UV EXTINCTION IN THE 30 DORADUS NEBULA AND THE UV ENERGY DISTRIBUTION OF R136a.

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The properties of ultraviolet interstellar extinction in and near the core of the 30 Doradus Nebula are studied. The pair method is employed using nine reddened stars from within 5' (80pc) of the core and nine unreddened stars from a variety of locations in the large Magellanic Cloud. All of the 30 Doradus stars examined appear to be reddened by $E(B-V) \simeq 0.12$ with an extinction law similar in wavelength dependence to those derived for the LMC by Koornneef and Code (1981) and Nandy et al. (1981). Several of the stars, including R136a, R145, and R147, are found to be additionally reddened by $E(B-V) \simeq 0.18$ with an extinction law qualitatively similar in wavelength dependence to the law found in the Orion region. A two-component model, featuring a layer of "LMC foreground dust" which affects all of the stars and a deeper layer of "nebular dust" which affects some of the stars, provides the simplest explanation of the extinction properties. The 2200 Å extinction bump is present in both curves. The wavelength positions of the bump and the bump profiles, when normalized to a linear "background extinction", are indistinguishable from the average Galactic bump. The strengths of the bumps, relative to E(B-V), are 20-30% weaker than for the Milky Way Curve.

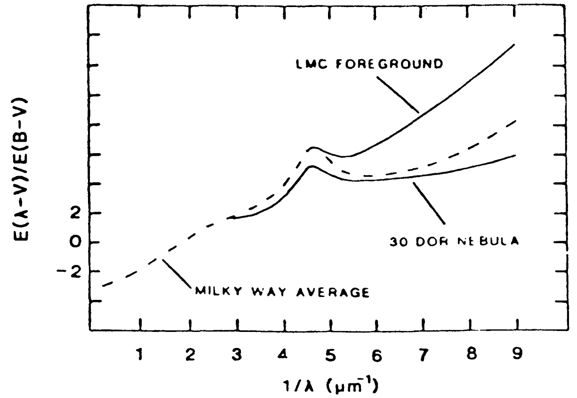

Figure 1. Extinction derived for "LMC foreground dust" and 30 Doradus "nebular dust" are shown along with the average Milky Way extinction.

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The extinction curves derived in this study have been applied to the ultraviolet energy distribution of R136a to determine its intrinsic continuum shape. The resultant UV continuum is similar in shape to that found for the LMC O3 stars R122 and Sk22-67. However, R136a is brighter than these stars by a factor of 13 and 43, respectively. This result implies an extremely large luminosity for R136a, because R122 is considered the most luminous "normal" star in the LMC, with $L \simeq 3 \times 10^6 L_\odot$. The dereddened energy distributions for R136a and R122 are shown in figure 2. Complete results of this investigation are contained in Savage et al. (1983) and Fitzpatrick and Savage (1984).

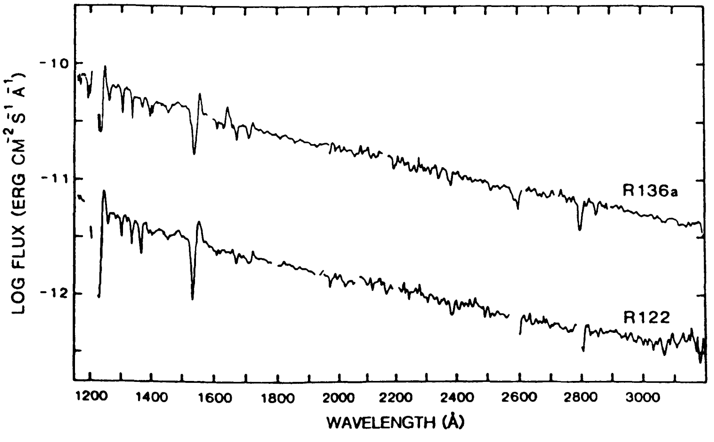

Figure 2. Dereddened IUE spectrum for R136a and R122. R136a was dereddened with E(B-V) = 0.06, 0.11, and 0.17 to account for Galactic foreground reddening, LMC foreground reddening and 30 Doradus Nebular reddening. The R136a fluxes have been scaled upwards by a factor of 2 in order to account for lightloss in the IUE small aperture. This correction assumes the ultraviolet radiation from R136a is dominated by radiation from component a1. A correction factor of 1.8 is required to correct for the small aperture light loss experienced by the extended emission around component a1 detected by Chu (this volume) at visible wavelengths. The comments by Melnick (1983) relating to the application of this correction factor are incorrect since the extended component has an extension comparable to the size of the IUE 3" aperture. R122 (O3III(f*)) is the brighter of the 2 LMC O3 stars, with $M_V \simeq -6.5$, and has been dereddened with E(B-V)=0.07 for Galactic foreground extinction.

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