THE LUMINOUS STELLAR CONTENT OF 30 DORADUS AND NGC 3603 - THE NEAREST VISIBLE GIANT HII REGIONS

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30 Dor in the LMC and NGC 3603 in the Galaxy are the nearest visible examples of similar giant (or even more massive supergiant) HII regions being studied in other more distant galaxies, where spatial resolution is a much more serious problem. Hence, understanding 30 Dor and NGC 3603 may provide important clues to understanding extragalactic giant HII regions in general.

On an angular scale, the bright stellar core regions of 30 Dor and NGC 3603 are very similar. On the basis of CCD imagery, Fig.1 shows that the central radial light distribution of each region satisfies a semi-empirical King profile for spherically symmetric, isothermal stellar systems, over a span of two orders of magnitude in radius. Allowing for background starlight (nebular light is almost negligible), the partially resolved, luminous central objects R136 (which emits $\sim$ 20% of the total starlight in 30 Dor) and HD 97950, respectively, do not contain stars that are significantly brighter than adjacent, isolated stars of high but normal luminosity (and mass), i.e. we find no evidence for supermassive stars.

Wolf-Rayet stars were detected using CCD image subtraction (narrow band minus broad band filter centered on the intense 4650-4686 A emission feature). We confirm that the number ratio of WR to O stars in 30 Dor and NGC 3603 is normal ($\sim$ 0.05) compared to other less exotic regions. This may mean that star formation bursts do not necessarily lead to high WR/O ratios. With the nearer distance modulus for the LMC of 18.2 (Schommer et al. 1984, Ap.J.(Lett.),285, L53), the WN6/7 and WN+O/Of stars in 30 Dor have identical mean absolute magnitudes $M_V \cong -6.7 \pm 0.6$ (σ), similar to their Galactic counterparts (Moffat et al. 1985, in prep.)

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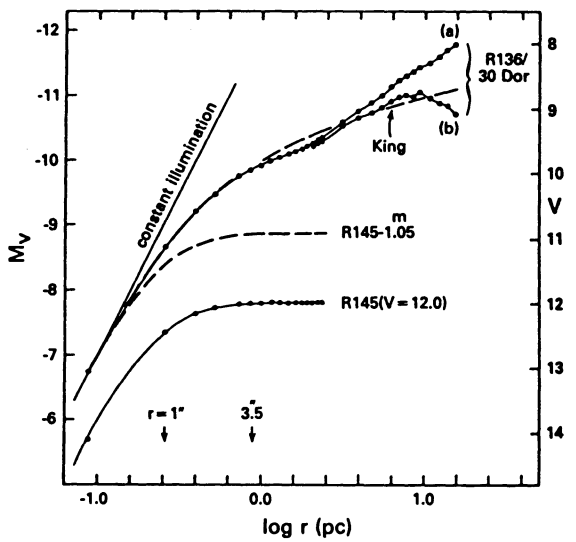
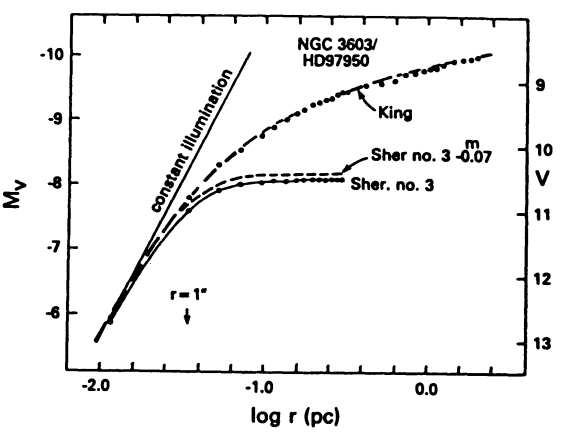
On an absolute scale, the stellar core of NGC 3603 is much more compact, with central density ~ two orders of magnitude greater than that of the 7 x more distant core of 30 Dor. The latter is similar to Galactic globular clusters. This may have some interesting dynamical consequences and may reflect a fundamental difference between massive star clusters in the Galaxy and in the LMC.
More details will be published in the Astrophysical Journal.

Fig.1: Accumulative magnitude versus radius from the center of 30 Dor and NGC 3603, relative to single stars on the same image, based on broad band CCD images at 4700 A. True distance moduli of 18.6 and 14.2, respectively, are assumed. Two extreme limits (a and b) for background subtraction in 30 Dor are indicated.





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