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POSTERS

Ionized gas kinematics and luminosity profiles of Low-z Lyman Alpha Blobs

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Abstract. This work is focused on the characterization of the Seyfert-2 galaxies hosting very large, ultra-luminous narrow-line regions (NLRs) at redshifts $z = 0.2-0.34$. With a space density of 4.4 Gpc^{-3} at $z \sim 0.3$, these "Low Redshift Lyman-α Blob" (LAB) host galaxies are amongst the rarest objects in the universe, and represent an exceptional and short-lived phenomenon in the life cycle of active galactic nuclei (AGNs). We present the study of GMOS spectra for 13 LAB galaxies covering the rest frame spectral range 3700–6700 Å. Predominantly, the [OIII]λ5007 emission line radial distribution is as widespread as that of the continuum one. The emission line profiles exhibit FWHM between 300–700 Km s^{-1}. In 7 of 13 cases a broad kinematical component is detected with FWHM within the range 600–1100 Km s^{-1}. The exceptionally high [OIII]λ5007 luminosity is responsible for very high equivalent width reaching 1500 Å at the nucleus.

Keywords. galaxies: Seyfert, galaxies: kinematics and dynamics, galaxies: stellar content

1. Background

Schirmer *et al.* (2013) serendipitously discovered J224024.1-092748 (hereafter J2240), a peculiar galaxy at $z = 0.326$ with "green" colors due to high [OIII] emission. Subsequently they systematically searched objects similar to J2240 in SDSS data, selecting objects with extremely green colors, and with resolved angular sizes. The authors obtained 29 galaxies that met these conditions and called them "Green Beans" (Schirmer *et al.* 2013). Later these objects were identified as Low redshift Lyman-α blob host galaxies (LABs, Schirmer *et al.* 2016; Kawamuro *et al.* 2017). The measured fluxes of the [OIII]λ5007 emission (hereafter [OIII]) of these galaxies are among the most energetic known, which result in very rare objects in the local universe (4.4 Gpc^{-3} at $z \sim 0.3$). WISE 24 μm luminosities are 5–50 times lower than predicted by the [OIII] fluxes, and the X-ray and Radio emission are intrinsically low in comparison with such an energetic emission-line object. The NLRs seem to reflect earlier, very active quasar states that have strongly subsided in less than a galaxy's light-crossing time. These ionization echoes, are about 10–100 times more luminous than any other such echo known to date.

2. Ongoing work and Results

We obtained GMOS-Gemini Band-4 spectra for 13 LABs (seeing ∼0.6–1.3"). We used the R400 grating (spectral sampling of 1.02–1.14 Å pix^{-1}) covering a rest frame wavelength range 3700–6700 Å (redshift range 0.192–0.341). The observations were performed prioritizing the availability of a guide star and in many cases the slit position angle (PA)

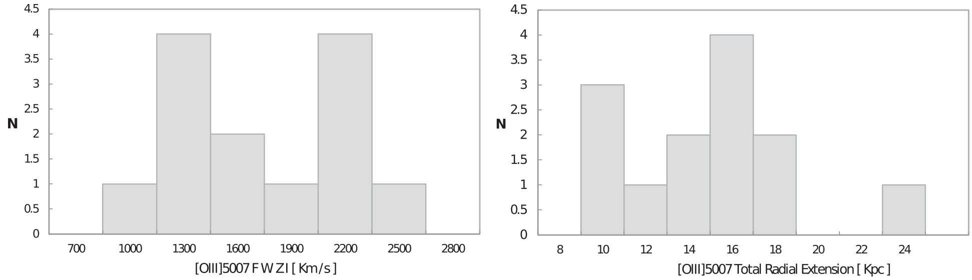

Figure 1. Full Width at Zero Intensity (Left) and Total Radial Extension (Right) distributions of the [OIII]5007 integrated emission line for the 13 GB sample.

does not match the galaxy major axis. The inclinations and major axis PAs used for deprojection were obtained from SDSS automatic surface brightness model fittings.

Several emission lines are detected in the LAB spectra. [OIII] is the most intense emission, with $\log(F([OIII])/F(H_\beta)) \geqslant 1$. Despite the large difference in flux, the [OIII] and hydrogen recombination line profiles are similar in shape. That is, both the radial and velocity FWHMs are comparable within the errors involved. However, the [OIII] high emission translates into extremely high values of the equivalent width (EW, range 160–1030Å). The radial distribution of EW([OIII]) has a steep rise at the nuclei up to 1500 Å. The integrated EW([OIII]) shows a positive correlation with the Concentration Index (ratio of Petrosian radii R_{90}/R_{50}). This would be consistent with the [OIII] being relatively more powerful in the earlier type galaxies of the sample. Although the integrated [OIII] FWHM is about 420 ± 120 Km s^{-1}, in a two component fit to the line profile, the widest kinematical component can reach FWHM = 1100 Km s^{-1}. The line profiles have asymmetries, and in four cases a broad blue component (FWHM > 900 Km s^{-1}) is detected, consistent with outflows.

The radial pure-continuum profile was determined at 5200 Å (green) and 4100 Å (blue). The average Half Light Diameter (HLD) of the sample is 4.1 ± 1.2 Kpc for the green continuum and 2.9 ± 1.4 Kpc for the [OIII]. The radial profile of [OIII] can be described with a Gaussian profile, with 7–15 % of the remaining flux in a weak and extended component. In contrast, the continuum profile has two more defined structures. The central region is characterised by a seeing-scale Gaussian, while the global component is best described by an exponential distribution.

From the SDSS magnitudes, the galaxy masses were estimated, which are of the order of 10^{11} M$_\odot$. We found that the [OIII] extension is greater for galaxies with weak disks.

From the green and blue continuum profile, we set up the color radial distribution. Of the 13 LAB host galaxies studied, 4 have flat color profiles, 4 have symmetrical profiles with reddened centers and the rest have profiles with gradient from one side to the other of the nucleus (signs of dust in galactic disks). This last group is characterized by having steeper profiles showing a mixture of stellar populations or the presence of dust bands.

In conclusion, LAB host galaxy continuum emission radial profiles always exhibit a disk component, with some evidences of distorted morphology, emission line off-centering and possible dust lanes. The very large scale [OIII] emission structures with Seyfert characteristics have 13 Kpc and 1600 Km s^{-1} on average (Fig. 1), and seem relatively more powerful in the earlier type galaxies of the sample.

References

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