

SHORT-TERM SPECTROSCOPIC VARIATIONS OF THE Be STAR 11 Cam

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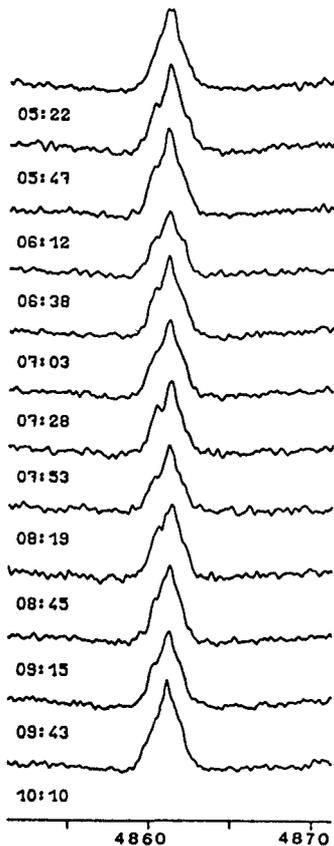
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11 Cam (HD 32343 = HR 1622) is a so-called "pole-on" Be star known for its long term variations, already noted by Merrill and Burwell (1943). Recent determinations of visual magnitude and spectral

Sequence of H β profiles observed on Dec.8,1985. Mid-time exposures are expressed in U.T.



type are $V = 5.222$ and $B2.5Ve$ (Rufener, 1981). The Balmer line profiles, especially $H\alpha$, have been frequently studied; Briot (1971), for instance, measured 40 and 4.9 \AA equivalent widths for $H\alpha$ and $H\beta$ respectively; the $H\alpha/H\beta$ peak to continuum ratio is $6.43/2.02$ according to Gray and Marlborough (1974) who give $v \sin i = 131 \text{ km s}^{-1}$, close to the value of 140 km s^{-1} adopted by Kogure (1968).

However, these "static" values have been obtained from only one or two spectra. Schild (1973) points out important changes over years in the emission of the hydrogen lines until $H\epsilon$, as well as in the occurrence of this emission itself on the higher terms of the Balmer series. Andrillat and Fehrenbach (1982) published two $H\alpha$ profiles recorded in april and december 1980, and showing significant differences. Shorter variations are a controversial subject. Lacy (1977) concluded that the rapid variations mentioned in the literature are not significant. Luud (1978), with a video-scan technique, detected small but actual variations in $H\alpha$ profiles, for 11 Cam and some other Be stars. Photometric studies carried out later (Percy et al., 1981) show that there is a probable variation of 0.02 magnitude on a time scale of a few hours.

So, 11 Cam was an excellent candidate to test an eventual short period variation (pulsation ?) in Be stars. We observed it

with the Echelle spectrograph of the 2.12 m telescope at San Pedro Martir Observatory (Mexico), in december 1985. Unfortunately, we could not obtain simultaneous photometry, due to poor weather conditions and instrumental problems. We present here our first spectrographic results concerning the H β line; the time resolution achieved is under 30 minutes (20 minutes exposure time), over four consecutive nights; the spectral resolution is 0.34 Å, with a dispersion of 8 Å mm⁻¹. The plates have been digitalized on a PDS microdensitometer and the noise filtered by a Fourier transform smoothing. The resulting signal to noise ratio is about 40. Let us note that the spectral resolution is better than Lacy's one (0.34 Å instead of 4 Å); indeed, the time resolution is not so fast as Luud's one (half an hour instead of a few minutes), but our observing conditions and data processing allow us to hope for a considerably higher security relative to different kinds of noise.

We do observe line profile variations from one spectrum to the next, (see the figure) which means that the time constants involved are much shorter than previously supposed from the photometric studies. A component clearly appears from time to time in the blue wing of the emission line, giving to this one the general aspect of a line-doubling or a strong absorption. The central depth of the photospheric component seems also to vary, but this is to be confirmed, as it strongly depends on the continuum determination.

Although short time scale variations are obviously present within half an hour, period analysis carried out on different parameters (radial velocities, equivalent widths, etc..) is inconclusive. This is not too surprising, since our recent experience on the short-period Be stars (HR 9070) shows that a precise photometric period determination is necessary to correlate information about the rapid profile variations. Moreover, a profile may vary significantly without large effects on equivalent width, and sudden events may occur sometimes, with or without periodicity. It remains to look at the different other Balmer line profiles to detect an eventual correlation with the actual H β variations, then to study their time dependency; this is what we are going to do.

References

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