

The stellar population in the dwarf starburst galaxy NGC 1705

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Abstract. We report preliminary results from high-resolution UV spectroscopy of the super star cluster 1 in the nearby dwarf starburst galaxy NGC 1705, using *HST*-STIS. These new observations can help us to quantify accurately the stellar content in this super cluster. Together with high quality spectra from SMC stars and the evolutionary synthesis code STARBURST99, we estimate an age for this cluster of 12 ± 3 Myr, in agreement with previous studies. The measured dynamical mass and the theoretical L/M ratio suggest a normal IMF down to the hydrogen-burning limit.

1. Introduction

NGC 1705 is one of the nearest and therefore best studied current starburst galaxies. It hosts one of the most luminous super star clusters known, NGC 1705-1. The super star cluster produces on its own 40% of the total UV emission from this galaxy. Previous studies (Meurer *et al.* 1992) have found a photometric age around 13 Myr. In this work we use features in the high-resolution UV spectrum to constrain the age of the stellar population and the IMF from a comparison with stars from the SMC and with models at $Z = 0.004$ from STARBURST99.

2. Observations, analysis and reduction

Echelle high-resolution UV spectra with *HST*-STIS were obtained in October 2000 (under observing program 8297) for NGC 1705 and October 2001 (under program 9116) for the SMC stars. Sections of the spectrum with $R = 0.015$ Å per pixel were combined, covering 1140–3050 Å for NGC 1705 and 1140–2370 Å for the SMC stars. The wavelength scale was rebinned into the rest frame

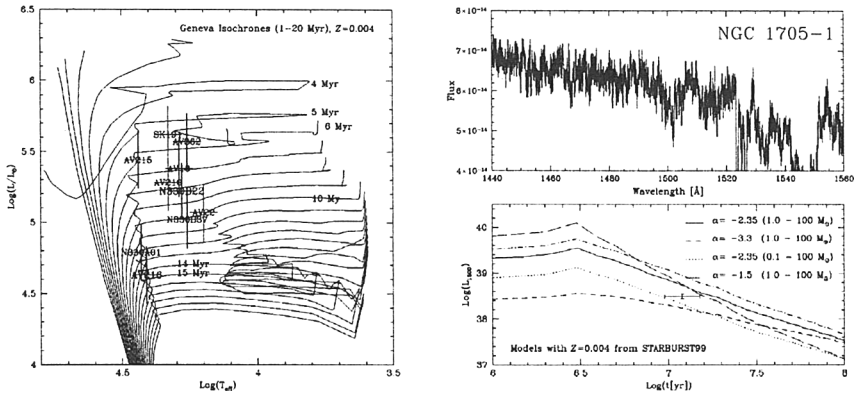


Figure 1. *Left:* H-R diagram for SMC stars. *Right:* spectrum of NGC 1705-1 around 1500 Å compared with models from STARBURST99.

of NGC 1705 ($v_{\text{hel}} = 622 \text{ km s}^{-1}$; Meurer *et al.* 1992) and SMC stars ($v_{\text{hel}} = 150 \text{ km s}^{-1}$). No reddening correction was found to be necessary for NGC 1705-1.

3. Discussion

We have resolved blends of lines shown in Heckman & Leitherer (1997) into lines from the Milky Way, a high-velocity cloud and lines originating in NGC 1705. We analyzed the stellar population by comparing the B-type stars from the SMC with the spectrum of NGC 1705. Stellar lines like Si III $\lambda 1417.2$ and C III $\lambda 1175.7$ agree best with the stars AV216 and NGC 330-B22. This suggest a turn-off age of $12 \pm 3 \text{ Myr}$ for NGC 1705-1 (Figure 1). The luminosity at 1500 Å has been measured from the NGC 1705 spectrum. We obtained $\log L_{1500} = 38.49 \pm 0.05$. This allows us to probe the low-mass IMF in combination with the dynamical mass of NGC 1705-1 ($M = 8.2 \pm 2.1 \times 10^4 M_{\odot}$, Ho & Filippenko 1996). We find an initial mass function with low-mass stars as shown in Figure 1, which agrees with IMF and M/L rates for clusters in the Galaxy (Ho & Filippenko 1996).

References

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