AXMon (HD 45910) kinematical parameters in the Fe II spectral lines as a function of the excitation potential

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Introduction

AX Monocerotis (HD45910=BD+5o, 1267=SAO13974, a=6h 27m 52s, δ=+5o, 54′,1 (1950), V=6,59-6,88 mag) is a binary system [1] consisting of a B2e III star and a some what fainter K0 III star, with an orbital period of 232.5 days [2, 3] and a variable spectrum [4, 5].

Danezis et al. [6, 7, 8] studied the UV spectrum of the system at phase 0.568 and detected the existence of two satellite components at the violet side and one at the red side of the main absorption lines, indicating that the envelope consists of four independent layers of matter. In the Fe II region they found three levels of values of radial velocities. The first level has values about -10 km/s, the second level has values about -72 km/s and the third level has values about -250 km/s. Danezis et al. [9, 10] proposed the so called Gaussian-Rotational (GR) model. By applying this model we calculate the apparent rotational and radial velocities, the random velocities of the ions, as well as the Full Width at Half Maximum (FWHM) and the column density of the independent density regions of matter which produce the main and the satellite components of the studied spectral lines.

In this paper we apply the above mentioned model and calculate the radial, rotational and random velocities for a group of Fe II lines with values of excitation potential between 0.35 to 3.75 eV.

Results and Discussion

In Figure 1, we give as an example the fit of the λ 2607.086 Å Fe II spectral line. We can see that the observed complex structure can be explained with SACs phenomenon.

In Figure 2, 3 and 4 we present the variation of the radial, rotational and the random velocities of the studied group of Fe II lines as a function of the excitation potential respectively. As we can see we detected three levels of radial velocities (Fig.2). The first level has values about -260 km/s (black circle), the second one has values about -125 km/s (rot circle) and the third one has values about -18 km/s (green circle). These values are in agreement with the respective values found by Danezis et al. [8]. The values of the rotational velocities (Fig. 3) for all SAC are between 20 and 60 km/s. Finally we detected three levels of the random velocities of the ions (Fig. 4). The first level has values about 115 km/s (black circle), the second one has values about 70 km/s (rot circle) and the third one has values of 35 km/s (green circle).

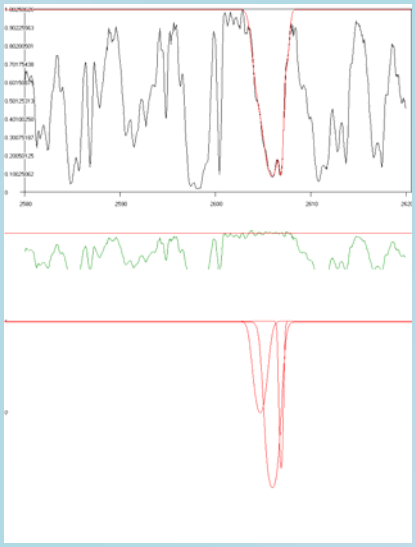

FIGURE 1. Best fit of the λ 2607.086 Å Fe II spectral line. We can explain the complex structure of these lines as a DACs or SACs phenomenon. Below the fit one can see the analysis (GR model) of the observed profile to its SACs.

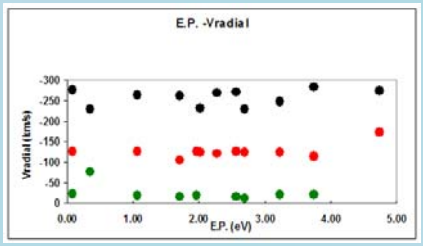

FIGURE 2. Rotational velocities of the studied group of Fe II spectral line as a function of the excitation potential.

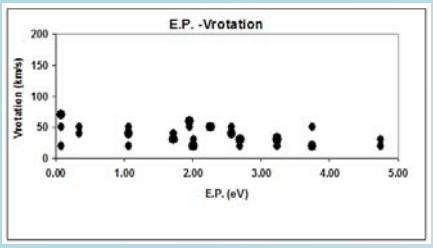

FIGURE 3. Rotational velocities of the studied group of Fe II spectral line as a function of the excitation potential.

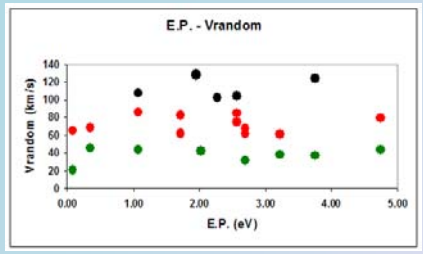

FIGURE 4. Random velocities of the ions of the studied group of Fe II spectral line as a function of the excitation potential.

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