Part 2. Interstellar Medium

Section B. Poster Papers

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New Views of the Magellanic Clouds
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Deep Wide-field Hα Images of the Magellanic Clouds

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Abstract. A new Hα survey of the Magellanic Clouds which is being carried out on fine-grained Tech-Pan emulsion with the UK 1.2m Schmidt Telescope will have the best combination of depth and resolution of any that cover such a wide area in and around the Magellanic Clouds. Preliminary results show that the films will provide identifications of new emission-line stars and nebulae.

1. Introduction

A new, large, single-element, Hα filter is being used with the UK 1.2m Schmidt Telescope for a survey of the Milky Way and Magellanic Clouds (Parker & Phillipps 1998) using fine-grained, panchromatic Tech-Pan emulsion on film as a detector. The standard exposure time is 180 minutes and the useful area covered is circular and 5.5 deg across (Parker & Bland-Hawthorn 1998). The survey of the Magellanic Clouds covers an area of ~650 sq deg using 40 field centres spaced 4 deg apart. The Hα exposures are accompanied by contemporaneous short R-band exposures (15mins) using Tech-Pan film and an OG590 filter.

As well as obtaining complete coverage of the Magellanic Cloud area, the UKST has an additional programme in which a set of ten 120 minute exposures is taken on the same centre and digitally co-added (stacked) to form a very deep image. The stacking programme has started on two centres, one in each Cloud.

2. Observations

The LMC field centre is $5^h\ 22^m$, $-69°$ (1950.0). To date, three good quality 120 minute exposures have been obtained. These films have been scanned using the SuperCOSMOS machine with a pixel size of 10 microns. The pixel maps were mapped on to the x-y coordinate grid of one chosen as master image, and were then added using a preliminary version of the stacking software which in its final

form will register and add the data and filter extraneous noise features (Knox et al. 1998). Data from the new short red films are not yet available, but older measurements of an SR Survey plate on IIIa-F emulsion with the RG630 filter have been used instead for initial comparison with the Hα data.

3. Results

The limiting magnitude of each exposure is around R $\leq$ 19.5, based on identifications in the sequence by Will et al. (1997) in association LH47.

One purpose of obtaining these films was to search for point sources that emit in Hα (see Morgan 1998). Accordingly, the first test was to search a crowded 2000 $\times$ 2000 pixel area in the Bar on the master Hα film and the SR plate for objects visible only on the former. Three small, faint nebulae were found: two known planetary nebulae – J15 (Jacoby 1980) and MG28 (Morgan & Good 1992) – and one unknown nebula. The last of these cannot be seen in [OIII]λ5007 on deep UKST objective-prism plates and appears resolved in Hα with a diameter of $\sim$5 arcsec. Its brightest pixel corresponds to $\sim 20\sigma$, whereas the two known planetary nebulae are $\sim 50\sigma$ and 60σ respectively, σ being the rms of the sky background. The nebula J15 is one of the faintest known planetary nebulae and has an Hα flux of $1.9 \times 10^{-14}\,\mathrm{erg\,cm^{-2}\,s^{-1}}$ (Boroson & Liebert 1989).

A similar exercise was carried out around the bright ($m_v = 13.4$) Bep star BE189 (Bohannan & Epps 1974) which has an Hα equivalent width of $\sim$112Å (Morgan et al. 1992). It too is easily identified.

These preliminary new images already have the best combination of depth and resolution of any that cover such a wide area in and around the Magellanic Clouds. They will be used to identify new Hα-emitting objects such as planetary nebulae (especially low-excitation objects), faint, diffuse nebulae and emission-line stars. The full stacking procedure will reduce the background noise significantly and will allow detection of even fainter nebulae.

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