Galaxy Evolution and Feedback across Different Environments
Proceedings IAU Symposium No. 359, 2020
T. Storchi-Bergmann, W. Forman, R. Overzier & R. Riffel, eds.
doi:10.1017/S1743921320001581

First results of the DIVING^{3D} survey of bright galaxies in the local universe: The mini-DIVING^{3D} sample

R. B. Menezes[1], J. E. Steiner[2], T. V. Ricci[3], Patrícia da Silva[2] and D. M. Nicolazzi[2]

[1]Instituto Mauá de Tecnologia, Praça Mauá 1, 09580-900, São Caetano do Sul, SP, Brazil
email: roberto.menezes@maua.br

[2]Instituto de Astronomia, Geofísica e Ciências Atmosféricas, Departamento de Astronomia, Universidade de São Paulo, 05508-090, SP, Brazil
email: joao.steiner@iag.usp.br

[3]Universidade Federal da Fronteira Sul, Campus Cerro Largo, 97900-000, RS, Brazil
email: tiago.ricci@uffs.edu.br

Abstract. We present the first results of the Deep Integral Field Spectroscopy View of Nuclei of Galaxies (DIVING^{3D}) survey, obtained from the analysis of the nuclear emission-line spectra of a sub-sample we call mini-DIVING^{3D}, including all southern galaxies with $B < 11.2$ and $|b| > 15°$. In comparison with previous studies, very few galaxies were classified as Transition objects. A possible explanation is that at least part of the Transition objects are composite systems, with a central low-ionization nuclear emission-line region (LINER) contaminated by the emission from circumnuclear H II regions. The high spatial resolution of the DIVING^{3D} survey allowed us to isolate the nuclear emission from circumnuclear contaminations, reducing the number of Transition objects.

Keywords. galaxies: nuclei, galaxies: active, galaxies: Seyfert, techniques: spectroscopic

1. Introduction

We are conducting the Deep IFS View of Nuclei of Galaxies (DIVING^{3D}) survey, with the goal of observing, using optical 3D spectroscopy, the central regions of all galaxies in the Southern hemisphere with $B < 12.0$ and with a Galactic latitude $|b| > 15°$. The complete sample has a total of 170 objects. All the observations are being taken with the Integral Field Unit (IFU) of the Gemini Multi-Object Spectrograph (GMOS), on the Gemini South and Gemini North telescopes, and with the SOAR Integral Field Spectrograph (SIFS), on the SOAR telescope.

Here we present the first results of the analysis of the DIVING^{3D} sample, focused on the nuclear emission-line properties of all galaxies brighter than $B = 11.2$. We call this sub-sample the mini-DIVING^{3D}, which has a total of 57 objects.

2. Observations, Reduction and Data treatment

The GMOS/IFU data cubes were reduced using the Gemini package, in IRAF environment. On the other hand, the SIFS data reduction was performed using scripts in Interactive Data Language (IDL).

After the data reduction, a data treatment was applied to all data cubes. Such a procedure included: correction of the differential atmospheric refraction (DAR); combination

Table 1. Fractions of galaxies with the classifications determined from the diagnostic diagram analysis. The fractions obtained from a sub-sample of the PALOMAR survey, selected with the same criteria used for the selection of the mini-DIVING^{3D} sample, are also shown.

	mini-DIVING^{3D}(%)	**PALOMAR with B < 11.2(%)**
H II regions	15.8 ± 2.1	25
Transition objects	7.0 ± 1.1	12
LINERs	23 ± 4	29
Seyferts	9 ± 3	7
LINERs/Seyferts	18 ± 7	10
Transition/LINERs/Seyferts	1.8 ± 1.8	0

of the data cubes of each galaxy into one in the form of a median; Butterworth spatial filtering; "instrumental fingerprint" removal; Richardson-Lucy deconvolution. For more detail about the treatment procedure, see Menezes *et al.* (2019).

3. Analysis and Results

We extracted the nuclear spectrum of each galaxy in the mini-DIVING^{3D} sample from a circular region, centered on the stellar nucleus of the object, with a radius equal to half of the FWHM of the PSF at the median wavelength of the data cube.

The subtraction of the stellar continuum from the extracted nuclear spectra was performed with the Penalized Pixel Fitting technique (pPXF - Cappellari & Emsellem 2004).

For the galaxies without blended emission lines, the integrated line fluxes were obtained via direct integration of the emission lines. On the other hand, for the objects with blended emission lines, the fluxes were determined by fitting the emission lines with a sum of Gaussian functions. After that, a dignostic diagram analysis was applied and the galaxies were classified as H II regions, Transion objects, Seyferts, and Low Ionization Nuclear Emission-Line Regions (LINERs). Table 1 shows the fractions of galaxies with different classifications. For a comparison, Table 1 also shows the corresponding fractions obtained from a sub-sample of the PALOMAR survey, selected with the same criteria used for the selection of the mini-DIVING^{3D} sample.

4. Conclusions

• By comparing our results with those obtained from a sub-sample of the PALOMAR survey (mini-PALOMAR), selected with the same criteria used for the mini-DIVING^{3D}, we verified that the fractions of objects in these two sub-samples classified as LINERs, Seyferts or with partial classifications of LINER/Seyfert and Transition/LINER/Seyfert are compatible, at the 1σ or 2σ levels

• The fractions of objects in the mini-DIVING^{3D} sample classified as H II regions and Transition objects are lower than the corresponding fractions in the mini-PALOMAR sample, not being compatible, even at the 3σ level

• Considering that PALOMAR long-slit spectra have a lower spatial resolution than DIVING^{3D} data cubes, the result obtained for Transition objects in the mini-DIVING^{3D} sample suggests that some Transition objects may be composite systems, with a central LINER emission contaminated by the emission from circumnuclear H II regions

References

Cappellari, M. & Emsellem, E. 2004, *PASP*, 116, 138
Menezes, R. B., Ricci, T. V., Steiner, J. E., *et al.* 2019, *MNRAS*, 483, 3700

https://doi.org/10.1017/S1743921320001581 Published online by Cambridge University Press