

AH Cam: An RR Lyr (Double Mode?) Star with Blazhko Effect

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Abstract. We report here the discovery of a new frequency not belonging to the Blazhko series and suggest an interpretation based on coupling between a radial and a nonradial mode from multicolor observations.

New multicolor observations from Korea and Spain show that the frequency solution for AH Cam is well described, as already shown by Smith et al. (1994), by a series of triplets centered at the main frequency 2.71 d^{-1} and its multiples, separated by the beat frequency at around $1/11 \text{ d}^{-1}$. These triplets are symmetric in frequency, but clearly not symmetric in amplitude and are present around each multiple of the main frequency. A DFT of the residuals shows the presence of a new frequency, not belonging to the triplet series, at 5.4 d^{-1} which could be a reasonable value for a third radial overtone.

In the T_{eff} and $\log g$ range of the RR Lyr stars, multicolor observations in the Strömgren photometric system can be useful to discriminate modes as described in Garrido, Garcia-Lobo, & Rodríguez (1990). For radial modes a positive phase difference between v and y is predicted, whereas a negative value is predicted for any $\ell \neq 0$ nonradial mode. The extremely small values of these phase differences allow us to calculate significant values only for the higher power frequencies. We find a positive value for f_a , the main radial frequency, and $2f_a$, and negative values for f_0 , the Blazhko frequency, and $f_a + f_0$, the positive interference with the main frequency. This could be an observational indication that the Blazhko effect is a coupling of a radial mode with a nonradial one as theoretically suggested by Van Hoolst, Dziembowski, & Kawaler (1998).

References

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