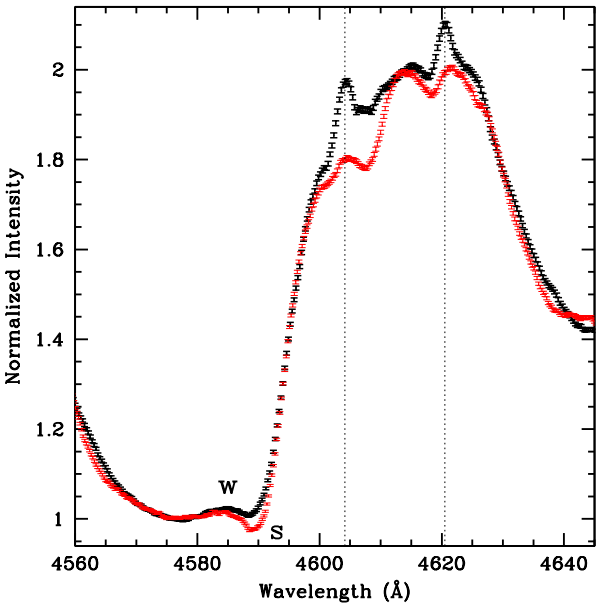


Fig. 2. Comparison between spectrum n20 and spectrum d07 illustrating the difference between the *weak* (w; black) and *strong* (s; red) types of absorption in N V 4604. Error bars indicate the uncertainties associated with each spectrum, as determined from the corresponding S/N ratios. The color figure can be viewed online.

TABLE 3

DAY-TO-DAY P CYGNI TYPE FOR EACH EPOCH[a]

| Epoch | Type | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1991 | s | s | a | - | w | s | a | w | w | s | a | w |
| 1999 | - | - | a | a | a | s | a | - | a | s | - | w |
| 2005 | - | - | a | w | a | s | a | w | w | s | - | - |
| 2009 | - | - | - | - | w | s | a | w | w | s | a | - |

[a]Each entry of the table corresponds to one night of observations, and they are listed sequentially starting at the left with the first night of data. The letters indicate whether the N V 4604 profile has a *strong*, *weak* or *absent* P Cygni absorption component. The nights of each epoch have been aligned so that the *s* spectra all lie along the same columns. A dash indicates no data available for the given night.

We assign a classification of *strong*, *weak*, or *absent* to the type of line-profile observed. The distinction between the three types of profiles is most clearly seen at $\lambda$ 4590 Å in Figure 1. The *weak* profiles have intensities that are very close to the continuum level, the *strong* profiles are below the continuum, and the *absent* profiles lie significantly above it. The continuum level lies at intensity level unity, by definition from the spectrum normalization process. Examples of the *strong* and the *weak* type profiles are shown in Figure 2. In Tables 1 and 2 each spectrum has been characterized with the letters *s*, *w* or *a* in accordance with this classification. Using this description for the N V profiles, the day-to-day variability pattern of the four epochs may be compared. Table 3 illustrates this variability pattern for each epoch individually (the different rows) and for the entire set by aligning the first *s* spectrum of the OGH data sets with the second *s* of the SPM set in the same column. Table 3 shows that the four epochs follow the same sequence that repeats with the 3.76 d period: $s \rightarrow a \rightarrow w/a \rightarrow a/w$, where $a/w$ and $w/a$ indicate that either *a* or *w* are present in the column.

Figure 1 also shows that part of the variability is due to the appearance of narrow emission peaks. A clear example of such features at the rest wavelength of He II 4642, N V 4604 and N V 4621 can be seen in the phase interval 0.64–0.70 of the OGH II spectra (see also Figure 2). Thus, in addition to the changing P Cyg absorption, the line-profile variability involves the presence of narrow, superposed emissions. The fact that they are located at the laboratory wavelength indicates that they originate in material that is flowing perpendicular to our line-of-sight.

Figure 3 again shows the spectral region containing He II 4542 and the N V 4604-21 doublet for the four epochs of observations. In this case, the first spectrum plotted from bottom to top is the first spectrum in the series having a *strong* N V 4604 P Cygni absorption component. In the SPM data set, we chose spectrum 'b' of the series because on night 'a' only 1 spectrum was obtained[6]. The second spectrum from bottom up, plotted with a +0.5 shift in the intensity scale, is the one obtained during the following night of observation; the third and fourth spectra correspond to the subsequent 2 nights, each with a corresponding additional +0.5 shift in the intensity scale. The fifth spectrum of the series is overlaid with the first, this time with a dotted line instead of a continuous line; similarly, with the following spectra of the series. This figure confirms the similarity between the four epochs' N V line profile variabiity, but it also shows that small changes in the line shapes are present for spectra of similar phases separated by a single 3.76 d cycle. The magnitude of these small changes may be evaluated from the ratios

[6]We do note, however, that spectrum 'a' has an *s*-type profile which apparently breaks the pattern described above.