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MULTIPLE COMPONENTS IN THE H α PROFILE OF THE LUMINOUS SUPERGIANT
HD 217476

The G-type supergiant HD 217476 (HR 8752) is one of the most luminous stars in our Galaxy, and curious behaviour has been reported at ultraviolet, optical and radio wavelengths (Sargent, 1965; Smolinski, 1971; Smolinski, Feldman and Higgs, 1977; Stickland and Harmer, 1978; Smolinski, Climenhaga, Funakawa and Fletcher, 1979; Lambert, Hinkle and Hall, 1981). Although this star has been extensively observed for more than a decade, the complex and variable nature of the spectrum is not well understood.

During 1982 this high luminosity supergiant showed multiple components in H α and in the metallic lines. Some of these components were not observed in any of our previous spectra of this star obtained at the Dominion Astrophysical Observatory over a 13-year period since 1969. Only a brief description of these interesting features as observed during 1982 will be given in this paper, but a full discussion of their behaviour based on our 13 years of observations will be given in a separate paper which is presently in preparation.

In Figure 1 are shown the profiles in the spectral region containing H α and the TiII line at λ 6559.6 for two spectra taken on May 4, 1982 and on September 27, 1982. The radial velocity information for the various components of these lines is given in Table I.

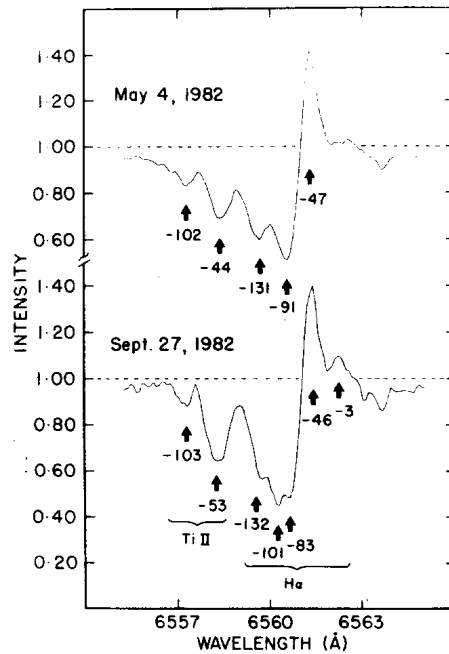


Figure 1 : The H α region for HD217476 with dispersion 10 Å/mm. The horizontal broken lines show the continuum levels of the spectra. The numbers give the radial velocities of the components. Note that the emission component with velocity -3 km/s appears in H α on September 27.

Table I

Radial Velocities for HD217476 in the H α Region

Date	Plate No.	Radial Velocity (km/s)							
		TiII		H α					
		A ₂	A _B	A ₁	A ₂	A ₃	A ₂ +A ₃	E ₁	E ₂
May 4, 1982	14167	-102	-44	-131	--	--	-91	-47	--
Sept. 27, 1982	14402	-103	-53	-132	-101	-83	-96*	-46	-3

Note *Best fit for the A₂ and A₃ components together.

The components of particular interest are as follows.

(1) There is a red emission component (E_2) in H α with velocity ≈ -3 km/s in addition to the red emission (E_1) which is always present with velocity ≈ -46 km/s. This -46 km/s emission component may be formed in the HII region surrounding the high luminosity star. The -3 km/s component varies in intensity and its origin is uncertain, but it may be associated with a binary nature and/or a pulsation of the star.

(2) An absorption component (A_1) appears in H α with velocity ≈ -131 km/s where blue emission occurred in previous spectra in 1979.

(3) Three absorption components (A_1 , A_2 , A_3) appear in the H α profile on September 27th with velocities ≈ -132 km/s (the component referred to in (2)), -101 km/s and -83 km/s, while only two components (A_1 and a blend of A_2 and A_3) are seen in the May 4th profile with velocities -131 km/s and -91 km/s. The shape of the absorption part of the H α profile is similar to that observed by Luck and Lambert (1981) in the long period Cepheids χ Cyg and SV Vul.

(4) The TiII line at $\lambda 6559.6$ shows two components on May 4th, one (A_2) with velocity -102 km/s is presumably formed in the expanding envelope, and the other (A_g), with velocity ≈ -44 km/s is the stellar component. On September 27th, the pattern is similar, but the stellar component now has a velocity ≈ -53 km/s. There is a possibility that the -102 km/s component is blended with a telluric H₂O line. However, most of the absorption lines, and in particular the neutral Fe I lines, show this same pattern.

More details and interpretation of the behaviour of this circumstellar envelope will be given in the paper which is presently in preparation.

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