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SEARCHING FOR EMISSION-LINE GALAXIES: THE UCM SURVEY

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1. The UCM Survey.

We are carrying out a long-term project with the main purposes of finding and analysing low metallicity galaxies. A very small number of very low metallicity galaxies is known up to now. However these objects are particularly interesting since they are excellent candidates to "young galaxies" in evolutionary sense as POX186 (Kunth, Maurogordato & Vigroux, 1988). Since the interstellar matter in these objects is only weakly contaminated by stellar evolution, their study could provide valuable information about the primordial helium abundance and therefore it could place constraints on the different Big-Bang models.

The instrumental set up of our survey is an objective-prism used with the Schmidt telescope at Calar Alto Observatory. By using hypersensitized IIIaF emulsion and RG630 filter low resolution spectra in the H α region of objects in a wide field is obtained (Rego et al. 1989, Zamorano et al. 1990).

Surveys carried out in the past two decades at optical blue wavelengths have also produced large samples of emission-line galaxies (ELGs), for example MacAlpine & Willians 1981 and references therein, Wasilewski 1983, Salzer and MacAlpine 1988, or Smith et al. 1976. Relying primarily on objective-prism plates taken in the blue, these surveys have found over 3000 blue/emission-line galaxies so far. A significant number of star-forming galaxies are missed by optical surveys in the blue because of their low-excitation spectra (MacAlpine and Willians 1981, Markarian et al. 1981 and references therein) or their low metallicity (Kunth and Sargent, 1986). This is identify that kind of galaxies.

2. General Objectives.

1. Identification and study of new young, low metallicity galaxies.
2. Clasification and determination of the overall properties and completeness of the sample.
3. Spatial distribution and luminosity function of the new galaxy population.
4. Comparison with other surveys. In particular, differences in the samples obtained with various objective-prism techniques.
5. Overall relation between the far infrared properties and the optical behaviour of the star-forming galaxies.
6. Determination of the evolutionary status and the different stellar subyaent population of the objects in order to detect any effect of evolution in the starburst phenomena.

3. Up-to-date main results.

- 18 plates have been visually scanned (648 square degrees of sky). So far the sample of ELGs obtained from our survey consists of 282 objects, i.e. 1 object per 2 square degrees. The detailed lists of the objects will be published this year (Zamorano et al. 1992, Rego et al. 1992).
- 136 candidates (the 48% of the sample) are galaxies which do not appear in any published catalogue. Only 36% of objects are Zwicky galaxies. Our survey recovers all the emission-line Markarian galaxies with $z < 0.04$.
- Spectra at moderate resolution have been obtained for 113 candidates, i.e. 40% of the whole sample. A 85% are emission-line galaxies of different types.
- CCD images of 181 galaxies (64%) in the r band of Gunn-Thuan have been obtained with the 2.2 m telescope at Calar Alto.
- Far Infrared Data is also available for the whole sample after coadding the IRAS original data at Rutherford Appleton Lab. (Gallego, 1992). Preliminary analysis of IRAS colors (Rego et al. 1991) and luminosities shows different behaviour between our survey and other samples as Markarian.
- With the data available up to now, the completeness of the UCM survey is assured up to $r=17.3$.

As an important result we have found that the F25 / F100 IRAS ratio is a good indicator of low metallicity and high excitation (Gallego, 1992). From the FIR data, we have selected a special subsample. These galaxies are candidates to genuine young galaxies which are experiencing the first burst of star formation because: 1) Previous spectroscopic observations, of low signal-to-noise, at low resolution, show galaxies with very high ionization and low abundance 2) CCD images with the 2.2 m telescope show compact, isolated and low-luminosity galaxies and 3) the far-infrared IRAS data point to the particular nature of these galaxies.

4. References

- Gallego, J., (1992) ISO/IRAS Newsletter (in press).
- Kunth, D., Sargent, W.L.W., (1986). Ap. J. 300, 496.
- Kunth, D., Maugé, S., Vigroux, L., (1988), Astron. Astroph. 204, 10.
- MacAlpine, G.M., Williams, G., (1981). Ap. J. S.S. 45, 113.
- Markarian, B.E., et al., (1981). Astrofizika 17, 619.
- Rego, M., Zamorano, J., González-Riestra, R. (1989). Astron. Astroph. S.S. 79, 443.
- Rego, M., Zamorano, J., Cordero, M., (1991). Active Galactic Nuclei symposium, Heidelberg, Springer-Verlag, in press.
- Salzer, J.J., MacAlpine, G.M., (1988). A. J. 96, 1192.
- Smith, M.G., Aguierre, C., Zelman, M., (1976). Ap. J. S.S. 32, 217.
- Wasilewski, A.J. (1983). Ap. J. 272, 68.
- Zamorano, J., Rego, M., González-Riestra, R., Rodríguez, G., (1990). Astrophys. Space Science 170, 353.