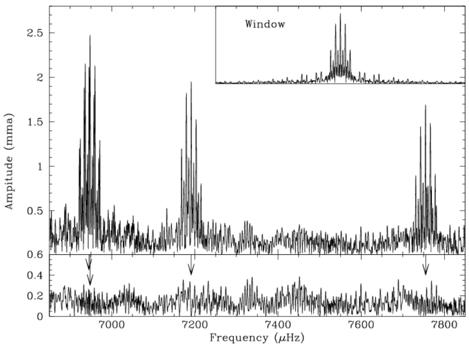

Fig. 2. FT of PG 1618 data. Window is inset and bottom panel shows residuals.

with the frequencies provided in Table 2.

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