RevMexAA (Serie de Conferencias), **42**, 68–69 (2013)

LAES & LBGS WITH OSIRIS

J. A. de Diego,[1,2] M. A. De Leo,[2] J. Cepa,[2,3] and A. Bongiovanni[2,3]

RESUMEN

Presentamos resultados preliminares de un proyecto en curso para estudiar Emisores de Lyman Alfa, Galaxias Lyman Break y Quasares a altos corrimientos al rojo con el instrumento OSIRIS instalado en el Gran Telescopio Canarias.

ABSTRACT

We present preliminary results of an on going program to study Lyman Alpha Emitters, Lyman Break Galaxies, and Quasars at high redshift with the OSIRIS instrument attached to the Gran Telescopio Canarias.

Key Words: galaxies: active — quasars: emission lines

1. INTRODUCTION

Star forming young galaxies at high redshift are important to understand the early star formation history and the formation of the initial structures in the universe. The ultraviolet features of these galaxies are observable in the optical range. Photometric techniques are used to select redshift galaxy candidates at $z \gtrsim 3$. Ulterior spectroscopic observations have led to identify two kinds of objects: Lyman Alpha Emitters (LAEs), and Lyman Break Galaxies (LBGs).

LAEs are star forming galaxies that harbor primordial H II interstellar gas. They are dust free, at least in the line of sight, and probably are composed essentially of first generation stars. LAEs are important from the cosmic point of view because they trace high redshift galaxies, dark matter halos and the evolution of matter distribution. Their spectra reveal a prominent asymmetric Lyα line (1216 Å) in emission on a much lower continuum with a strong cut-off at wavelengths shorter than the line.

Regarding LBGs, they are star forming galaxies holding OB stars, enriched interstellar gas and dust. Their spectra show the continuum contribution of the different components of the galaxy along with a sharp drop at wavelengths shorter than the Lyman discontinuity (912 Å).

[1]Instituto de Astronomía, Universidad Nacional Autónoma de México, Apdo. Postal 70-264, 04510, México, D. F., Mexico (jdo@astro.unam.mx).

[2]Instituto de Astrofísica de Canarias, La Laguna, Tenerife, Spain.

[3]Astrophysics Department, University of La Laguna, La Laguna, Tenerife, Spain.

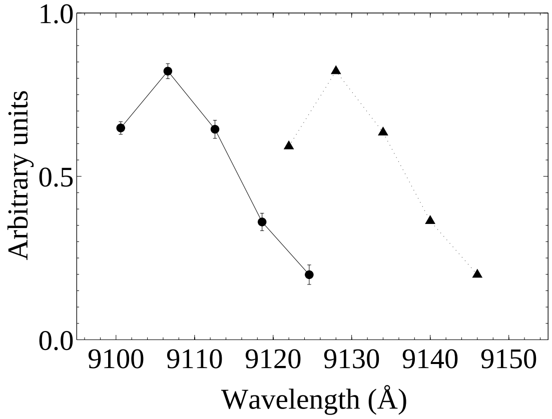
2. OBSERVATIONS

We are carrying out a project in the Gran Telescopio Canarias (GTC) to identify high redshift candidates such as LAEs, LBGs and Quasars with the instrument OSIRIS and its set of tunable filters (OSIRIS-TF; Cepa et al. 2011). We have chosen three sky fields and we plan to swipe across them in wavelength at at three different spectral ranges not contaminated by atmospheric lines: 6753–6915 Å, 8100–8230 Å, and 9122–9264 Å. However, our discussion in this paper will be focused on the region between 9122 and 9146 Å, for which we have already obtained observations. In this range, the filter passband is 12 Å and the swiping step is 6 Å for optimal sampling.

The observations were performed with central wavelengths λ_c = 9122 Å, 9128 Å, 9134 Å, 9140 Å & 9146 Å at the center of the fields (note that the central wavelength varies smoothly with the distance to the optical center OSIRIS-TF: Cepa et al. 2011). The observation run was done during a single night in September 2010. A binning of 2×2 was used in fast (standard) readout mode (200 kHz), with three exposures per wavelength (each separated by a triangular offset pattern of $10''$ to eliminate diametric ghosts during data reduction) of 210 s each. The total exposure in each wavelength is therefore 630 sec. The seeing varied from 0.75 to $0.82''$ during the observation run.

3. RESULTS

A deep image was built piling up all the monochromatic exposures, rendering a level of detection of 8×10^{-18} erg cm^{-1}. Objects above the detection level were identified using the SEXTRACTOR routine (Bertin & Arnouts 1996). On the other



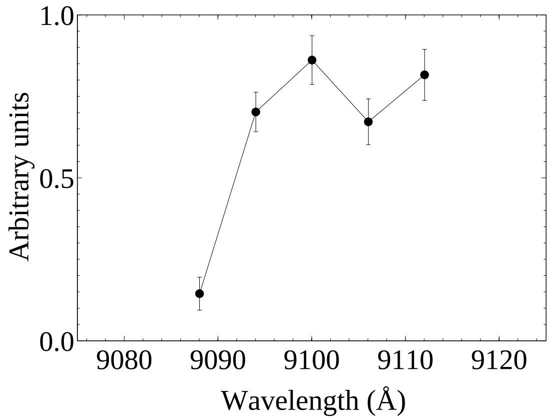


Fig. 1. Top panel: the circles and the solid line shows one of the LAE candidates identified from the OSIRIS-TF data. The triangles and the dotted line shows the relative photometry for one of the LAEs extracted from our simulations. Bottom panel: a LBG candidate.

hand, we have performed simulations of LAEs to study the results of OSIRIS-TF observations. Then, we developed our own code based on the simulations to select LAE and LBG candidates among the SEXTRACTOR detected sources. The candidates found are:

- Three LAE candidates
- Two possibly LAE or LBG candidates
- Two LBG candidates

The top panel in Figure 1 shows one of the LAE candidates compared with one of our simulations. The shift in wavelength for the candidate is a consequence of the varying wavelength across the field covered by the instrument. The LAE candidate is at redshift $z = 6.49$ while the simulation shows the photometry for a LAE at $z = 6.50$ located at the center of the OSIRIS-TF field. The bottom panel shows one LBG candidate at redshift $z = 6.48$.

M.A.D. and J.A.D. are grateful for support from CONACyT grant CB-128556. J.A.D. is grateful for support from grant SAB2010-0011 awarded by the Spanish MIED through the Programa Nacional de Movilidad de Recursos Humanos included in the Plan Nacional de I-D+i 2008-2011. This work has been partially funded by the Spanish MICINN under the Consolider-Ingenio 2010 Program grant CSD2006-00070: first Science with the GTC (http://www.iac.es/consolider-ingenio-gtc).

REFERENCES

Bertin, E., & Arnouts, S. 1996, A&AS, 117, 393

Cepa, J., Alfaro, E., Bongiovanni, A., Cabrera Lavers, A., Ederoclite, A., González, I., López, J. C., Pérez, A. M., & Sánchez, M. 2011, OSIRIS: User Manual (Scientific Use; http://www.gtc.iac.es/en/pages/instrumentation/osiris/osiris2.php#Useful_Documents)