VARIATIONS IN THE SHELL SPECTRUM OF ZETA TAURI

In 1965 Underhill (*) noticed that one spectrogram of Zeta Tauri obtained the 19th of October, 1964, and covering the red-yellow region at 15 A/mm, presents the Na D lines and the Si II lines at 6347 A and 6371 A strong in absorption, the profiles being asymmetric, sharp on the red side and winged on the violet side. The He I lines at 5876 A and 6678 A have symmetrical contours.

We have observed this star in December 1964, January and February 1965, with the grating spectrograph of the Merate Observatory, the dispersion being 35 A/mm in the red-yellow region, 34 and 23 A/mm in the violet. Our observations confirm those by Underhill. Moreover the spectrograms covering the violet region show that all the Balmer lines are still more asymmetric. From inspection of the tracings of the spectral region Hα — 3500 A we can conclude that the stellar lines — 4481 Mg II and the non-metastable lines of He I — show broad and symmetrical contours, while the shell lines due to Fe II, Si II and Na I are clearly asymmetrical, and the asymmetry is much more evident in the profiles of the lines formed at greater height in the shell, like the Balmer lines and the Ca II K line (Fig. 1 and Fig. 2).

The Hα line has strong emission wings with R/V > 1, Hβ shows also R/V > 1, Hγ, Hδ, and the strongest Fe II lines present the characteristic P Cygni contour. The asymmetry reaches a maximum in January 1965.

The radial velocity during this period indicate that the shell is expanding at a velocity of about 50 Km/sec.

The asymmetry can be explained as due to the presence in the shell of different clouds at different heights, having different expansional velocities. This model explains also the fact that the Balmer lines and the K line, which are due to the contribution of the whole shell, present a stronger asym-

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(*) A. B. Underhill - Astron. J., **70**, p. 149 (1965).

metry than the Si II and Fe II lines, which are probably formed in the lower part of the shell.

Several other spectrograms of Zeta Tauri have been taken from November 1965 to March 1966 with the prism spectrograph of the Asiago Observatory (dispersion 40 A/mm at Hγ). The asymmetry is completely disappeared (Fig. 3). Hα and Hβ still have emission wings with R/V > 1.

M. HACK, P. STENNER

Osservatorio Astronomico di Trieste
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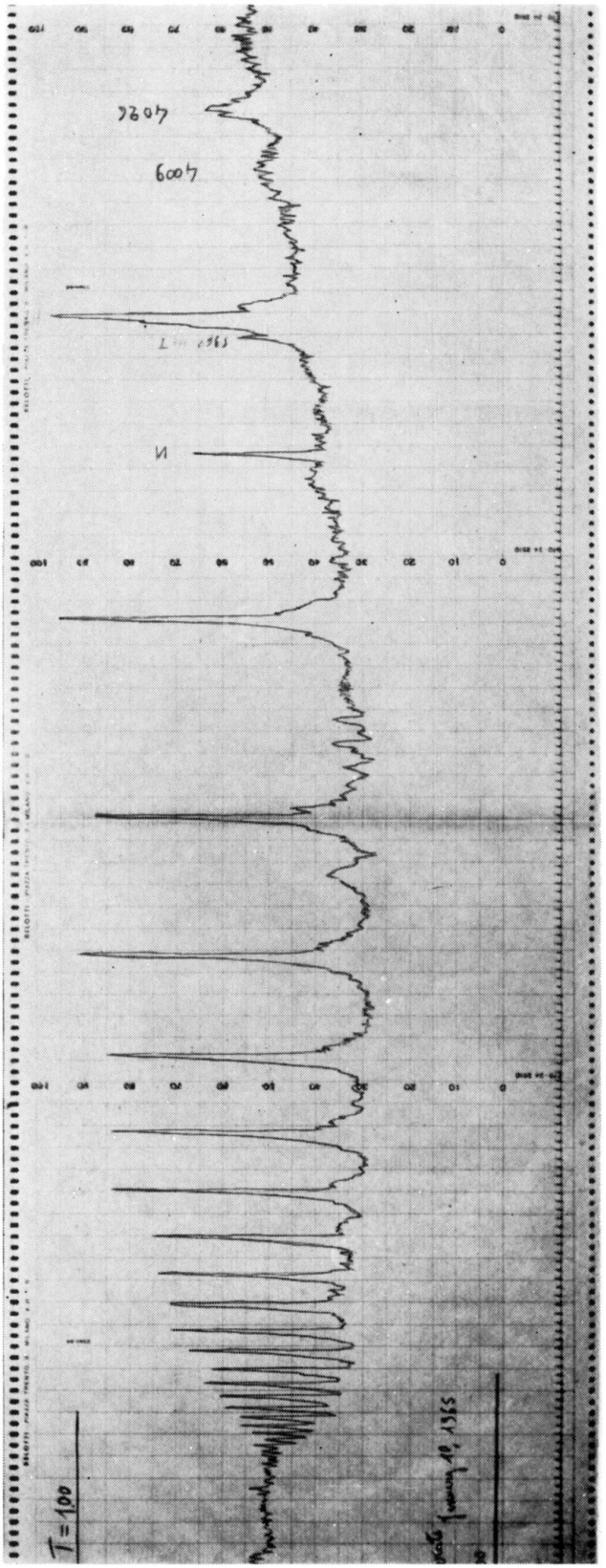

Fig. 1 - Transmission tracings of one spectrogram of ζ Tauri taken on January 10, 1965. Spectral region: λ 4026 He I — Balmer limit.

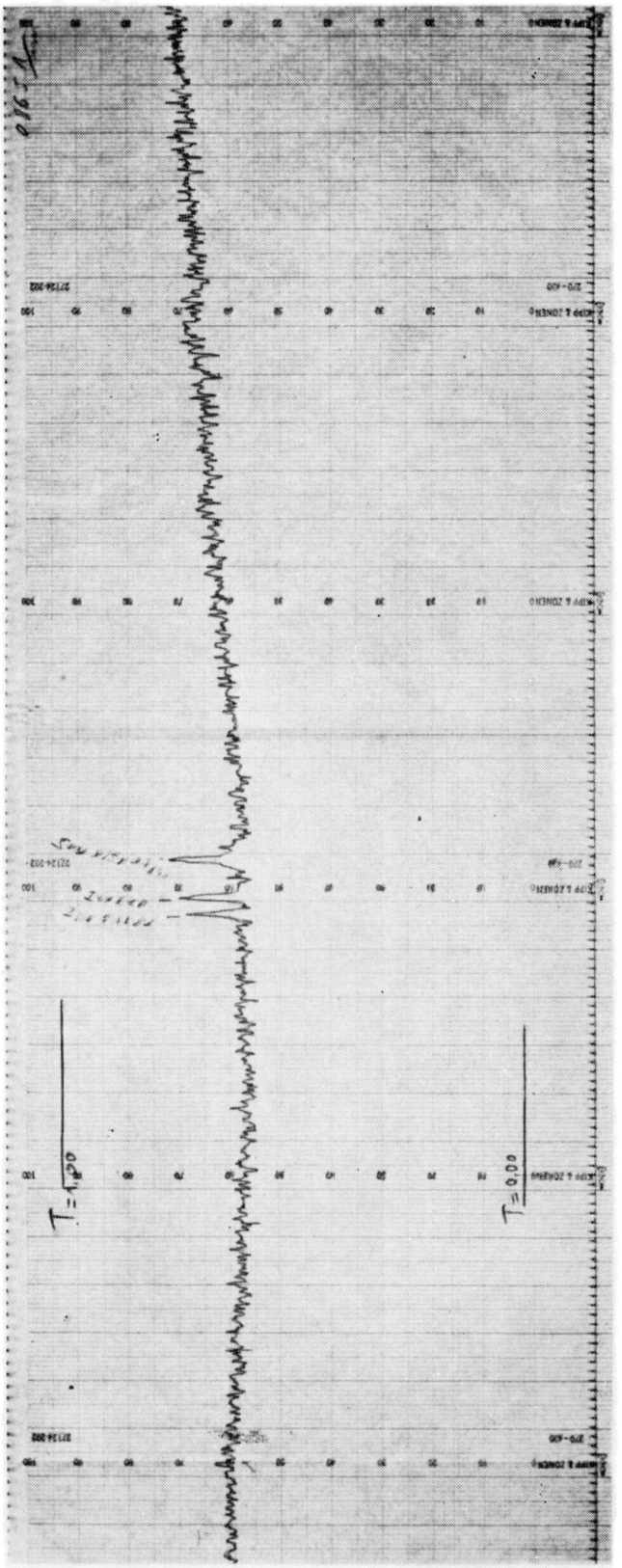

Fig. 2 - Transmission tracings of the same spectrogram. Yellow-red region. The strong absorption lines of 5875 He I and the Na I D lines are visible on the center of the tracing.

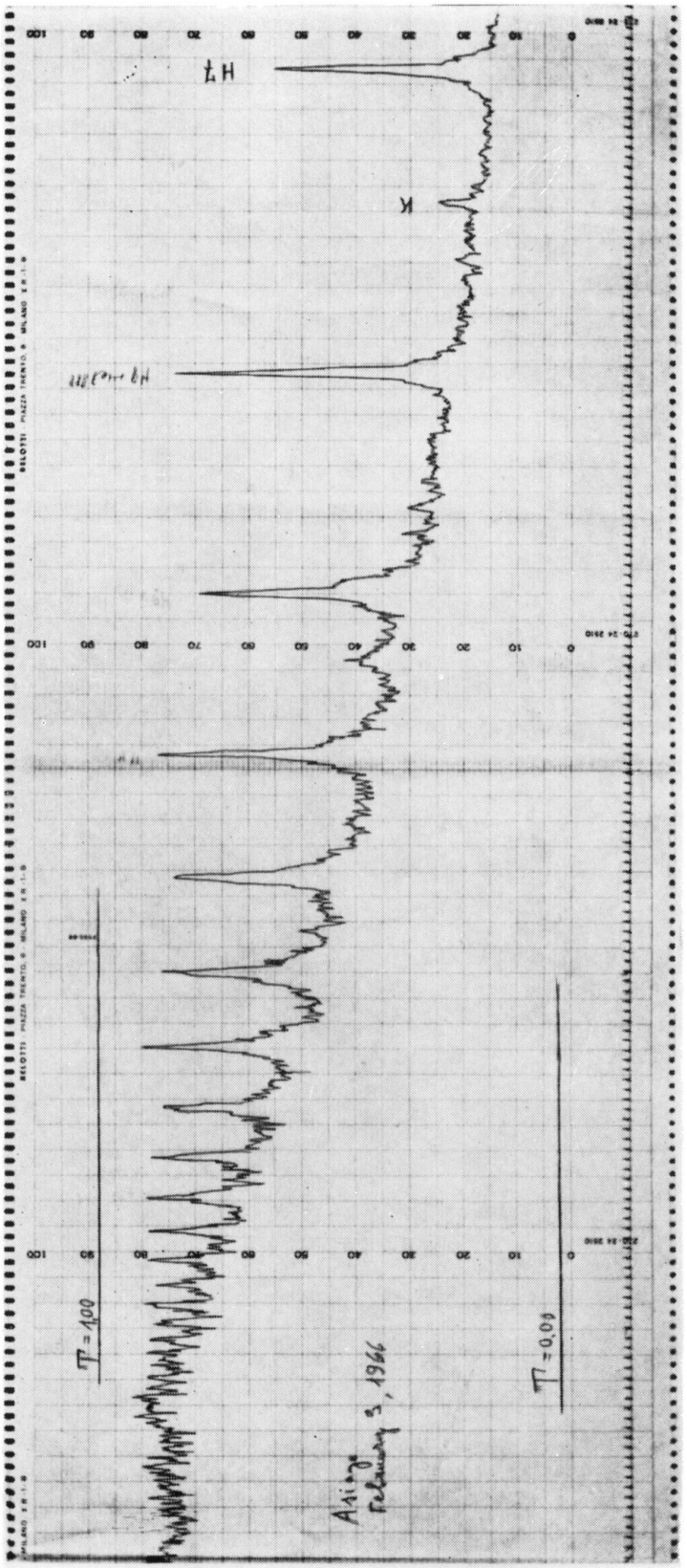

Fig. 3 - Transmission tracings of one spectrogram of ζ Tauri taken on Febraury 3, 1966. Spectral region: H7 — Balmer limit.