

Blazhko variables – recent results

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Abstract

The light curve modulation of a fraction of the RR Lyrae stars is still one of the unexplained phenomena of stellar pulsation. The suggested models cannot explain even the most prominent observed properties of the light variation.

During the past five years 90% of the observing time on the 60 cm automatic telescope of Konkoly Observatory was dedicated to observing RR Lyrae stars, especially those showing Blazhko modulation. In the course of the Konkoly Blazhko Survey we have obtained the densest and most extended standard multicolour photometric observations of about a dozen Blazhko variables. Detailed analyses of our observations of RR Gem, SS Cnc and MW Lyrae have already been published (Jurcsik et al. 2006a, 2006b, 2008), while similar studies of many other Blazhko variables are in progress. These data allow us to detect previously unknown properties of the modulation which help to gain more complete insight into the phenomenon.

Some of the most important new achievements obtained in the course of our studies are the following:

- Contrary to previous results, which described the light variation with triplet frequencies at the main pulsation component and its harmonics, we detected quintuplet and even more complex modulation frequency patterns in the Fourier spectra of Blazhko variables (Hurta et al. 2008, Jurcsik et al. 2008).
- Contrary to previous assumptions that the amplitude of the modulation is relatively large in all Blazhko variables we detected small amplitude modulations as well (Jurcsik et al. 2006a, 2006b).
- Contrary to previous results we detected modulations with periods as short as some days (Jurcsik et al. 2006a, 2006b). This result warns that those automatic selections of Blazhko variables which search for modulation frequencies e.g., only in the 0.1 c/d vicinity of the pulsation frequencies (e.g., Collinge et al. 2006) are biased by artificial omission of short period modulations.
- Our extended multicolour photometric data of Blazhko variables which fully cover the pulsation light curves in different phases of the modulation make it possible to determine the changes in the global mean properties of the stars connected with the modulation cycle (Jurcsik et al. 2009) using an inverse photometric Baade-Wesselink method developed by Sódor et al. (2009).

These results may have crucial importance in finding the correct physical explanation of the Blazhko effect more than hundred years after its discovery.

Individual Objects: RR Gem, SS Cnc, MW Lyrae

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