

INFRARED LINES IN PECULIAR EMISSION-LINE STARS

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Abstract. An image-tube Cassegrain spectrograph, equipped with an S-1 photocathode enabled us to obtain infrared spectra of peculiar emission-line objects, as V 1016 Cyg, HBV 475, HD 51585, HD 45677, XX Oph and CI Cyg. Many of these objects display emission lines of H I, He I, He II, O I, N I, Ca II [S II] [S III], [Fe II]. The line intensities can be used together with data from other parts of the spectrum to determine relative abundances of these ions in the shells of these objects, which may be at a critical phase of their evolution.

The image-tube spectrograph installed at the Cassegrain focus of the 193 cm telescope of the Haute-Provence Observatory enabled us to obtain infrared spectra of peculiar emission-line stars. The S-1 photocathode permitted to cover the range 8000–11 000 Å with a dispersion of 230 Å mm⁻¹. In addition, IN plates have been used to cover the 5800–8800 Å range with the same dispersion.

The peculiar objects include HD 51585, V 1016 Cyg, HBV 475, HD 45677, and XX

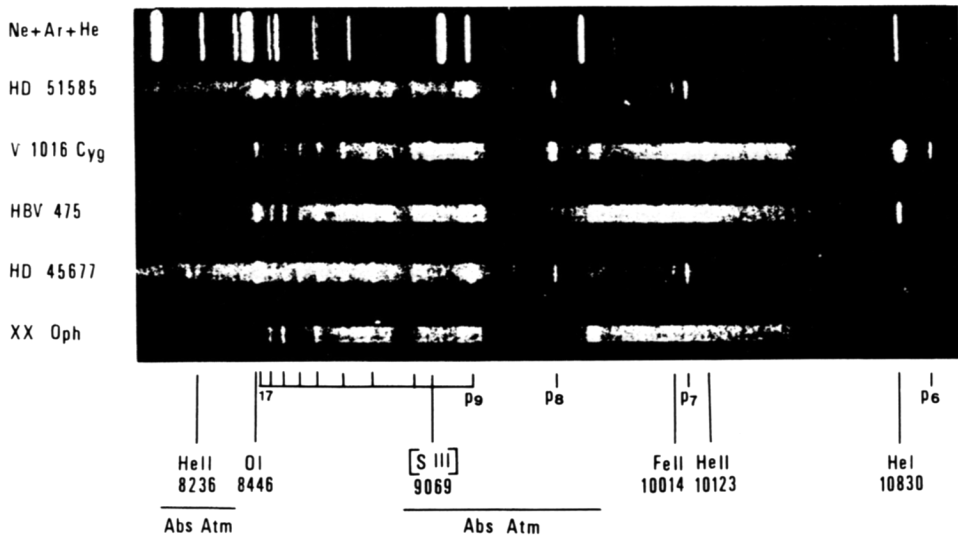


Fig. 1.

Oph. In addition to light and spectral variability, these stars exhibit (a) characteristic continua of hot stars, (b) characteristic continua of cool stars, (c) infrared excess (3-10 μ region), (d) stellar and nebular emission and/or absorption lines, (e) molecular bands in absorption, (f) abnormal radio emission. It has been suggested that they are double stars including a long period variable ejecting mass, and a hot companion responsible for the excitation of the nebular spectrum.

HD 51585 shows a well-developed Paschen series (P6 to P23), together with O I, He I, N I, Ca II and [Fe II] lines. Two features at 9180–9205 Å are present unidentified.

V 1016 Cygni reveals lines of H I, He I, He II, [S II], [S III], O I, but Ca II is absent.

HBV 475 (a radio star) has a variable spectrum where [S III], He II, He I, Ca II, O I, and H I lines are detected. Wide features identified in the visible to He II, C III, N III, N IV transitions indicate that this object is close to a WR type star.

The moderate excitation object HD 45677 is similar to HD 51585, except for the two unidentified features, which are absent.

XX Oph, which shows so many bright lines in the visible, is rather poor in the infrared, except for O I and Ca II emissions. The strong P Cyg profile lines He I 10830 and P 6 observed in 1974 have disappeared on the 1975 spectrogram.

These spectra will be used for relative abundance determination using neighbouring lines: He/H (with He I 10830/P 6 and He II 10123/P 7 ratios), O/H (O I) 8446/P 17 ratio), N/H ([N II]/H α and N I 8630/P 13 ratios) and S/H ([S III] λ 9069/P 9 ratio). It is interesting to compare these ratios to the ones derived for planetary nebulae, since the nebulae emitted may be associated with H and He burning phenomena in shell sources.

DISCUSSION

Morgan: Did you observe spectral variations in the old nova T Cr B?

Houziaux: Our observations of this object in the infrared cover only a short period of time over which we did not, however, observe any variations.

McCarthy: For V 1016 Cyg can you tell me the source of emission features to the shortward of the He 10 830 Å emission feature (near 1 μ) and whether you have observed any variations in these features?

Y. Andrillat: [S II] 10 284 Å est présent dans V1016 Cyg. En ce qui concerne les variations, il faut être prudent car, pour les étoiles faibles, obtenues avec un temps de pose assez long, les raies de OH du ciel nocturne peuvent contaminer [S II], notamment la forte raie de OH à 10 273 Å.

Dans l'infrarouge, nous n'avons noté aucune variation dans TCrB car nos observations portent sur un très court laps de temps.