RevMexAA (Serie de Conferencias), **29**, 168–168 (2007)

THE OTELO PROJECT

J. Cepa,[1,2] E. J. Alfaro,[3] H. O. Castañeda,[1] J. Gallego,[4] J. I. González-Serrano,[5] J. J. González,[6] D. H. Jones,[7] A. M. Pérez-García,[1] and M. Sánchez-Portal[8]

OSIRIS is the Spanish Day One instrument for the GTC 10.4m telescope. OSIRIS is a general purpose instrument for imaging, low-resolution long slit and multi-object spectroscopy (MOS). OSIRIS has a field of view of 8.6×8.6 arcminutes, which makes it ideal for deep surveys, and operates in the optical wavelength range from 365 through 1000nm. The main characteristic that makes OSIRIS unique amongst other instruments in 8-10m class telescopes is the use of Tunable Filters (Bland-Hawthorn & Jones 1998). These allow a continuous selection of both the central wavelength and the width, thus providing scanning narrow band imaging within the OSIRIS wavelength range. The combination of the large GTC aperture, large OSIRIS field of view and availability of the TFs makes OTELO a truly unique emission line survey.

OTELO will explore the wavelength intervals, or windows through the OH emission line forest, centred at 815 and 920 nm, with spectral widths of 15 and 18 nm. Telluric bands in the first window are insignificant, while their higher strength around 920 nm require an increase of the exposure time of $\simeq$15% (Stevenson 1994) in the second window.

The resolution and sampling used will be such that the [NII]λ658.3 nm line can be accurately deblended from Hα, which is essential for metallicity discrimination.

A cross correlation with the, currently under way, broad band UBVRIJK auxiliary survey for the same fields, will allow (i) identifying the emission line detected via photometric redshifts, and (ii) whenever possible, a morphological classification of the objects. The total GTC exposure time required to cover 1 square degree is about 100 dark/grey nights with 1 arcsecond seeing, distributed in three years.

From the photometric redshifts obtained using the auxiliary broad band survey, a fraction of the targets at $0.6 < z < 1.5$ (for example, those with Hα in the NIR domain and [OII]λ372.7 nm, [OIII]λ500.7 nm in the OTELO spectral windows) will be observed with NIR spectrographs to determine Hα and [NII] fluxes for star formation rate (SFR) calculations and metallicity determinations at these redshifts. For the brightest targets LIRIS at the 4.2-m WHT is perfect, while there are several other NIR spectrographs available for OTELO for the fainter sources, such as ISAAC at the VLT or CIRCE at GTC.

Cross-correlation with FIR (60-600μm) images of some OTELO fields will allow obtaining complete SEDs to derive extinction corrected SFRs and FIR properties of the different sources detected with respect to cosmic time. The FIR data will be obtained via the HERSCHEL extragalactic survey using the satellite guaranteed time. A fraction of the OTELO team is also part of the HERSCHEL extragalactic survey team.

The scientific subjects where OTELO will likely have the greatest impact include: star formation density evolution in the Universe, Lyα emitters up to z=6.5, high redshift QSO, AGNs at any redshift, chemical evolution of the Universe up to z=1.5 and galactic emission stars. The total expected number of emitters in OTELO survey is of the order of 10^4, where 10% would be Hα star forming emitters up to a z=0.4 (about 10% of these would be low luminosity star forming galaxies), 70% would be star forming emitters detected at other optical emission lines up to a z=1.5; 5% Lyα emitters at z up to 6.7 (10% of the age of the Universe), 15% QSO and AGNs at different redshifts, and about 0.5% galactic emission stars. The spectra extracted from the data cubes will allow deblending the Hα from the [NII]$\lambda\lambda$ 658.3,654.8 nm lines, thus allowing an estimation of the metal contents of the targets and the possibility to discriminate between the various AGN types.

[1]Instituto de Astrofísica de Canarias, E-38200 La Laguna, Tenerife, Spain (jcn@iac.es).
[2]Depto. de Astrofísica, Universidad de La Laguna, Spain.
[3]Instituto de Astrofísica de Andalucía (CSIC), Spain.
[4]Departamento de Astrofísica, Facultad de Ciencias Físicas, Universidad Complutense de Madrid, Spain.
[5]Instituto de Física de Cantabria (CSIC), Spain.
[6]Instituto de Astronomía, Universidad Nacional Autónoma de México, México.
[7]Mount Stromlo Observatory, Australia.
[8]European Space Astronomy Center (ESAC), Spain.

REFERENCES

Bland-Hawthorn, J., & Jones, D. H. 1998, PASA, 15, 44
Stevenson, C. C. 1994, MNRAS, 267, 904