

A Search for Rotationally Modulated H α Variability in OB Supergiants

T. Morel,^{1,2} S.V. Marchenko,³ A.K. Pati,⁴ K. Kuppuswamy,⁴ M.T. Carini,³ E. Wood³, and R. Zimmerman³

¹ *Osservatorio Astronomico di Palermo, Italy.*

² *Inter-University Centre for Astronomy and Astrophysics, Pune, India.*

³ *Western Kentucky University, Bowling Green, USA.*

⁴ *Indian Institute of Astrophysics (IIAP), Bangalore, India.*

Abstract. We present preliminary results of a long-term spectroscopic monitoring of a magnitude-limited ($V < 7.5$) sample of OB-supergiants (O7.5-B9) aimed at establishing the incidence of co-rotating, large-scale wind structures. In the optical, this can be achieved by detecting rotationally modulated variability in H α . Dramatic line-profile variations operating on a daily (and in some cases on a hourly) timescale are observed. Firm conclusions regarding the origin of the variability must, however, await a detailed period analysis. There is no clear evidence for a causal link between photospheric and wind activities.

1. Introduction

The UV line-profile variability displayed by OB stars is widely believed to be induced by the rotational modulation of co-rotating interaction regions, whose formation is triggered by some kind of photospheric activity (Cranmer & Owocki 1996). Establishing a cyclical pattern of variability in H α would suggest that these large-scale wind streams can already be found at the base of the outflow, in addition to being present further out, as indicated by UV data. Our observations aim at circumventing the limitations of previous surveys, i.e., poor temporal sampling and/or limited number of targets (Ebbets 1982; Kaper et al. 1997). A total of 22 objects was monitored between 2001 November and 2002 May (36 nights) at the 40-inch telescope of the Vainu Bappu Observatory (India).

2. Results

Some illustrative examples of the line-profile variations are shown in Fig.1. Most changes take place on a daily timescale, although significant hourly variations are sometimes observed (e.g., HD 37128; Fig.1). We sought for a correlation between the fractional amplitude of the H α variations and a "photometric activity index" derived from *Hipparcos* data. Although there is a hint of a positive correlation (false alarm probability of 2%), this trend disappears when the 4 stars displaying line-profile variations that cannot be unambiguously related to wind activity are

excluded from the analysis. There is therefore no clear causal link between the changes taking place at the photosphere and at the base of the outflow.

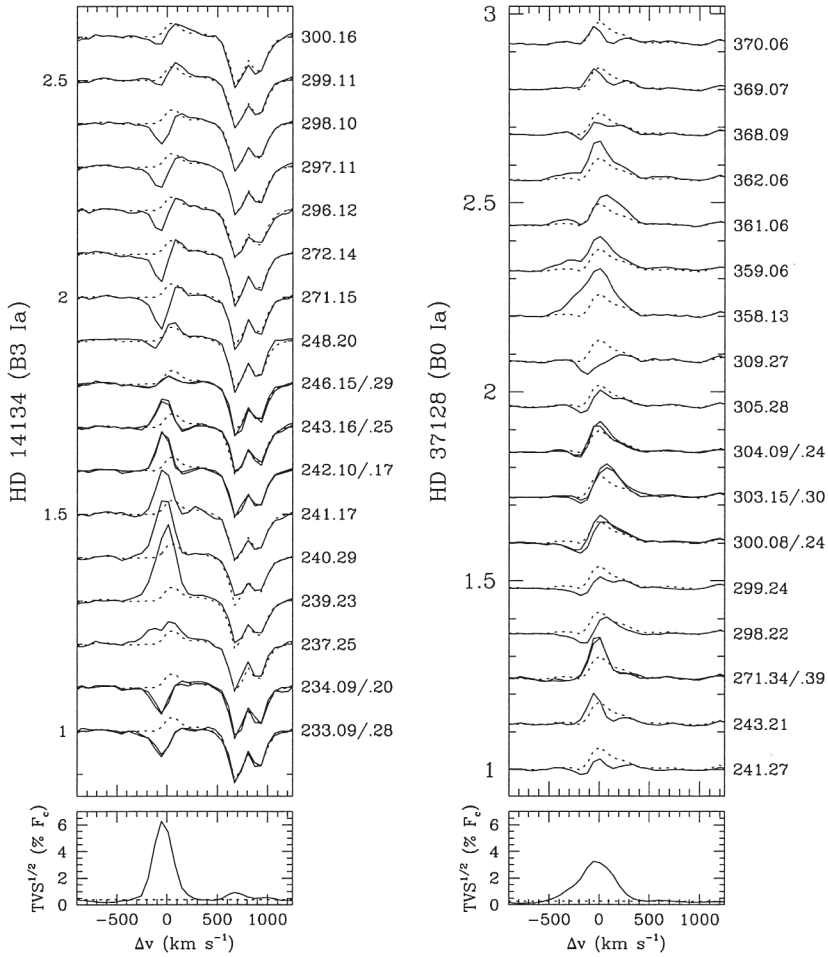


Figure 1. $H\alpha$ time series for HD 14134 (B3 Ia) and HD 37128 (B0 Ia). The nightly mean profile is overplotted as a dashed line. The mean (HJD-2,452,000) of the observations is indicated to the right-hand side of the upper panel. The lower panel shows the TVS (Fullerton, Gies, & Bolton 1996), along with the threshold for a significant variability at the 99% confidence level (*dashed line*).

References

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