LUMINOSITY FUNCTIONS AND MASS FUNCTIONS FOR MASSIVE STARS: ASSOCIATIONS IN THE LARGE AND SMALL MAGELLANIC CLOUDS

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UBV CCD photometry has been obtained for 14 OB associations in the Large and Small Magellanic Clouds. The data have been used to construct color-magnitude diagrams for the purpose of investigating the massive-star content of these extragalactic associations.

The color excesses derived for the various associations range from $E(B-V) = 0.01$ to 0.26 mag for the LMC, and from $E(B-V) = 0.06$ to 0.25 mag for the SMC associations. A detailed analysis and simulation of the effects of systematic and random errors in the photometry indicates that the observed scatter in the color excesses of individual stars can only be explained by the existence of differential reddening within many of the associations, in excess of a foreground Galactic component.

The main sequence luminosity functions of the Magellanic Cloud associations are remarkably similar over the luminosity range $-4 < M_V < -1$ mag. The slope of the luminosity function is flatter (0.3) than published luminosity functions slopes (0.7) for brighter ($M_V < -5$ mag) stars in the Milky Way and other Local Group galaxies.

The slope of the initial mass function (IMF) is $\Gamma = -2.0 \pm 0.5$ for masses $9 < M < 60 M_\odot$. There is no statistically significant evidence for a variation in the initial mass functions among the associations in any one galaxy. Nor is there any evidence for a difference between the slopes of the initial mass functions between the two galaxies; the implication of this last conclusion being that there is no dependence of the slope of the IMF on metallicity at this present epoch. There is however some suggestion that the slope of the IMF is leveling off for masses $M < 10 M_\odot$, but deeper and more complete studies are needed to confirm this trend.

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