

## **BVR<sub>C</sub>I<sub>C</sub> Observations of the Dwarf Nova AH Her during 2005**

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*SIMBAD object(s):*     [AH Her](#)

*Type(s):*     CWA

*Keyword(s):*   photometry

*Abstract:* In this paper we report BVRI observations of the dwarf nova AH Her during some outbursts occurred in 2005.

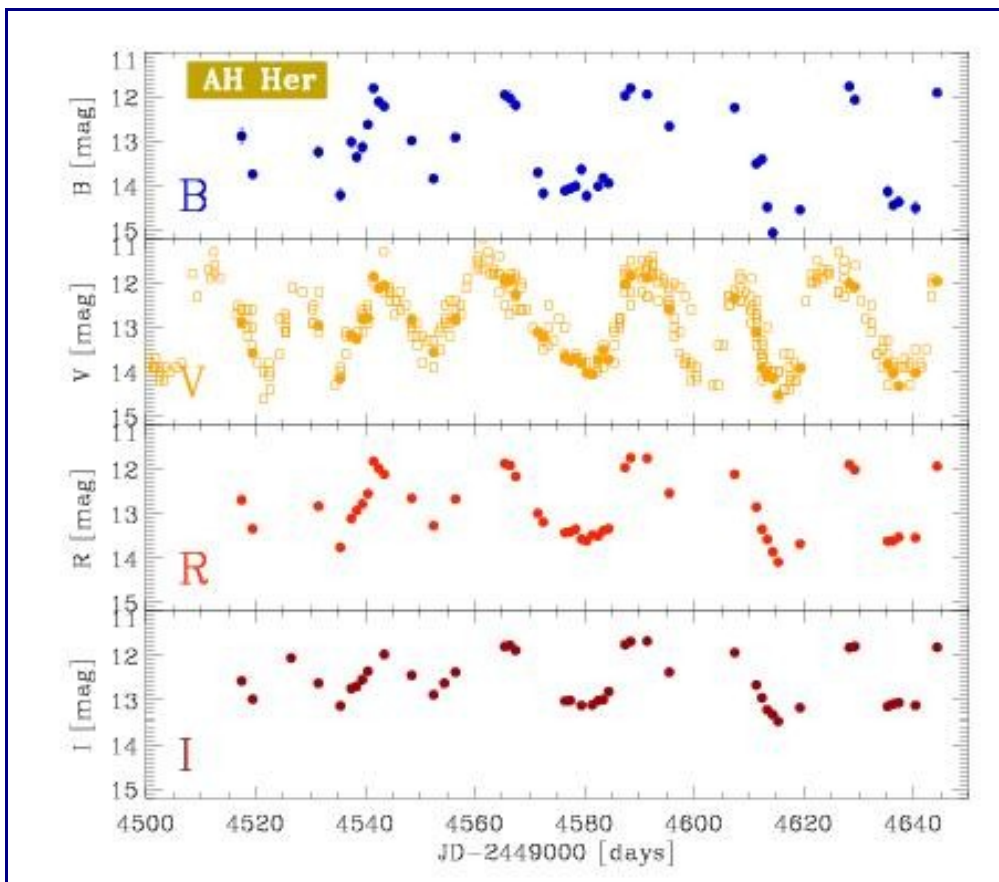
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AH Her belongs to the subclass of dwarf novae (DNe) named by the group prototype Z Cam. DNe in general are cataclysmic variable stars characterized by the presence of sudden increases of brightness (2-5 mag, outbursts) in the optical light curve, and consist of a white dwarf (primary) star accreting matter from a red dwarf (mass donor), which is in contact with its Roche lobe. Outburst intervals for each object are quasi-periodic, but within the DN family, intervals can range from days to decades. In particular stars like AH Her (Z Cam subclass) display intervals of outbursts as well as phases of steady brightness (known as standstill stages). AH Her varies in magnitude between  $V=14.7$  to  $V=13.9$  at minimum, while in the outburst the star may reach the value of  $V=11.3$ . During the standstill stages the brightness value is swinging about  $V=12.0$  magnitude (Ritter & Kolb, 1998). The recurrence time ( $T_c$ ) between two outbursts varies of 7-27 days (for a review see Spogli et al., 2001, and references therein). In particular an increase of  $T_c$  accompanied by a slow brightening of the mean  $V$  magnitude was reported recently by Simon (2004), while accurate radial

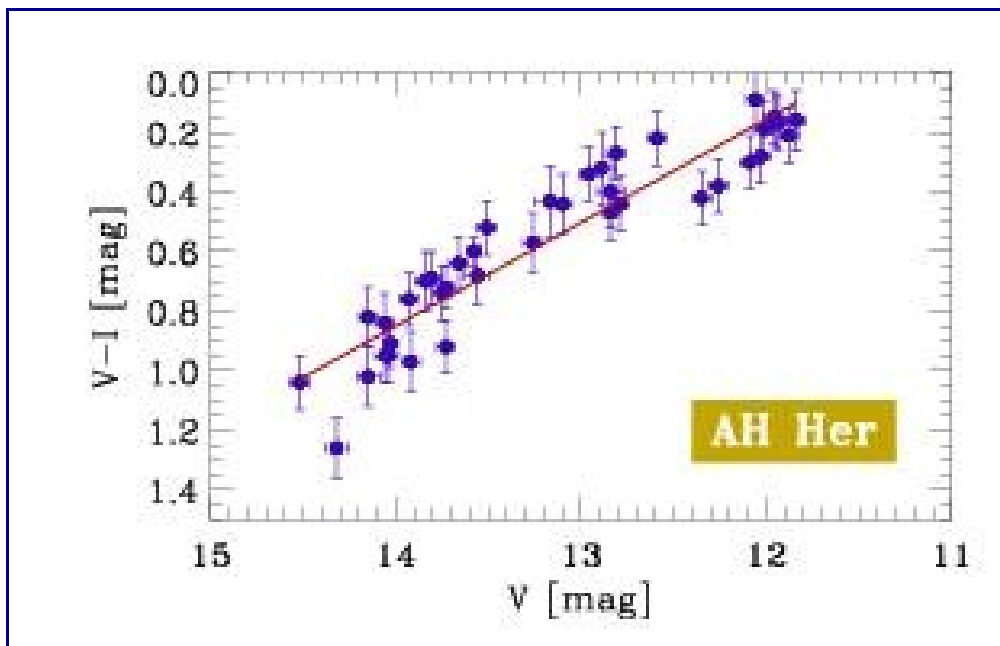
velocity determinations of the AH Her system can be found in North et al. (2002).

Table 1

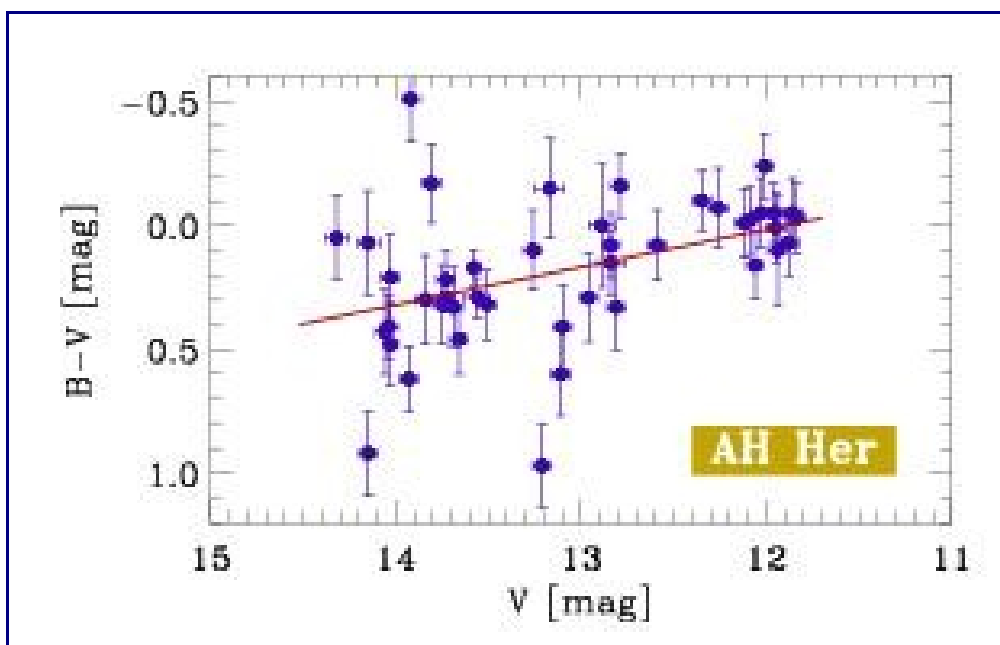
	B	V	R <sub>C</sub>	I <sub>C</sub>
Maximum outburst	11.77±0.08	11.84±0.05	11.74±0.05	11.67±0.04
Minimum of light	15.07±0.12	14.52±0.05	14.09±0.05	13.48±0.05
Mean values at minimum	14.2±0.3	13.9±0.3	13.5±0.2	13.1±0.1
Mean values at maximum	12.1±0.2	12.0±0.1	11.9±0.1	11.8±0.1
Outburst amplitude	3.2	2.6	2.4	1.8
Decay rates (mag/day)	0.27±0.12	0.22±0.05	0.18±0.05	0.16±0.05
	B-V	V-R <sub>C</sub>	R-I <sub>C</sub>	V-I <sub>C</sub>
Mean values at Maximum	-0.03	0.08	0.14	0.23
Mean Values at Minimum	0.36	0.34	0.49	0.83



BVR<sub>C</sub>I<sub>C</sub> light curves of AH Her from 25 May 2005 to 30 September 2005 assembled with our original data (filled circle symbols). The available V-band data from the AFOEV database are also reported for a comparison (open square symbols). Time expressed in Julian Days is reported in the X-axis



The V-I colour index variations of AH Her plotted against the V magnitude. The star appears to be redder in quiescence and data are well represented by a simple linear trend



The B-V colour index variations of AH Her plotted against the V magnitude. The scattering in the data (owed to the smaller precision in B data when the star is faint, and possibly to some loop patterns) is evident, even if the bluer when brighter general trend is still identifiable

In this brief paper we present results of our intermittent observations of AH Her made in the year 2005 at the Astronomical Observatory of the Perugia University and the Porziano amateur observatory. Observations were performed in the B, V (Johnson), and  $R_C$ ,  $I_C$  (Cousins) photometric bands. Instruments and photometric techniques used at the Perugia Observatory are already described in Spogli et al. (1998), while the calibration stars are reported in Spogli et al. (2001). In the Porziano Observatory we used a 0.30-m Schmidt-Cassegrain  $f/6.5$  telescope, equipped with an AP-32ME CCD camera (Kodak 3200-ME,  $2184 \times 1470$  pixels). AH Her was monitored from

26/05/2005 to 30/09/2005 for a total of 48 photometric nights (Figure 1). Our data are reported in Table 2, which is available electronically through the IBVS website as file 5727-t2.tex, while in Table 1 the main characteristics of our dataset (improving the values reported in our previous publications) are outlined. We computed the continuum spectral slope using the same procedure described in Spogli et al. (1998). We found a value ranging from 0.6 to 1.1, with a mean value equal to  $0.7 \pm 0.2$ .

Table: [5727-t2.tex](#)

Data file: [5727-t2](#)

The results presented here are part of a project devoted to gain multi-band light curves of a sample of DNe, with the goal of increasing the historical database and information on this class of cataclysmic variables which can help to constrain theoretical models. Figure 2 and Figure 3 show the colour-indices versus magnitude diagrams for AH Her: obviously the star is bluer during the outburst and redder in quiescence stages, but it is worth to note that the data seem to be well represented by a linear regression (at least for the V-I plot, characterized by higher precision photometric data), and there is not a loop typical of other DNe (see, for example, Spogli et al., 2000a, 2000b). On the other hand the larger scattering in the B-V plot might also be produced by few loop patterns produced during outburst. A study of this behaviour is underway, even if the statistics is poor.

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