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Follow-up campaign of the Blazhko star RR Lyr

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Abstract

Stars with changing Blazhko periods challenge the currently proposed hypotheses for the Blazhko effect. RR Lyr, the prototype of the class, is one of the best-studied Blazhko stars but it keeps on surprising its observers. We present the first results from a photometric follow-up campaign in 2006-2007 of the star. Multicolour data were gathered from 4 different observatories in the northern hemisphere. Our analysis focuses specifically on the period behaviour. We confirm the previously reported decrease of the modulation period.

Individual Objects: RR Lyr

Several Blazhko stars are known to have shown changes in their Blazhko period (e.g. XZ Cyg, see LaCluyzé et al. 2004). The prototype of the class, RR Lyr, is also known to have a changing Blazhko period. This was most recently reported by Kolenberg et al. (2006), who discussed photometric data of RR Lyr in 2003-2004 and found a Blazhko period of about 39 days, considerably smaller than the previously known 40.8 days. We kept a close eye on RR Lyrae over the past years.

Our observations were obtained in 2006 and 2007 from Michelbach (Austria), Athens (Greece), Ankara (Turkey), and Wichita (Kansas, US). The new ephemerides are rather different from the one we obtained from our 2003-2004 data, especially for the Blazhko maximum. This may not only be due to a change in the Blazhko period, but also to the start of a new 4-year cycle in RR Lyr.

$$\mathrm{HJD}(T_{\mathrm{max}}) = 2453992.591 + 0.566885 \times E_{\mathrm{puls}}$$
$$\mathrm{HJD}(T_{\mathrm{Bl.max}}) = 2453992.591 + 38.1 \times E_{\mathrm{Blazhko}}$$

Using Period04 (Lenz & Breger 2005), we clearly detected the triplet structures typical for Blazhko stars and found in the earlier frequency analyses of RR Lyrae. Compared to our data set from 2003-2004, we obtain different values for the main frequency and the Blazhko frequency. The differences are small but significant. The results obtained with the VSAA (see Kolenberg & Tsantillas, 2008) also confirm our observations of a shorter Blazhko period.

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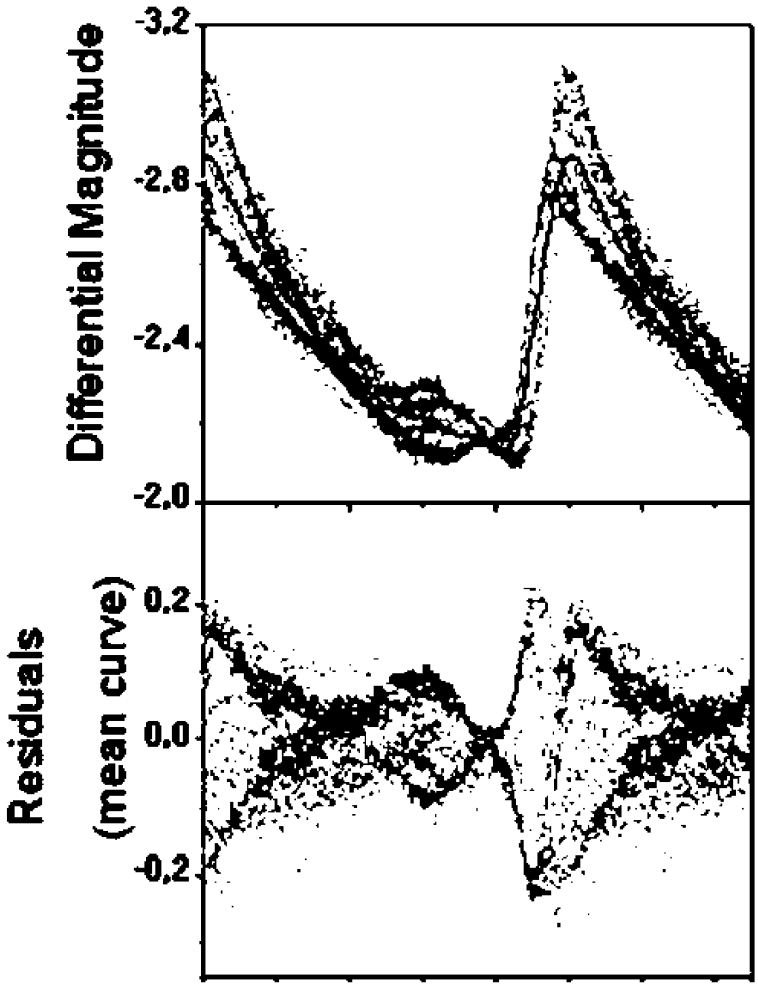

Figure 1: Upper panel: folded light curve of our RR Lyr data in the Johnson *V* filter. The full line represents the mean light curve. Lower panel: residuals after subtracting the mean light curve.

References

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