

H α EMISSION-LINE STAR SURVEY IN TWO YOUNG SMALL MAGELLANIC CLOUD STAR CLUSTERS

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RESUMEN

Se informa sobre una b squeda de estrellas con H α en emisi n dentro de dos c mulos j venes de la Nube Menor de Magallanes: NGC 346 y NGC 371; usando para tal fin el telescopio de 3.6-m del ESO equipado con EFOSC en modo espectrogr fico sin ranura, “grism” y un filtro interferencial en la regi n de H α + [N II]. Los datos fueron reducidos con un procedimiento semi-autom tico dentro del ambiente de MIDAS, a fines de detectar perfiles de H α y/o [N II] en emisi n dentro del campo espectrosc pico bidimensional.

ABSTRACT

We report a search for H α emission-line stars that was carried out in two young star clusters of the Small Magellanic Cloud: NGC 346 and NGC 371; using the ESO 3.6-m telescope equipped with EFOSC in the slitless spectroscopic mode, a grism, and an H α + [N II] interference filter. Data were reduced in the MIDAS environment by means of a semi-automatic procedure in order to detect the H α and/or [N II] emission features on the 2D-spectroscopic frames.

Key words: GALAXIES: STAR CLUSTERS: INDIVIDUAL: (NGC 346, NGC 371) — MAGELLANIC CLOUDS — STARS: EMISSION-LINE, Be

Within the framework of the ESO key programme “Coordinated Investigations of Selected Regions in the Magellanic Clouds” (see Azzopardi 1993), we had the opportunity to search for H α emission-line stars in some young star clusters in the Small Magellanic Cloud (SMC), using the ESO 3.6-m telescope equipped with EFOSC in slitless spectroscopic mode, a grism providing a dispersion of 270 Å mm^{−1} (3.5 Å pixel^{−1}) and an H α + [N II] interference filter ($\lambda_0 = 6563$ Å, $\Delta\lambda = 120$ Å). By reducing both the sky background —due mainly to the contribution of faint stars— and the length of the spectra to the useful range, this interference filter allowed us to survey H α emission-line stars in compact clusters, even for their crowded inner regions. The efficiency of this spectroscopic observing technique may be seen comparing H α emission-line stars detected by Muratorio & Azzopardi (1992) in NGC 330, and those detected by Grebel, Richtler, & de Boer (1992) using a direct imaging photometric method with a CCD camera on the Max Planck Gesellschaft–ESO 2.2-m telescope (same projected pixel size of 0''34 and similar integration times). It is clear that the use of the 3.6-m telescope with EFOSC more than compensates the flux lost due to the dispersion of the light by the grism, and the sizes of the spectra are not a serious problem in regard to the crowding. In addition, the emission-line nature of stars revealed by this grism technique does not need subsequent confirmation by spectroscopic observations. H α emission-line stars identified in NGC 376 have previously been reported by Muratorio & Azzopardi (1993). This paper is a survey report on two additional young star clusters in the SMC, namely NGC 346 (Fig. 1) and NGC 371 (Fig. 2). Obviously, cluster memberships of all identified H α emission-line stars remain to be proved.

The semi-automatic procedure used to reduce the data has been described by Muratorio & Azzopardi (1992). Briefly, each stellar spectrum, whose position has previously been determined using a direct image taken with the same instrument, is compared automatically with some template stellar spectra obtained from the brightest emission-line stars of a given frame. Therefore, all detected emission-line candidates are visually scrutinized for a final selection, rejecting false emission detection induced by superpositions of spectra.

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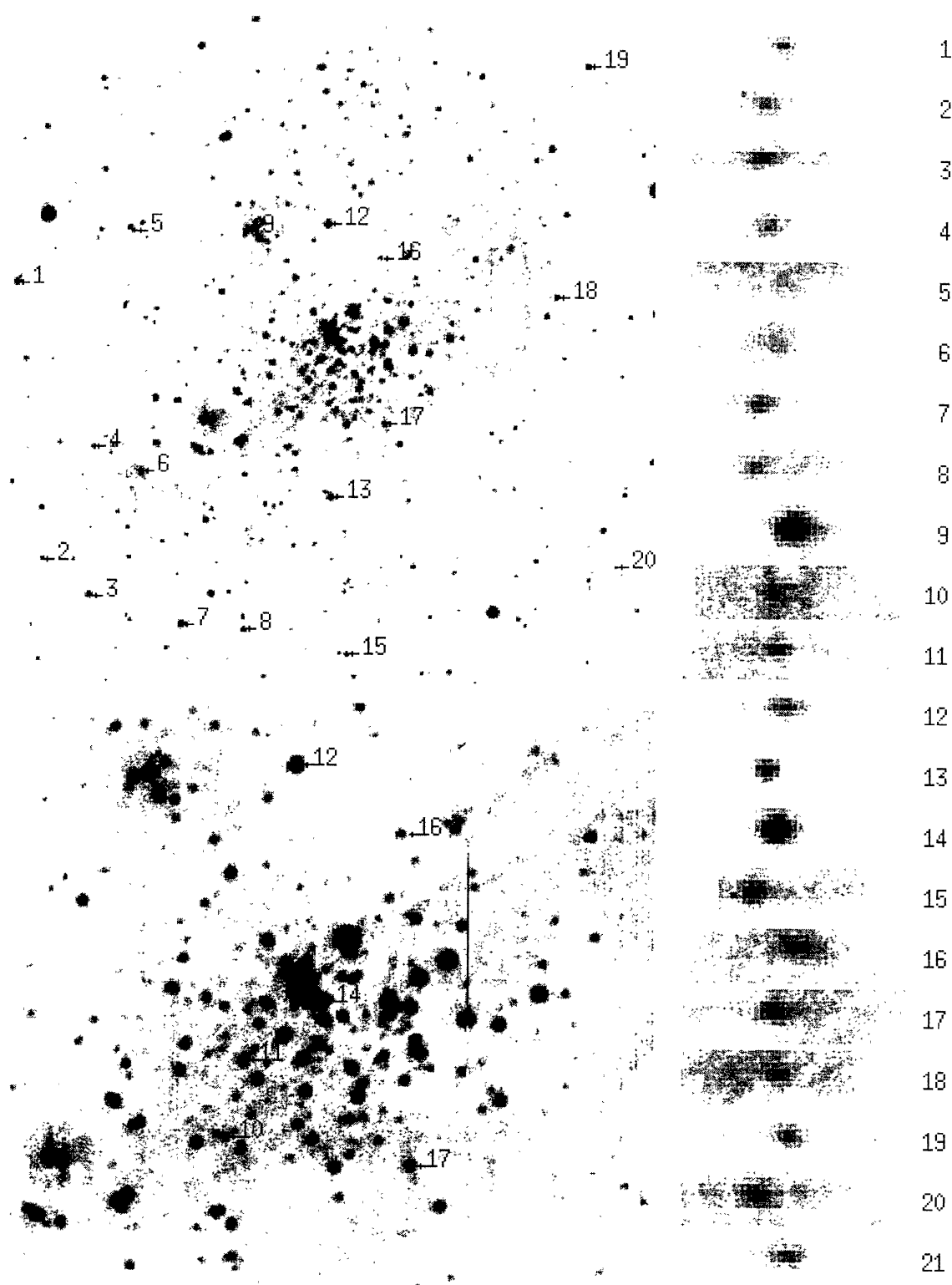


Fig. 1. NGC 346: finding chart for $H\alpha$ and/or $[N II]$ objects seen on the line of sight of the star cluster (upper left), North is at the top, East to the left; same picture for its inner regions (lower left); extracted spectra from the slitless spectroscopy frame (right).

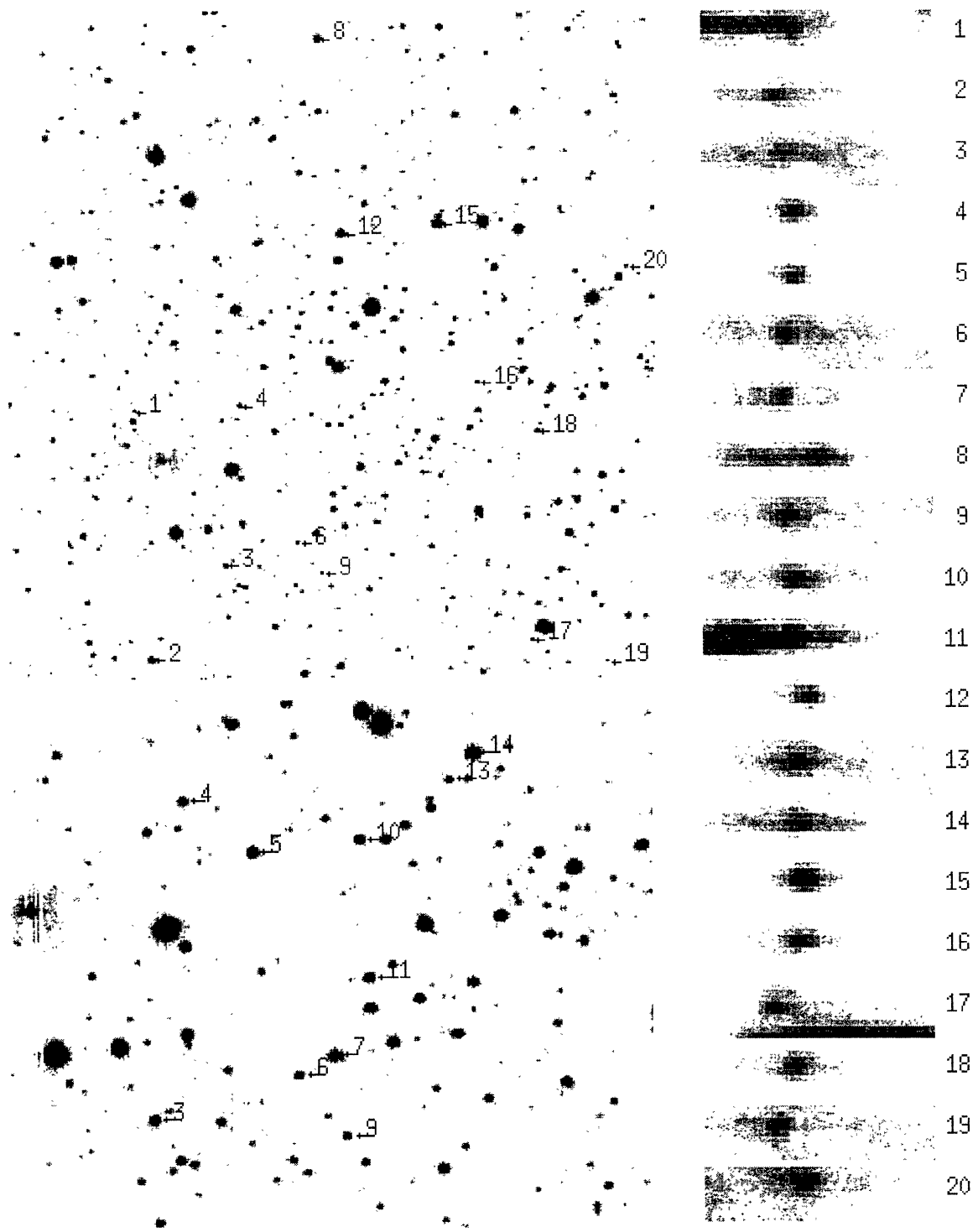


Fig. 2. NGC 371: finding chart for $H\alpha$ and/or $[NII]$ objects seen on the line of sight of the star cluster (upper left), North is at the top, East to the left; same picture for its inner regions (lower left); extracted spectra from the slitless spectroscopy frame (right).