ON SPECTRAL OBSERVATIONS OF ζ GEM

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Abstract. I want to show two slides with the evidence of the presence of the λ10830 Å HeI absorption line in the spectrum of the classical Cepheid ζ Gem. In Figure 1 you can see the profile of the blend near λ10830 Å (dispersion 48 Å mm^{-1}); this blend

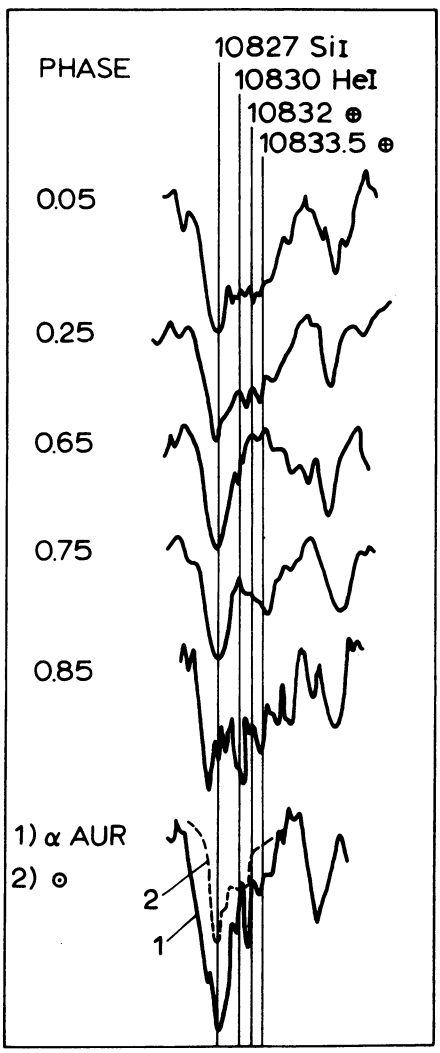

Fig. 1. The phase changes of the λ10830 Å blend profile in the spectrum of ζ Gem. Curve 1 is the same blend in the spectrum of α Aur; this blend according to Vaughan and Zirin (1968), has an equivalent width of about 700 mÅ for the He I line. Curve 2 is the solar plage spectrum (Namba, 1963) near λ10830 Å plotted as if it was obtained with a dispersion 48 Å mm^{-1}.

Sherwood and Plaut (eds.), Variable Stars and Stellar Evolution, 225–229.

consists of lines of neutral silicon, helium and atmospheric water. The monotonous phase changes of the profile are easily seen.

Figure 2 shows the changes of the equivalent width of the blend during the pulsation. These changes are also monotonous. The equivalent width of the blend shows phase changes by a factor of more than 3. The silicon line λ10827 Å is the strongest in the blend, so it can be easily separated. Since the central intensities of the lines in the blend are small (10 to 15% of the continuum), we may do the following: Assuming that the silicon line is symmetrical, let us find the equivalent width of its left wing, and

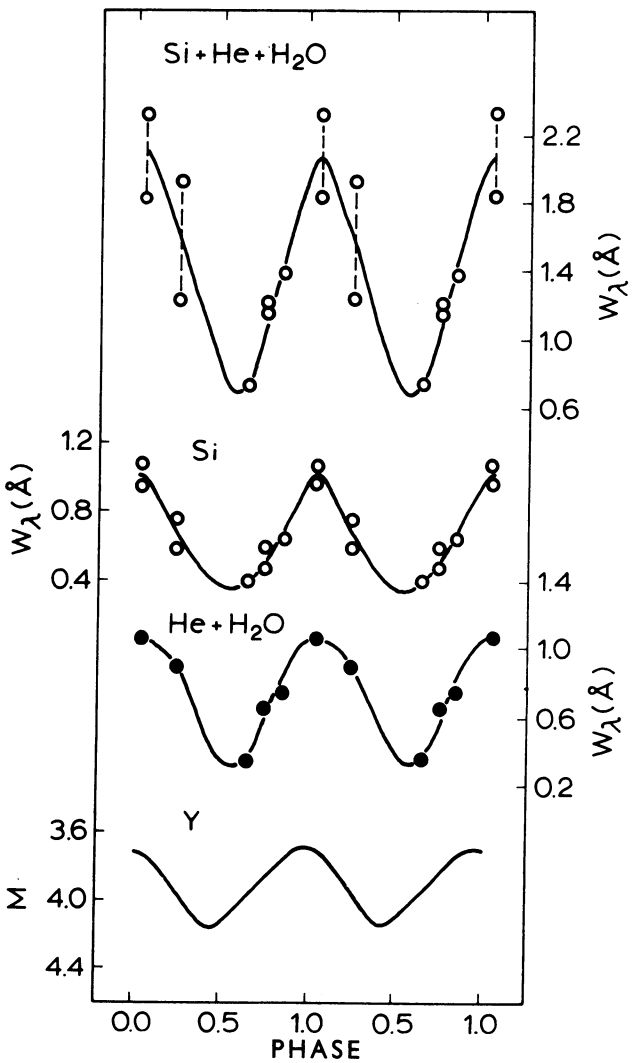

Fig. 2. The changes in the equivalent widths of the blend near λ10830 Å, the line λ10827 Å Si I and the helium line λ10830 Å blended with H_2O lines. The filled circles show mean values. The curve *Y* shows the variability of ζ Gem in the filter *Y* (λ5493 Å) according to Kelsall (1971).

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then obtain the total equivalent width by multiplying it by 2. It is evident that the difference of the equivalent width of the blend and that of the silicon line will give the equivalent width of the helium line blended with atmospheric H_2O. This difference changes monotonously from 300 to 1000–1100 mÅ during the period. The monotonous character of these changes is an evidence for the presence in the spectrum of ζ Gem of the λ 10830 Å HeI line with variable intensity, since the character of the changes of the lines of atmospheric water should be irregular. The equivalent width of the helium line at maximum light probably does not exceed 700 mÅ.

References

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Namba, O.: 1963, *Bull. Astron. Inst. Neth.* **17**, 93.
Vaughan, A. H. and Zirin, H.: 1968, *Astrophys. J.* **152**, 123.

DISCUSSION

D. S. Evans: What technique did you use for your observations?

A. G. Shcherbakov: The spectra of ζ Gem in the λ10830 Å region were obtained by G. I. Shanin and A. G. Shcherbakov with the 50″ telescope at the Crimean Observatory with the one-stage image tube S1. The detailed paper is presented to *Izv. Krymsk. Astrofiz. Obs.*