The Metallicity of the Young SMC Cluster NGC330 and its Environment Derived from CCD Strömgren Photometry

The distinct metal deficiency of the young globular cluster NGC 330 in the Small Magellanic Cloud, although independently found in several spectroscopic analyses (e.g. Spite and Spite, 1991) is nevertheless surprising. NGC330 belongs to the youngest population in the SMC. The metal abundances of young SMC field stars turned out to be about −0.6 dex (e.g. Spite and Spite, 1991), and not −1 dex or even lower as it was found for NGC330.

In an attempt to measure directly a possible metallicity difference between NGC330 and the surrounding field, we performed CCD Strömgren photometry in this region with the 2.2-m telescope on La Silla.

Our results are displayed in Figure 1. The filled circles are red supergiants which are radial-velocity members of NGC330, while the open symbols represent stars which are located at distances of more than 100″ from the cluster centre and which we consider to be field stars. Indicated are three loci of equal metallicities according to a calibration using published spectroscopic abundances and Strömgren colours of galactic stars of luminosity class III or brighter. We derive a mean abundance of the SMC field stars of −0.8 dex, while the cluster stars give −1.2 dex (a reddening of $E_{B-V}=0^m.03$ is assumed).

Here, we prefer not to put too much emphasis on the absolute values, although they are in reasonable agreement with the spectroscopic analyses. The important point is that cluster stars and stars in the neighbouring field show a differential offset in their metallicity as derived from photometry, a difference which agrees excellently with that predicted by spectroscopy. This questions the role of globular clusters as tracers of chemical evolution!

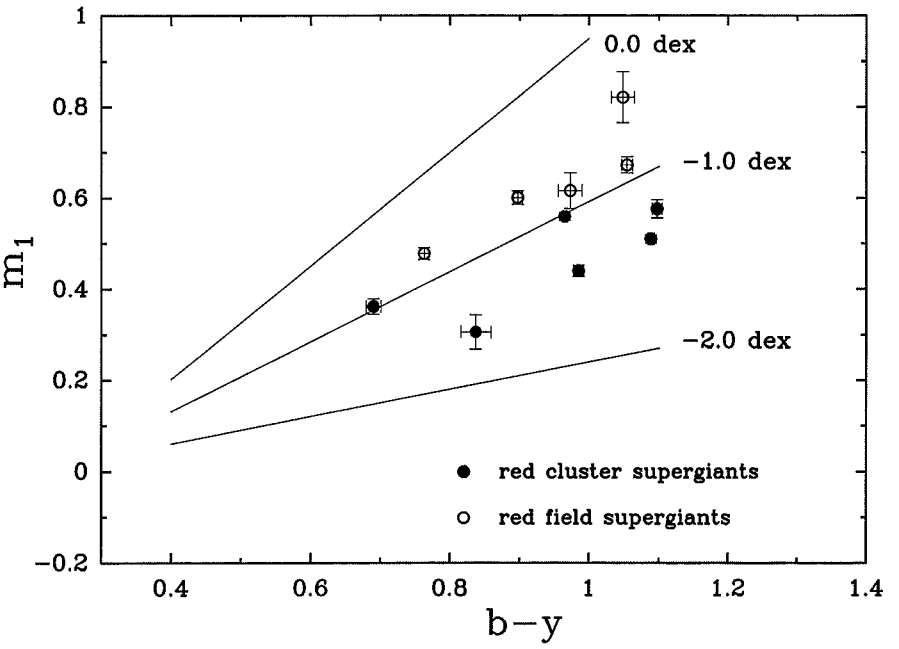

Figure 1: *This (b-y)-m_1 diagram shows the location of supergiants in NGC330 (filled circles) and in the surrounding field (open circles). A reddening of $E_{B-V}=0^m.03$ has been adopted. Indicated are three lines of equal metallicities. The cluster stars are clearly separated from the field stars, which is interpreted as an offset in metallicity of about 0.4 dex.*

The interpretation of this finding is beyond the scope of this short communication. However, a possible role of metal deficiency in a scenario of globular cluster formation has been suggested by several authors (e.g. Fall and Rees, 1985, Richtler and Seggewiss, 1989).

Our results show that CCD Strömgren photometry is a very promising tool for investigating the pattern of the distribution of stellar metallicities in the Magellanic Clouds.

References

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IC 4296: Observations of an Elliptical Galaxy Core

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Introduction

The cores of elliptical galaxies can provide very important clues to the formation and dynamical evolution of the parent galaxies, e.g. recent episodes of star formation, merging and cannibalism, possible presence of central black holes. Cores kinematically decoupled from the main body of the galaxy are known to exist in many ellipticals and are widely interpreted as evidence for galactic cannibalism. Different signatures of decoupling have been found:

- counter-rotation and, more generally, misalignment of the kinematic axes of the stellar component in the central region with respect to the main galaxy body (Franx and Illingworth, 1988);
- anomalous velocity gradients and dispersion profiles in the central parts (see, e.g., Tonry, 1984; Jedrzejewski and Schechter, 1988);
- central light excess (Kormendy, 1985).

More recently, central unresolved