

**PERIOD ANALYSIS OF THE H α LINE PROFILE VARIATION
OF THE Be BINARY STAR π Aqr**

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The spectrum of the classical, rapidly rotating ($v \sin i \sim 300$ km/s) Be binary star π Aqr (HR 8539) has been already investigated photographically since 1911 (Merill, 1913, Lockyer, 1924, 1928).

The star is now well-known for its transition from a Be- to a normal B-star phase and for strong long-term and short-term V/R variations of the hydrogen Balmer line profiles. In many Be-stars, the emission line profiles occasionally have the shape of asymmetrically double peaks. For characterizing the asymmetry, the maximum intensity of the short-wave (violet) peak of the line is marked with V (in intensities of the continuum), and the long-wave (red) peak is marked with R . As quantitative dimension for the asymmetry of line profiles, the intensity ratio is indicated as V/R .

The V/R measurements in the H α spectra of the binary star π Aqr obtained between October 2004 and August 2011, together with the available spectra of the data base BeSS (<http://basebe.obspm.fr/basebe>) were subjected to an analysis of a possible periodic behavior using the program AVE (<http://www.astrogea.org/soft/ave/aveint.htm>).

Figure 1 shows the V/R time behaviour in eight visibility phases, Figure 2 shows a dominant frequency with a period of 83.8 ± 0.8 day in the power spectrum, and Figure 3 shows the phase diagram based on ephemeris: $JD\ 2\ 453\ 280.0 + 83.8(\pm 0.8) \cdot T$.

This period falls suspiciously near to the orbital period of 84.1 ± 0.004 day of the binary system (Bjorkman et al., 2002). Thomas Rivinius (ESO) confirms this period in his spectra, from phases almost without emissions (private communication, Nov. 2010). The cause for the found periodicity is the “traveling emission component”, as it was found and examined in the paper of Bjorkman et al. (2002) in B-phase of the star.

Since π Aqr is still well visible at present, it would be desirable, if potential observers could dedicate themselves to this star. In addition, spectra, which have not been deposited in data base BeSS so far, would contribute for completion of this analysis.

References:

- Bjorkman K. S., Miroshnichenko A. S., McDavid D. & Pogrosheva T., 2002, *ApJ*, **573**, 812
Lockyer W.J.S., 1924, *MNRAS*, **84**, 409
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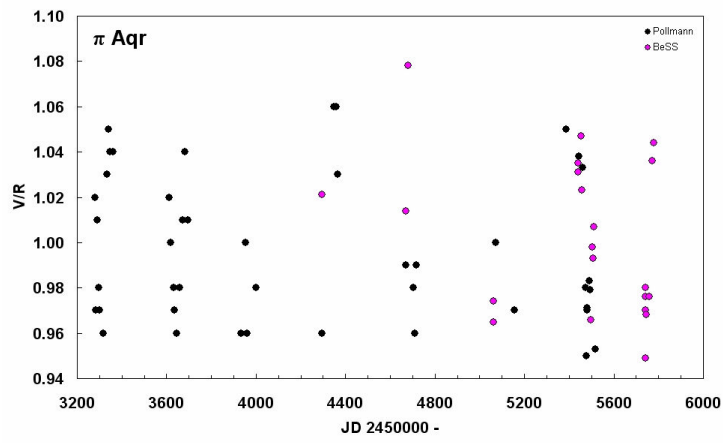


Figure 1. The V/R time behaviour in eight visibility phases.

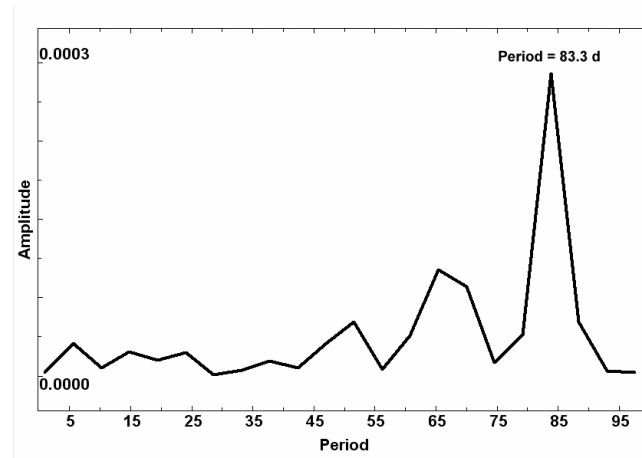


Figure 2. Power spectrum of the V/R data.

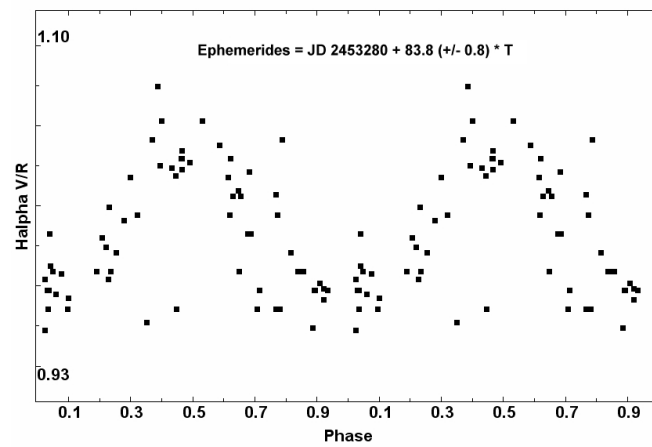


Figure 3. Phase diagram of the V/R data.