

DIRECT IR DETERMINATION OF THE STELLAR LUMINOSITY FUNCTION TO $0.2 M_{\odot}$ IN ELLIPTICAL GALAXIES

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SUMMARY. We present a determination of the stellar luminosity function in luminous elliptical galaxies which includes all stars more massive than $0.15 M_{\odot}$. This limit corresponds to masses beyond the maximum in the solar neighbourhood stellar mass function, and therefore includes effectively all the luminous mass. Galaxies with X-ray evidence for current massive star formation, also show no evidence for enhanced low mass star formation in their central regions. All elliptical galaxies studied to date have stellar luminosity functions for masses above 0.15 solar masses which do not differ significantly from that in the solar neighbourhood. Elliptical galaxies have stellar bolometric mass-to-light ratios of $2.5 < M/L < 5.0$.

OBSERVATIONS

The 2.3 micron CO absorption feature is a sensitive gravity indicator, being weak in dwarfs and pronounced in giants cf. Figure 1. We have observed a grid of stars spanning a wide range of gravity and abundance, particularly including super metal rich M giants in Baade's Window. These have been used to synthesise spectral scans of two samples of elliptical galaxies using the technique of Arnaud and Gilmore (1986, MNRAS 220, 759). The first sample (Figure 2a) contains well studied galaxies with no known peculiarities, the second (Figure 2b) galaxies with X-ray evidence for substantial current accretion from a cooling gaseous halo.

RESULTS

There is no evidence for any statistically significant differences in the stellar luminosity function for stars with masses greater than 0.15 solar masses between elliptical galaxies with and without X-ray cooling flows. The best fit model to the stellar CO absorption spectra corresponds to a total bolometric mass-to-light ratio for stars more massive than 0.15 solar masses of: $2.5 < M/L < 5.0$.

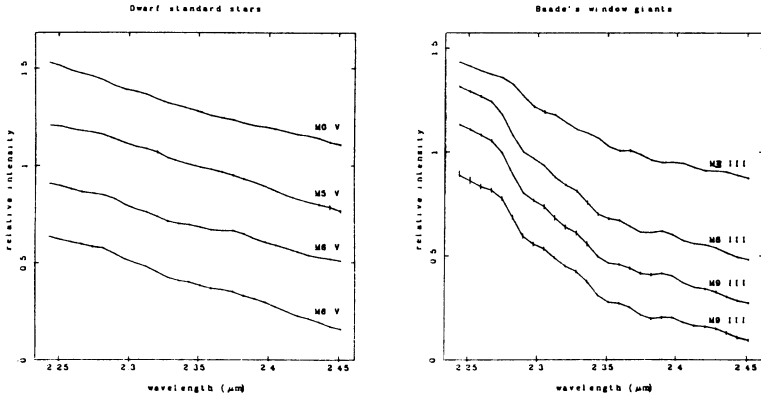


Figure 1. Spectra showing the difference in CO absorption between solar abundance dwarfs (left panel) and metal rich giants (right panel).

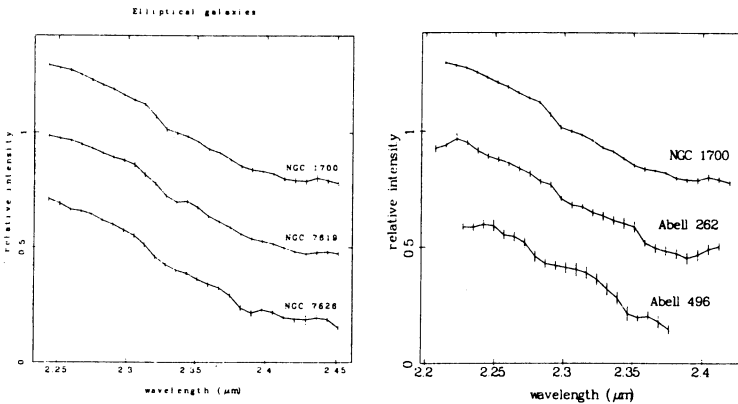


Figure 2. Spectra of elliptical galaxies without (left panel) and with (right panel) X-ray cooling flows. NGC 1700 is shown in both panels for comparison. There is no significant difference in the CO absorption between these galaxies.