

Preliminary reductions of the WFI data have been made, but a powerful computer was still missing at that time. Remember that a full frame is 300 Mb!

Here are the different reduction stages adopted:

- Bias subtraction and FF division
- Cosmic-event removing
- Combine the 5 images per filter (not yet done)
- Frame recentring (Continuum as reference)
- Flux calibration
- Continuum frame subtraction
- ([OIII]-Continuum) divided by (H α -Continuum)
- Accurate astrometry using the ESO Starcat package facility (not yet done)

5. Results

These observations demonstrate that, as expected, we still can find a lot of new emission-line objects. Moreover, these observations provide, in the survey area, an unbiased and complete survey (range greater than 8 magnitudes).

As a first product this study, preliminary to further spectroscopic study, will lead to the publication of a catalogue with precise coordinates and good finding charts of more than 1000 emission objects (PNe, HII regions, SNR, H α -emission stars, etc.) per square degree.

The performance of the WFI is very encouraging:

- Firstly, we were able to (easily) find the 6 known PNe present in our 4 fields, and moreover our photometry agreed

within 10–20% with the fluxes derived spectroscopically.

- Secondly, with the calibration in fluxes, we confirm that we easily reach fluxes down to $F_{\alpha} = 10^{-16}$ erg.cm $^{-2}$ s $^{-1}$, and therefore that we are able to find objects 20–50 times fainter than the last deep survey (Jacoby 1980).

With a bigger area covered and better statistics, we will derive an unbiased PNe luminosity function.

In each of the two first 30' by 30' reduced fields we discovered more than 100 emission-line objects. In one field we found 2 new PNe, 8 compact HII regions and ~ 80 H α -emission-line stars. In the other field, also 2 new PNe, 4 compact HII regions and ~140 H α - emission line stars.

All 4 PNe are very faint and 2 of them are fully resolved (diameter > 1.0"). The PNe have fluxes of the order of 10^{-16} erg.cm $^{-2}$.s $^{-1}$, which one can compare to brightest ($3000 \cdot 10^{-16}$ erg.cm $^{-2}$.s $^{-1}$) or the faintest ($\sim 200 \cdot 10^{-16}$ erg.cm $^{-2}$.s $^{-1}$) PNe already known.

Figures 1 to 4 show the finding charts in both H α and [OIII] filters.

5.1. Expected PNe number in the LMC

In 1978 Sanduleak et al. have estimated the total PNe number to 400 in the LMC (and 100 in the SMC accordingly to the LMC/SMC mass ratio equal to 4). In 1980 Jacoby determined these numbers to be 996 and 285, respectively.

The current number of known PNe in the Magellanic Clouds are respectively

282 and ~ 85 for the LMC and the SMC.

This study demonstrates that many PNe have been missed by the previous surveys and that probably a few hundred can be discovered with the current instrumentation.

In the studied area we double the known sample of PNe, therefore, we can extrapolate to find more than 250 new PNe in the LMC. Statistically, we can at least expect to find about 50–100 new faint and extended PNe in the Bar. These PNe are of particular interest because they are old, allowing to determine galaxy abundances at epoch up to 10 billions years.

6. Conclusion

The WFI has proved with this study that it is an excellent efficient instrument which can be used to survey large areas (like nearby galaxies) and still discover many faint interesting objects.

We hope that we will soon be able to cover several other square degree and determine an accurate PNe luminosity functions over this complete and unbiased sample.

The next step, with such faint objects, will be a follow-up with VLT telescopes (FORS) to obtain very good S/N spectra and derive accurate abundances.

References

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(1st July 1999 – 30th September 1999)

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ESO, the European Southern Observatory, was created in 1962 to "... establish and operate an astronomical observatory in the southern hemisphere, equipped with powerful instruments, with the aim of furthering and organising collaboration in astronomy ..." It is supported by eight countries: Belgium, Denmark, France, Germany, Italy, the Netherlands, Sweden and Switzerland. ESO operates at two sites. It operates the La Silla observatory in the Atacama desert, 600 km north of Santiago de Chile, at 2,400 m altitude, where several optical telescopes with diameters up to 3.6 m and a 15-m submillimetre radio telescope (SEST) are now in operation. In addition, ESO is in the process of building the Very Large Telescope (VLT) on Paranal, a 2,600 m high mountain approximately 130 km south of Antofagasta, in the driest part of the Atacama desert. The VLT consists of four 8.2-metre and three 1.8-metre telescopes. These telescopes can also be used in combination as a giant interferometer (VLTi). The first 8.2-metre telescope (called ANTU) started regular scientific operations in April 1999 and also the second one (KUEYEN) has already delivered pictures of excellent quality. Over 1200 proposals are made each year for the use of the ESO telescopes. The ESO Headquarters are located in Garching, near Munich, Germany. This is the scientific, technical and administrative centre of ESO where technical development programmes are carried out to provide the La Silla and Paranal observatories with the most advanced instruments. There are also extensive astronomical data facilities. In Europe ESO employs about 200 international staff members, Fellows and Associates; in Chile about 70 and, in addition, about 130 local staff members.

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List of Scientific Preprints

(July–September 1999)

1331. C. Mouton, K. Sellgren, L. Verstraete, A. Léger: Upper Limit on C₆₀ and C₆₀⁺ Features in the ISO-SWS Spectrum of the Reflection Nebula NGC 7023. *A&A*.
1332. V. Doublier, D. Kunth, F. Courbin, P. Magain: POX 186: the Ultracompact Blue Compact Dwarf Galaxy Reveals its Nature. *A&A*.
1333. V. Doublier, A. Caulet, G. Comte: Multi-Spectral Study of a New Sample of Blue Compact Dwarf Galaxies: II. – B and R Surface Photometry of 22 Southern Objects. *A&A*.
1334. Th. Rivinius, S. Štefl, D. Baade: Central Quasi-Emission Peaks in Shell Spectra and the Rotation of Disks of Be Stars. *A&A*.
1335. F. Marchis, H. Boehnhardt, O.R. Hainaut, D. Le Mignant: Adaptive Optics Observations of the Innermost Coma of C/1995 O1. Is there a "Hale" and a "Bopp" in Comet Hale-Bopp? *A&A*.
1336. P. François, D. Briot, F. Spite, J. Schneider: Line Profile Variation and Planets Around 51 Peg and υ And. *A&A*.
1337. F. Comerón and J. Torra: A Near Infrared Study of the HII/Photodissociation Region DR 18 in Cygnus. *A&A*.
1338. S. Arnouts et al.: Measuring and Modelling the Redshift Evolution of Clustering: the Hubble Deep Field North. *M.N.R.A.S.*
1339. G. De Marchi, F. Paresce, L. Pulone: The Mass Function of Main Sequence Stars in NGC 6397 from Near IR and Optical High Resolution HST Observations. *ApJ*.
1340. F. Comerón: Vertical Motion and Expansion of the Gould Belt. *A&A*.

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