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NEW LIGHT ON THE PECULIAR STAR HD 108

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HD 108 is a very rare specimen in the stellar population: it is one of the only three Of?p stars known in the Galaxy. Recently, a long-term observing campaign undertaken at the Haute-Provence Observatory revealed the peculiar behaviour of this star (Nazé et al. 2001, 2004). HD 108 displays large variations of its H and HeI line profiles that are evolving from P Cygni profiles to pure absorptions. A comparison with data from the literature suggests that this modulation is recurrent (Nazé et al. 2001). However, there were some gaps in the reported observations of this object, and the exact timescale of the phenomenon was therefore somewhat uncertain. In this context, archival data can provide important information, and are especially suited to uncover long-term trends in celestial objects.

The Asiago Observatory (Italy) has a long history of observations: its archives contain approximately 70000 photographic plates, taken since 1950 and including spectroscopic data of early-type stars. However, this treasure of valuable old data could have been lost if nothing was done. This is why a program was undertaken to make an inventory of the old photographic plates and to digitize them, with the aim to preserve this precious documentation and make it available to the worldwide astronomical community (Barbieri et al. 2003).

During this inventory, it appeared that some unpublished Asiago spectra allow us to fill some of the gaps in the observations of HD108. Table 1 reports these observations and therefore completes Table 6 from Nazé et al. (2001). During the 1950s and 1960s, HD108 displayed a smooth evolution, just as is seen now. These additional data thus confirm the putative 50-60 yr period of HD108. 1958 marks the transition for the H β line: before that date, it appeared as a pure absorption; after, it appeared with a P Cygni profile; in 1958, it displayed a very weak P Cygni (nearly non-existent) line. In addition, we note that the apparent spectral type of HD108 was O8.5-O9 around 1953. This is the latest type ever observed for this star.

Table 1. Aspect of the $H\beta$, $H\gamma$ and $HeI\lambda 4471$ lines. This complements Table 6 from Nazé et al. (2001).

Date	$H\beta$	$H\gamma$	$HeI\lambda 4471$
1955	Abs.	Abs.	Abs.
1956	Abs.	Abs.	Abs.
1957	Abs.	Abs.	Abs.
1958	weak	Abs.	Abs.
1964	P Cyg.	P Cyg.	Abs.
1965	P Cyg.	P Cyg.	Abs.
2001	Abs.	Abs.	Abs.
2002	Abs.		Abs.
2003	Abs.		Abs.
2004	Abs.		Abs.
2005	Abs.		Abs.

The monitoring of HD 108 continues at the Haute-Provence and Asiago Observatories. The recent data reveal that HD 108 has not yet reached its minimum state. Fig. 1 presents these spectra, and the continuously declining H and HeI lines are clearly visible. The equivalent widths (EWs) and radial velocities (RVs) of some lines are shown in Fig. 2. The spectral type of HD 108 is currently O8.5 and if we compare this situation with that revealed by the archives, we expect that the star is still a few years ahead of reaching the minimum state.

Although the behaviour of HD 108 is similar to that of another Of?p star, HD 191612 (Walborn et al. 2004), we may note some differences: the period is much longer (50-60yr vs. 538d) and the RVs are varying more ‘randomly’ for HD 108 (Nazé et al. 2006, in preparation).

Observatory and telescope:

Haute-Provence Observatory, 1.52m telescope, Aurélie spectrograph; Asiago Observatory, 1.22m tel, Cassegrain spectrograph and camera III or VII+S1

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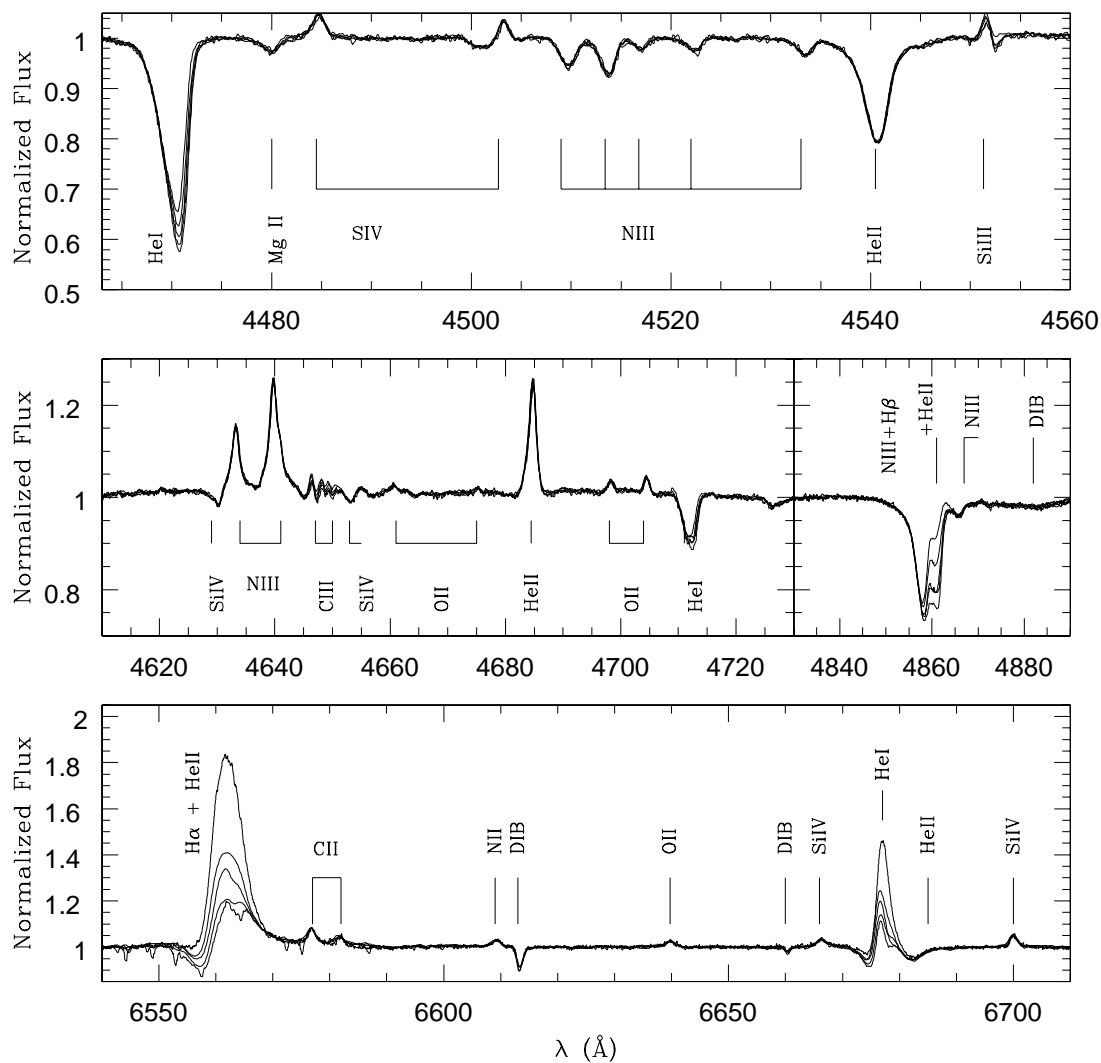


Figure 1. The evolution of the spectrum of HD 108 from 2002 to 2005 for the 4460-4560 \AA range, 2001 to 2005 for 4610-4890 \AA , and 1997 to 2005 for 6545-6705 \AA . The weakest lines always correspond to the most recent data.

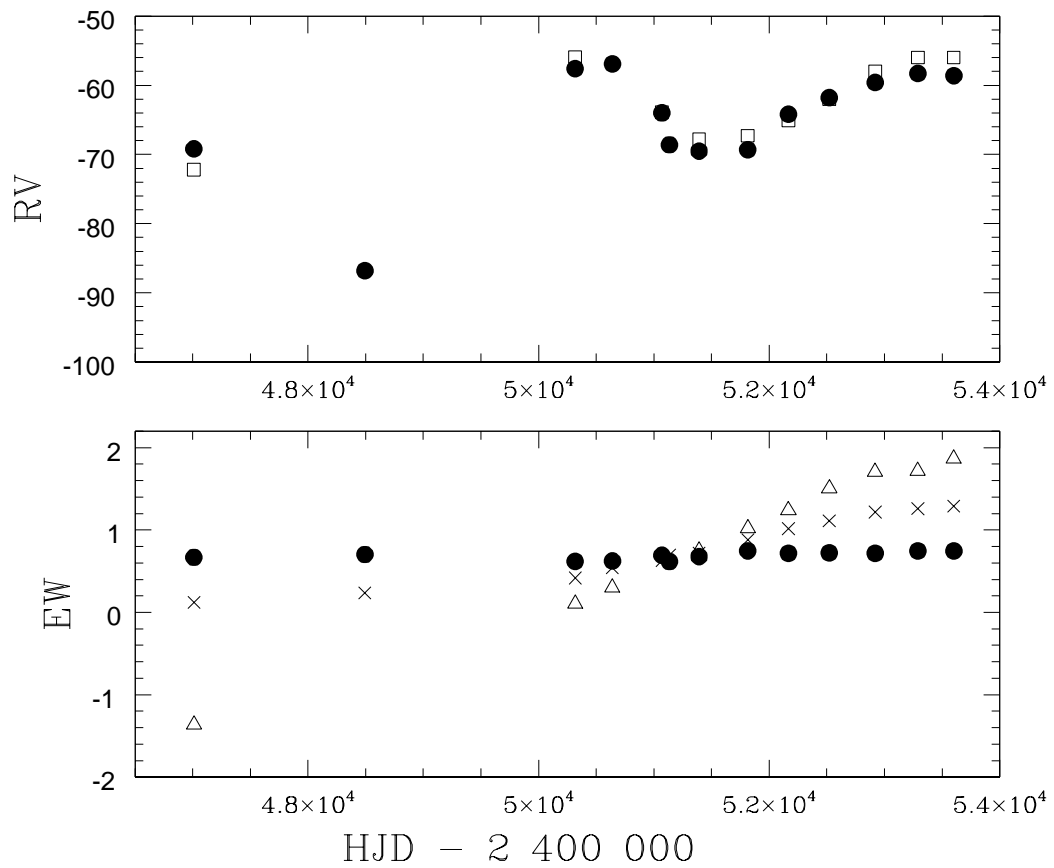


Figure 2. RV and/or EW of HeI λ 4471 (crosses), HeII λ 4542 (filled circles), HeII λ 4686 (open squares), and H β (open triangles, excluding the DIB, i.e. evaluated from 4845 to 4870Å). The rest wavelengths were taken from Conti et al. (1977)