THE PROBLEM OF THE 2200 Å FEATURE

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In my earlier work (Nandy, 1977) I have described an ultraviolet photometric system which involves a two dimensional stellar classification. This system is based on constructing broad band ($\Delta\lambda \approx 100$ Å) ultraviolet colors ($m_{2700} - V$), ($m_{2190} - m_{2740}$) and ($m_{1550} - V$) from the low dispersion S2/68 spectra. This photometric system is suited ideally to extend the classification to stars fainter than $V = 6^m.0$, because the spectral features as described by the previous speaker, A. Cucchiaro, are not easily identifiable in these spectra.

However, because of the very high extinction near 2190 Å (the interstellar extinction at 2190 Å is $\sim 9^m.0$ for $E_{B-V} = 1$), heavily reddened stars will have very little observable flux near 2190 Å. In fact, the S2/68 spectral range is dominated by the broad 2200 Å feature extending from about 2600 Å to 1600 Å. This feature of interstellar dust is universal in the sense that the dust in the nearest external galaxy, the Large Magellanic Cloud exhibits this feature (Nandy and Morgan 1978). For example, the 2200 feature in the reddened LMC member SK-69-108 (recently obtained with IUE) is shown clearly in Fig. 1. This star (V = 12.10 B-V = 0.27) has been classified as B3Ia (Rousseau et al., 1978) and its visual reddening $E_{B-V} \sim 0^m.4$. The spectrum of a comparison star SK-67-111, which is also a LMC member and observed by IUE, does not show this feature (Fig. 2).

Any color involving the magnitude at 2190 Å as an interstellar extinction indicator is of not much use for faint early type stars which are likely to be very reddened. In view of this I am suggesting an ultraviolet photometric system which takes account of the fact that the interstellar extinction at

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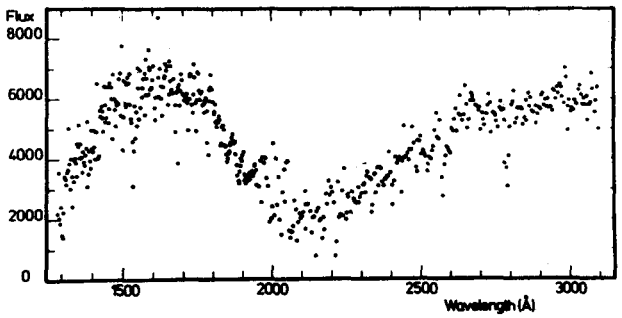

Fig. 1. The ultraviolet spectrum of a reddened LMC member SK-69-108.

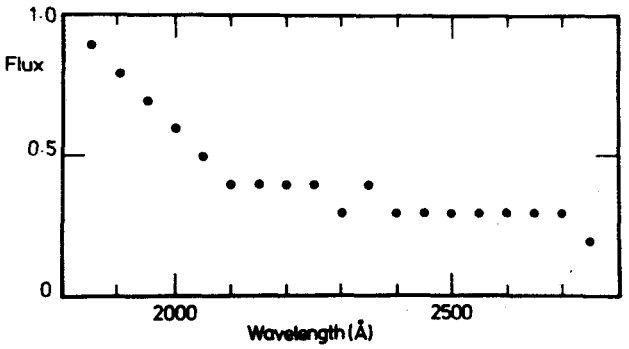

Fig. 2. The ultraviolet spectrum of a comparison star SK-67-111.

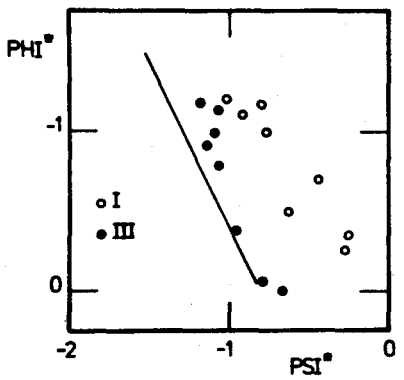

Fig. 3. The Φ vs ψ diagram for the dwarfs, giants and supergiants.

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2350 Å is almost equal to that at 1550 Å so that the color ($m_{1550} - m_{2350}$) is almost extinction free. The following extinction free parameters enable the extension of the two dimensional classification to the stars V = 10^{m}.0 from ultraviolet colors constructed from the S2/68 spectra:

$$\Phi \simeq (m_{2740} - V) - 1.37\,(m_{2350} - V)$$

$$\psi \simeq (m_{1550} - V) - 0.94\,(m_{2350} - V)$$

The initial result of the application of this system to the stars observed by the S2/68 survey is shown in Fig. 3; the main sequence is represented by the solid line, and the dots and the open circles denote giants and supergiants respectively. The broad band ($\Delta\lambda \sim 150$ Å) magnitudes m_{2740}, m_{2350} and m_{1550} have been obtained from the new catalogue of stellar ultraviolet fluxes (Thompson et al., 1978), which will be published soon.

REFERENCES

Nandy, K. (1977). Highlights of Astronomy, 4, Part II, 289.

Nandy, K. and Morgan, D. H. (1978). Nature, (in press).

Rousseau, J., Martin, N., Prevat, L., Robbeird, E., Robin, A. and Brunet, J.P. (1978). Astron. and Astrophys. Suppl., 31, 243.

Thompson, G.I., Nandy, K., Jamar, C., Monfils, A., Houziaux, L., Carnochan, D. and Wilson, R. (1978). Catalogue of Stellar Ultraviolet Fluxes (to be published by the Science Research Council, U.K.).