

How extreme are the Wolf-Rayet clusters in NGC3125?

L J Hadfield, P A Crowther

University of Sheffield, UK

We reinvestigate the massive stellar content of NGC3125 (Tol3) using VLT/FORS1 imaging & spectroscopy, plus archival VLT/ISAAC, HST/FOC and HST/STIS datasets. Narrow-band imaging confirms that A and B knots represent the primary sites of Wolf-Rayet (WR) stars, whilst HST imaging reveals that both regions host multiple clusters. Clusters A1 + A2 within region A host WR stars. although is not clear which cluster within region B hosts WR stars. Nebular properties infer an LMC-like metallicity. LMC template WN5-6 & WC4 spectra are matched to the observed optical WR bumps of A1 and B, permitting the contribution of WC stars to the blue bump to be quantified. We obtain $N(\text{WN5-6}:\text{WC4})=105:20, 55:0, 40:20$ for clusters A1, A2 and B1+B2, a factor of 3 lower than optical studies, as a result of a lower $E(B-V)$. Using Starburst99 models to estimate O star populations for individual clusters, we find $N(\text{WR})/N(\text{O})=0.2$ for A1 and 0.1 for A2 and B1+B2. From H α imaging, the O star content of the Giant HII regions A and B is found to be a factor of 5-10 times higher than that derived spectroscopically for the UV/optically bright clusters, suggesting that NGC3125 hosts optically obscured young massive clusters, further supported by VLT/ISAAC K band imaging. Archival HST/STIS UV spectroscopy confirms the low $E(B-V)$ towards A1, for which we have determined an SMC extinction law, in preference to an LMC or starburst law. We obtain $N(\text{WN5-6})=110$ from the slit-loss corrected H α 1640 line flux, in excellent agreement with optical result. However, this is a factor of 35 times lower than that inferred from the same dataset by Chandar et al. due to their use of a starburst extinction law. Highly discrepant stellar populations may result in spatially resolved star forming regions from UV and optical studies through use of different extinction laws.

Reference: 12 pages, MNRAS in press

Status: Manuscript has been accepted

Weblink: <http://arxiv.org/abs/astro-ph/0602591>

Comments:

Email: paul.crowther@sheffield.ac.uk