10th Hel.A.S Conference
Ioannina, 5-8 September, 2011
CONTRIBUTED POSTER

Time scale variations of CIV resonance lines in HD 24534

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1 Introduction

As it is well known, many lines in the spectra of hot emission stars (Be, Oe), such as HD 24534, present peculiar and very complex profiles. In order to explain this complexity Danezis et al. (2007) constructed a model (GR model) that proposed the idea that the whole observed feature of these profiles is not produced by a uniform atmospherical region, but by a number of components, which are created in different regions that rotate and move radially with different velocities (Danezis et al. 1991, 2007, Lyratzi et al. 2003, 2007). These components were named Discrete Absorption Components or Satellite Absorption Components (e.g. Doazan 1982, Danezis et al. 1991, Doazan et al. 1991, Lyratzi et al. 2007, Danezis et al. 2007). Using the GR model we can calculate the values of a group of physical parameters, such as the apparent radial and rotational velocities, the random velocities of the thermal motions of the ions, as well as the full width at half maximum (FWHM) and the absorption energy of the independent regions of matter which produce the main and the satellite components of the studied spectral lines. In our study, using the GR model (Danezis et al., 2007), we analyze the UV CIV resonance lines $\lambda\lambda$ 1548.187, 1550.772 $\AA$ in the spectra of HD 24534 in three different time periods in order to investigate the presence of Discrete or Satellite Absorption Components (DACs, SACs), as well as to calculate the values of the above physical parameters and their time scale variations.

2 Data and Spectral Analysis

The data we have used are the CIV resonance lines $\lambda\lambda$ 1548.187, 1550.772 $\AA$ of HD 24534, taken in three different time periods (1980/03/29, 1994/12/28, 1996/02/10). The spectrograms of the star have been taken by IUE satellite, with the Long Wavelength range Prime and Redundant cameras (LWP, LWR) at high resolution (0.1 to 0.3 $\AA$). From our analysis we have detected that each CIV resonance line consists of five absorption components.

In Table 1 we present the average radial, rotational and random velocities, as well as the average absorption energy for each one of the five absorption components that produce the CIV line profiles.

Component	U_{rad} (km/s)	U_{rot} (km/s)	U_{rand} (km/s)	E_{abs} (eV) (1548.187Å)	E_{abs} (eV) (1550.772Å)
1st	9±16	7±3	18±5	0.09±0.03	0.08±0.03
2nd	-36±27	0.8±0.2	14±2	0.041±0.012	0.037±0.011
3d	-72±23	0.93±0.07	11±3	0.026±0.006	0.024±0.005
4th	-95±5	200±0	81±12	0.51±0.07	0.47±0.06
5th	-210±30	9.3±0.7	20±4	0.047±0.004	0.042±0.004

Table 1: Average values of the physical parameters estimated, for the 5 absorption components of the CIV resonance lines ($\lambda\lambda$ 1548.187, 1550.772 $\AA$)

In Figure (1.a) we present the best fit of the UV CIV resonance lines. We note that in all three cases the best fit has been obtained using five absorption components. In Figures(1.b-d) we present

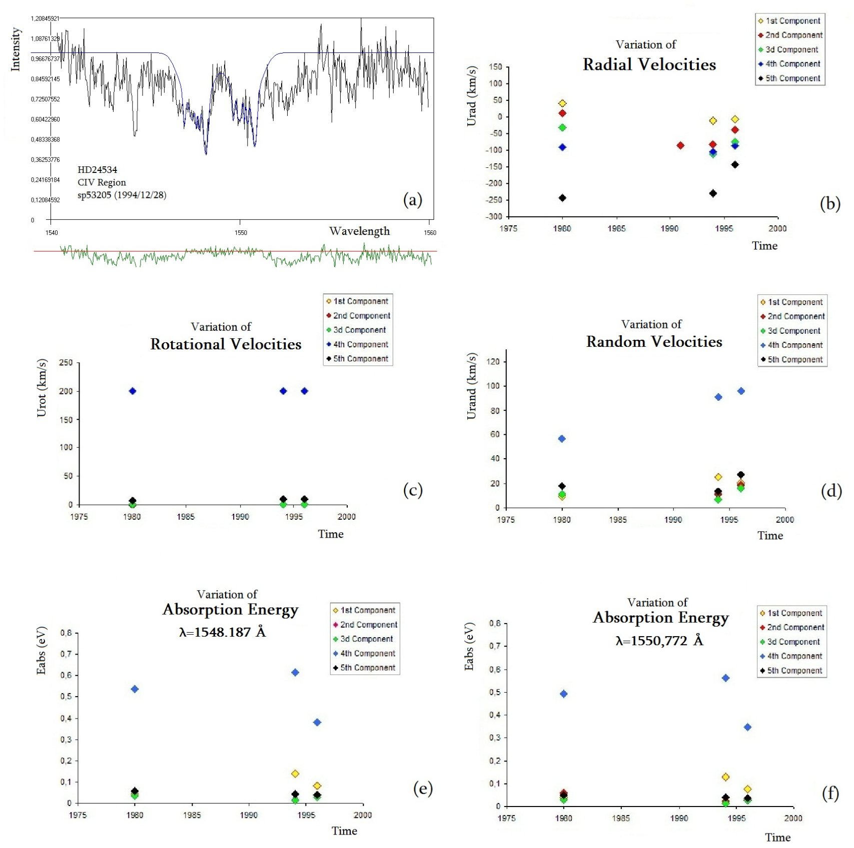

Figure 1: (a): Best fit of the CIV resonance lines in HD 24534. (b)-(f): Time scale variations of the physical parameters estimated, for the 5 absorption components of the CIV resonance lines ($\lambda\lambda$ 1548.187, 1550.772 $\AA$)

the time scale variations of the radial, rotational and random velocities of the independent regions of matter which produce the main and the satellite components of the studied spectral lines. Finally, in Figures (1.e) and (1.f) we present the time scale variation of the absorption energy for each one of the CIV resonance lines.

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