A NEW SURVEY FOR Hα-EMISSION-LINE STARS IN THE SMALL MAGELLANIC CLOUD

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A number of surveys for emission-line objects have been made in the Magellanic Clouds (see Westerlund, 1983). Hα-emission-line objects in the Small Magellanic Cloud (SMC) have been identified mainly by Henize (1956) and Lindsay (1961). Since this pioneering work took place, no other extensive survey for this kind of object - such as the one by Bohannan and Epps (1974) in the Large Cloud - has been carried out in the SMC. Consequently the detection of Hα-emission-line objects in the SMC is still rather incomplete.

Recent observations with the Curtis Schmidt telescope at CTIO allowed one of us (MA) to secure a set of very good SMC plates with the 10° objective-prism (420 Å mm^{-1} dispersion at Hα) through a 120 Å bandwidth Hα interference filter (λ_o = 6565 Å). Exposures of ½, 1, 2 and 4 hours on hypersensitized IIIa-F plates permitted us to survey a field of 3.5 × 3.5 sq. degrees fully covering the central regions of the SMC.

Many new Hα-emission-line objects have been detected, especially in the very crowded fields of the SMC Bar. Since our spectra are very short, the number of overlaps is greatly reduced. In addition, the use of interference filters cuts down the sky background, allowing longer exposures and hence the possibility of reaching fainter stars (Azzopardi, 1983). For instance, our 4 hour exposure plate allowed us to reach the continuum of Be stars 2 to 3 magnitudes fainter than those found by previous Hα-objective-prism surveys.

This new SMC survey - which is in an early stage - resulted in the visual identification of about 3000 Hα-emission-line objects, quintupling the number of these objects found during the previous most complete survey (593 objects) by Lindsay (1961). Work is in progress. The 4 hour exposure objective-prism plate has been fully scanned with the PDS microdensitometer of the "Laboratoire d'Astronomie Spatiale" of Marseille in order to detect the continuum, if any, of the very

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faint Hα-emission-line objects, to compute accurate positions and also to determine the shape and intensity of Hα-emission-lines.

The main goal of this new survey is the most complete detection possible of Be stars in order to determine more accurately their distribution throughout the large SMC stellar complexes and to understand better their role in stellar evolution. For example, using our technique, 14 Hα-emission-line objects have been identified in the region (5 sq. arc min.) centered on NGC 330 where just 3 (Nos. 298, 303 and 305) were previously known (Lindsay, 1961). All of these are Be stars except L 305 which is a planetary nebula. Its objective-prism spectrum clearly shows the λ6584 [N II] nebular excitation line previously detected by Webster (1976).

An interesting by-product of this survey is the discovery of 15 new faint nebulae - probably planetary nebula candidates - showing λ6584 [N II] lines. For two of them, these spectral features have already been confirmed on Boller & Chivens spectra (8 Å FWHM) obtained at the ESO 3.6 m telescope. If the λ6584 [N II] lines are also confirmed in the remaining objects, they will allow us to investigate whether nitrogen is really deficient in the SMC as suggested by Sanduleak and his associates (1972, 1978).

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