Anomalous Cepheids Among Short Period Type II Cepheids in the Milky Way

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The number of Anomalous Cepheids (ACs) in the Milky Way has risen significantly in recent years. Inspired by this we have looked into 59 short period Type II Cepheids (T2Cs), the so-called BL Herculis stars (BLHs), and found 19 ACs among them.

1 Introduction

The BL Herculis stars (BLHs) are pulsating stars with periods between 1 and 4 days and with masses around $0.5 - 0.6\,\mathrm{M}_{\odot}$, while the Anomalous Cepheids (ACs) have a period range of 0.3 to 3 days and masses $1.2 - 1.8\,\mathrm{M}_{\odot}$. In the OGLE-III catalog (Soszyński et al., 2008, 2010b,a) these variables have been found in the Large and Small Magellanic Clouds (LMC and SMC), and they clearly form separate period-luminosity (PL) relations.

2 Method

We calculated the V-band Fourier parameters (R_{21}, R_{31}, Φ_{21} and Φ_{31}) for the OGLE-III LMC BLHs and ACs, and used it as a comparison sample, since their classification can be cross-checked with their position on the PL relations. Once we established this sample we calculated the V-band Fourier parameters for the Milky Way stars, and compared the two. Where the Fourier parameters showed a match, we double checked our claim for the new classification through the visual inspection of the light curve shapes. The Fourier analysis was done using Period04 (Lenz & Breger, 2004). The details on the analysis and results will be published in an upcoming article (Jurkovic, in prep.).

3 Results

The new ACs are: FY Aqr, V563 Cen, PP Tel, DF Hyi, BH Cet, BI Tel, V2733 Oph, CE Her, MQ Aql, V745 Oph, UY Eri, UX Nor, and one possible first overtone AC: V742 Cyg. We confirm additional six ACs found in CSS: FY Vir, V716 Oph, BF Ser, VX Cap, XX Vir, V1149 Her. Only three objects had direct [Fe/H] measurements in the literature (V716 Oph: −1.87 (Soubiran et al., 2016), BI Tel: −1.96 (Layden,

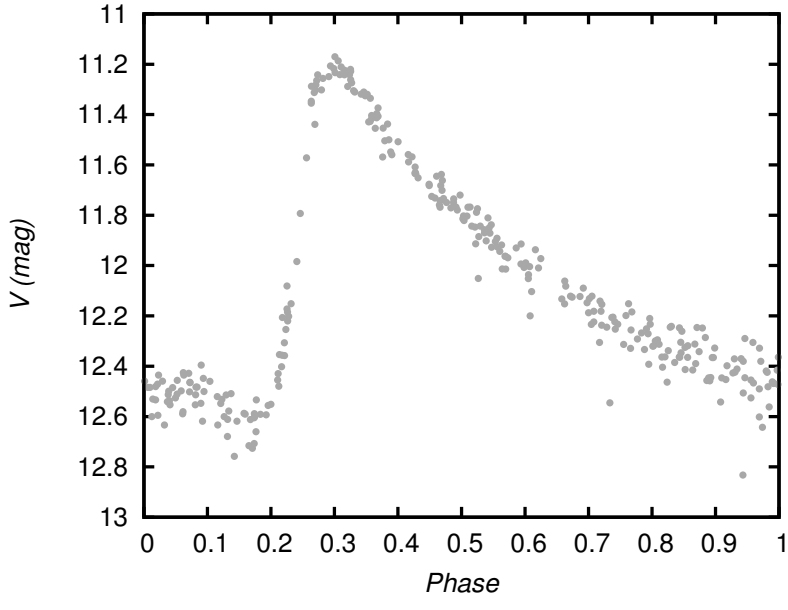

Fig. 1: Phased light curve of BF Ser with period $P = 1.165$ d, using data from the ASAS-3 catalog (Pojmanski, 1997).

1994), and UY Eri: −1.430 (Soubiran et al., 2016), 0.01, 0.10, 0.30 (Schmidt et al., 2011) and −1.8 (Maas et al., 2007)), but the indication is that they are metal-poor objects. A phased light curve of BF Ser is given in Figure 1, as an example.

Acknowledgements. This research had financial support from the Ministry of Education, Science and Technological Development of the Republic of Serbia through the project 176004, and by the NKFIH K-115709 grant of the Hungarian National Research, Development and Innovation Office.

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