cation of superposed emission-like spikes that were either at line center, or "blueward", or "redward" of this location; and (b) the strength of the N V 4604-21 P Cygni absorptions. Georgiev et al. (1999) showed that the variations in this high ionization N V doublet retained coherence over ∼14 years of observations, with a period $P = 3.765$ d. However, although the variability in other lines and in photometric data is always consistent with the 3.76 d period, it is often not coherent over timescales of several weeks or longer (Drissen et al. 1989). Hence, the binary nature of HD 50896 has been questioned.

Another problem with the *WR+cc* scenario for HD 50896 is the absence of significant X-ray variability. Stevens & Willis (1988) and Skinner, Itoh, & Nagase (1998) showed that the observed levels of X-ray emission were far too low to be attributable to accretion onto a neutron star or black hole. On the other hand, Skinner et al. (2002) concluded that the presence of a low-mass companion upon which the WR wind collides would be consistent with the low X-ray emission levels. Hence, the binary scenario is still a viable one. However, even under the binary hypothesis, a physical mechanism by which the line-profile variability occurs is still not identified.

In this investigation we focus on one of the physical mechanisms that may produce the observed line-profile variations in HD 50896. Specifically, we will analyze the N V 4604 line profiles in order to determine the type of wind structure variations that may produce the observed variability. In § 2 we describe the observations; § 3 contains a description of the N V variability; § 4 describes the line-fitting technique; § 5 contains a discussion; and § 6 the conclusions.

2. OBSERVATIONS

The new observations were carried out during three epochs in 1999, 2005 and 2009 (hereafter referred to as OGH I, OGH II and OGH III, respectively), with the 2.1 m telescope of the Observatorio Astronómico Guillermo Haro (OGH), using a Boller & Chivens spectrograph, with a 830 grooves mm^{-1} grating in the second order, and a slit aperture of 250 μm. A Schott BG18 blocking filter was placed at the slit entrance, thus removing light at $\lambda < 4000$ Å. For the first and second epochs, we used a CCD with a 1024×1024 Tek chip and for the third epoch a CCD with 1300×1300 BestArray chip. The reciprocal dispersion for the first and second epochs was 0.31 Å/pix, and the spectral window was $\lambda\lambda$4463–4778 Å, while for the third epoch, the corresponding parameters were 0.26 Å/pix, and $\lambda\lambda$4470–4810 Å.

Data reduction was performed using standard procedures in the Image Reduction and Analysis Facility (IRAF) version 2.14.1 package[5], which included bias subtraction, flat field correction, cosmic ray deletion, and wavelength calibration. The wavelength calibration was performed using a He-Ar comparison lamp, yielding an uncertainty of 0.34 Å in wavelength measurements for the OGH II and OGH III epochs. For the OGH I epoch, due to a problem with the comparison lamp spectrum, the wavelength calibration was deficient, leading to uncertainties twice as large. Individual spectra have S/N∼110 at the continuum level, with the average spectra per night having S/N $\sim \sqrt{n}110$, where $n = 3,...,35$ is the number of spectra averaged. The individual spectra were normalized to the continuum level after interpolating a third-order Legendre polynomial function to line-free spectral regions.

One of the noteworthy features of these observations is the fact that each set was obtained over seven or eight consecutive nights, thus covering two contiguous 3.76-day cycles. On each night, between 3 and 35 spectra were obtained within time intervals ranging from one to six hours. The three sets of data are comprised of 151 spectra. Table 1 contains the journal of observations. Column 1 lists the identification number of the spectrum, Column 2 the mean Julian Date −2445000, Column 3 the date of observations, Column 4 the number of spectra obtained over the night, Column 5 the timespan (in hours) over which these spectra were collected and Column 6 the phase computed with $P = 3.7650$ d and $T_0 = 2443199.53$ from Georgiev et al. (1999).

The above data sets were complemented with a set of nightly average spectra obtained in the Observatorio Astronómico Nacional San Pedro Mártir (SPM) during 1991 January (Piceno 2003; Vázquez 2003; Morel et al. 1998; Georgiev et al. 1999). The date of observation, number of spectra averaged, and nightly timespan covered by these spectra are listed in Table 2. The SPM data set covers 13 consecutive nights. Only one spectrum was obtained on nights "a" and "d" due to bad weather; the first of these is a useful spectrum having S/N ∼ 100. On night "d" the spectrum has S/N ∼ 35 and was not used for the analysis presented in this paper. This set provides spectra for three consecutive cycles in the 3.76 d period.

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