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Dissertation Summary

Nuclear Kinematics of Narrow-line Seyfert 1 Galaxies

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The aim of this dissertation is to expose the main results of my PhD thesis, in which I study the nuclear kinematics of narrow-line Seyfert 1 (NLS1) galaxies through long-slit spectroscopy. This study includes the influence of the black hole mass in some properties of the emission lines, such as luminosities, FWHM, and asymmetries. To carry out this work, I observed and obtained medium-resolution spectra of 53 NLS1 galaxies from the sample of Véron-Cetty & Véron (2010). The studied emission lines are Hβ, [O III]λ5007, Hα, [N II]$\lambda\lambda$6548,6584, and [S II], which were measured considering a Gaussian decomposition. The processes of observation, reduction, and measurement are widely described in Schmidt et al. (2012, 2016).

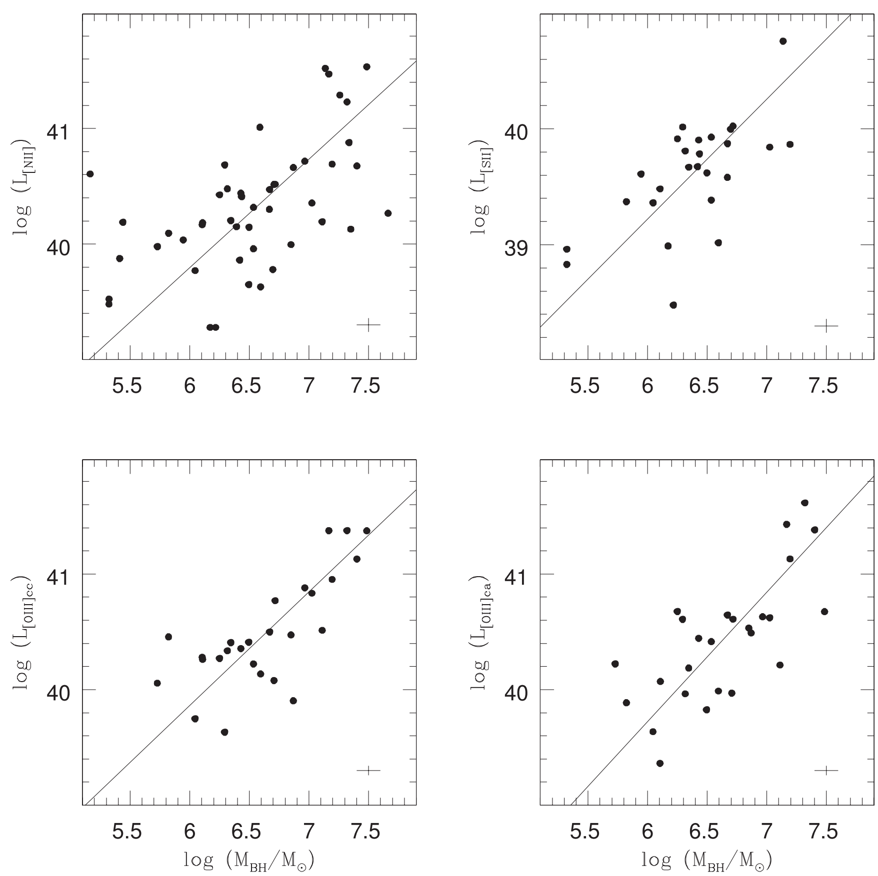

Figure 1. Correlations between the black hole mass and the luminosity of [N II] (top left), [S II] (top right), the core component of [O III] (bottom left), and the asymmetric component of [O III] (bottom right). Solid lines indicate the OLS bisector fits to the data.

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[2] PhD thesis directed by Diego Ferreiro; PhD Degree awarded 2017 March 30.

The narrow component of Hα and Hβ and the forbidden lines [O III], [N II], and [S II] were tested as possible surrogate of the stellar velocity dispersion, finding that, in general, NLS1 seem to be located below the M_{BH}–σ relation, in agreement with previous results (e.g., Grupe & Mathur 2004). A comprehensive discussion of a part of the results exposed here is presented in Schmidt et al. (2016).

According to my results, 18 of 53 galaxies (34%) showed an intermediate component (IC) of Hα and Hβ, which is well correlated with the broad component (BC) and the black hole mass. Pearson coefficients of correlation of 0.66 and 0.93 were found for $\mathrm{FWHM}_{\mathrm{IC}\beta}$ and $\mathrm{FWHM}_{\mathrm{BC}\beta}$, and for $\mathrm{FWHM}_{\mathrm{IC}\alpha}$ and $\mathrm{FWHM}_{\mathrm{BC}\alpha}$, respectively. The relations between the black hole mass and $\mathrm{FWHM}_{\mathrm{IC}\alpha}$ and $\mathrm{FWHM}_{\mathrm{IC}\beta}$ present correlation coefficients of 0.86 and 0.64, respectively, indicating that the kinematic of the intermediate emitting region is clearly affected by the central engine. Partial results are discussed in Schmidt et al. (2016).

Considering the blue wing of [O III], a close correlation was found between the amount of asymmetry and the black hole mass, with a correlation coefficient of -0.63. Furthermore, the luminosity of the asymmetric component also correlates with the black hole mass, with a correlation coefficient of 0.68. This suggests that the blue wing of [O III] is highly influenced by the black hole, not only through the velocity of the outflow, but also in the luminosity of the asymmetric component (Schmidt et al. 2018).

Studying and comparing the luminosities of the different emission lines, moderate and strong correlations were found between the luminosity of BC_{α} and BC_{β} and the remaining lines. Correlation coefficients of around 0.67 and 0.90 were found between the luminosities of mentioned lines and the luminosities of the forbidden lines and the intermediate lines, respectively. Correlations were also found between the black hole mass and the luminosities of the different lines, with correlation coefficient in the range 0.65–0.85 (Figure 1).

All these results suggest that several properties and characteristics of the different permitted and forbidden emission lines, originated at different regions, are influenced by the central black hole, not only in the kinematic (FWHM and asymmetry), but also in the emitted energy (luminosity).

References

Grupe, D., & Mathur, S. 2004, ApJL, 606, L41
Schmidt, E., Ferreiro, D., Oio, G., Vega, L., & Donoso, L. 2012, BAAA, 55, 361
Schmidt, E. O., Ferreiro, D., Vega Neme, L., & Oio, G. 2016, A&A, 596, A95
Schmidt, E. O., Oio, G. A., Ferreiro, D., Vega, L., & Weidmann, W. 2018, A&A, 615, A13
Véron-Cetty, M.-P., & Véron, P. 2010, A&A, 518, A10