MEASUREMENT OF INTERSTELLAR EXTINCTION IN EMISSION LINE STARS

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Usually selective interstellar extinction is derived by comparing the spectrum of a reddened star with an unreddened nearby star, preferably of the same spectral type. But in many cases this comparison is not possible, so that new methods have to be used.

A direct measure of this quantity is possible when a spectrum shows a number of emission lines as for the peculiar stars (novae, nova-like objects, symbiotic stars, etc.) and for nebulae. From a statistical point of view there are a small number of objects but they are of very high interest as far as stellar evolution is concerned.

The analysis of the different behaviour of the emission lines of the same ion in the different spectral regions may give the selective interstellar extinction provided that a suitable theory of the excitation of these lines is available. This may be the case for the ionized iron emission lines (permitted and forbidden) that have been observed in almost all the peculiar objects.

In fact, a detailed study of these lines in the optical spectrum of η Car and other astrophysical objects has shown that: (1) the Fe II levels are populated according to Boltzmann's law, giving a well determined excitation temperature, and that (2) the self-absorption in the strongest lines of Fe II is negligible (Viotti, 1969). Thus the intensity I must be proportional to the transition probability A and to the population of the upper level N_u; then the plot of I/AN_u against $1/\lambda$ gives immediately the colour excess for that spectrum.

From the [Fe II] emission lines Pagel (1969) obtained a very high $E(B-V)$ for η Car (about 1.2) and this value is confirmed by the writer's computations. This result was used to derive the absolute magnitude of η Car and its corrected continuum. The latter agrees fairly well with the continuum that has been directly computed by means of a similar analysis of the equivalent widths of the Fe II and [Fe II] emission lines. More recently, the method has been used at the Astrophysical Laboratory of Frascati to derive the true continuum of other peculiar stars, such as AG Peg and MHα 328–116 (Caputo *et al.*, 1970).

In conclusion, we stress the importance of obtaining the ultraviolet spectra of peculiar objects, at a sufficient dispersion to give a measure of the colour excess and of the true continuum. The former may give information on the absorption by the circumstellar matter, as in the case of η Car.

Both are very important for any theoretical study on the spectral formation in extended envelopes. Obviously, the method will be of the widest use as soon as more satisfactory theories become available on the formation of emission lines of hydrogen, helium and other elements in astrophysical objects.

Houziaux and Butler (eds.), Ultraviolet Stellar Spectra and Ground-Based Observations, 50–51.

References

Caputo, F., Panagia, N., and Gerola, H.: 1970, *Astrophys. J.* (in press).
Pagel, B. E. J.: 1969, *Nature* **221**, 325.
Viotti, R.: 1969, Thesis, Scuola di Perfezionamento in Fisica, Rome University, Italy.

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