The absorption feature at 1920Å in the spectra of early-type supergiants in the Small Magellanic Cloud.

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The 1600-2500Å spectra of many early-type supergiants are dominated by a broad depression of the continuum near 1920Å. This depression, often called the 1920Å feature, was detected in S2/68 (TD-1) spectra of early B stars (Thompson et al. 1974) and was shown to be strongly luminosity dependent. It was also shown that its profile could be matched by the cumulative effects of FeIII absorption lines.

The 1920Å feature is also prominent in LMC early-type supergiants. In their studies of interstellar extinction in the LMC, Nandy et al. (1981), by separating the 1920Å feature from the 2200Å interstellar extinction maximum, found the profile of the 1920Å feature to be the same for LMC stars as for galactic stars and found its strength to be dependent on both spectral type and luminosity, being strongest for stars of spectral type BO-B3 with $-8.5 < M_V < -6.5$.

Early-type supergiants in the SMC have metal absorption lines generally weaker in strength than those of their LMC counterparts (Crampton and Greasley 1982). Is the 1920Å feature, attributed to FeIII lines, also weak in the SMC stars?

The observations used to answer this question are some 24 IUE low resolution spectra. The strength of the 1920Å feature is defined as $S(1920) = -2.5 \log [2F^o_{1920}/(F^o_{1700}+F^o_{2200})]$ where F^o_λ is the dereddened stellar flux in a band 30Å wide centred at wavelength λ. This is the same as the definition of S(1920) used by Nandy et al. (1981) for the LMC stars. The fluxes were dereddened using the appropriate extinction laws and colour excesses (Prévot et al. 1984). The reddening of many of the stars in question is small.

The results are shown in Figure 1 where S(1920) is plotted against absolute magnitude M_V. M_V was calculated using (B-V) colours and spectral types quoted by Azzopardi and Vigneau (1982) and Prévot et al. (1984) and an assumed distance modulus of 19.1 (Crampton and Greasley 1982). The chief source of error lies in the spectral classification: an error of ±1 subclass is assumed here. The results

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for the LMC stars are those presented by Nandy et al. (1981).

It is clear that S(1920) is on average weaker in the SMC BO-B3 stars than in comparable LMC stars and as with the LMC data, has a considerable spread. The SMC O stars, like those in the LMC, do not show significant 1920Å features. Similarly, SMC stars of type B5-B6 (not shown in Figure 1) also show the 1920Å feature but at a lower strength than the BO-B3 stars.

The profile of the 1920Å feature was measured from the five SMC stars with the greatest S(1920) and good signal-to-noise ratios. The profile of the 1920Å feature was then obtained by fitting an appropriate continuum and sub tracting a suitably scaled Lorentz profile (see Howarth 1983) representing the weak 2200Å feature. The average 1920Å profile normalized to 0.1 mag at 1920Å is shown in Figure 2 along with the profiles for the LMC and galactic supergiants taken from Nandy et al. (1981). It is clear that the profiles of the features are the same in all three galaxies.

The 1920Å feature, having a large equivalent width, can in principle be used as a distance indicator. However its difference in strength in the two Magellanic Clouds coupled with its strong spectral class dependence prevents its use as a reliable luminosity class indicator.

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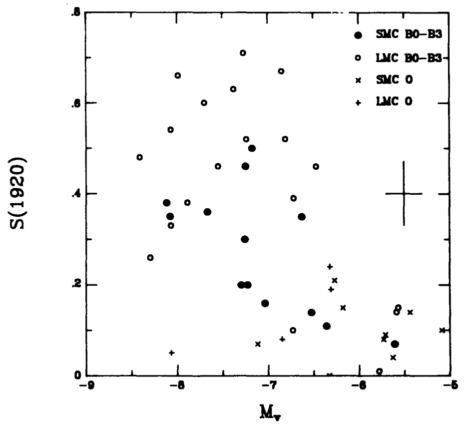

Fig.1 S(1920) vs absolute magnitude

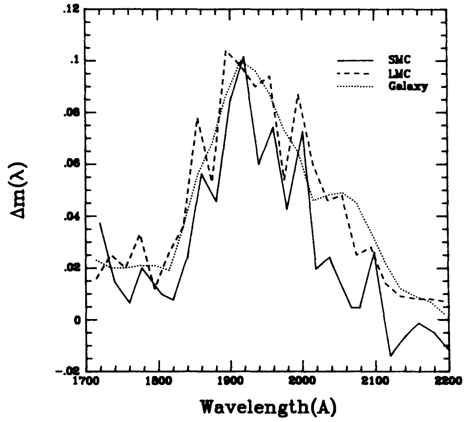

Fig.2 profile of 1920Å feature

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