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Extended Near-IR Spectra of NGC 1068

Lucimara Martins[1], Alberto Ardila[2], Ruth Gruenwald[3], and Ronaldo de Souza[3]

[1]NAT - Universidade Cruzeiro do Sul
Email: lucimara.martins@cruzeirodosul.edu.br
[2]Laboratório Nacional de Astrofísica, Itajubá MG, Brazil
[3]IAG – Universidade de São Paulo, São Paulo SP, Brazil

Abstract. NGC 1068 is a well-studied Seyfert type 2 AGN. Because of its proximity, it is one of the brightest Seyferts observed. Its nuclear region harbors a variety of astrophysical phenomena connected to physical conditions in the NLR and its emission lines. The relative importance of photoionization from the nucleus and shocks produced by jets has been long debated. To help resolve this controversy, we have carried out long-slit spectroscopy in the near-IR and present here for the first time spectroscopy of the whole range from 0.8 to 2.4 μm for this galaxy over 15″ in the nuclear region.

Keywords. galaxies: active, galaxies: individual (NGC 1068), galaxies: Seyfert, infrared: galaxies

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Near-IR spectroscopy plays a unique role in our understanding of the AGN phenomenon. Thanks to the availability of cross-dispersed (XD) spectrographs, it is possible to study the whole 0.8–2.4 μm region in a single observation.

With the above in mind, here we present the first spatially resolved XD spectroscopy of NGC 1068 covering the interval 0.8–2.4 μm This object is one of the nearest and probably the most intensely studied Seyfert 2 galaxy (e.g., Antonucci & Miller 1985; Telesco & Decher 1988; Evans *et al.* 1991; Thatte *et al.* 1997). The mechanisms powering the gas of the NLR have long been under debate. The scenario in NGC 1068 is clearly complex, and observational constrains from all wavelengths need to be put together if we want to understand the processes taking place in this galaxy. Spatially resolved NLR spectroscopy in the NIR can contribute to the solution of the NGC 1068 puzzle.

Our results show that (1) many emission lines consist of two narrow components, whose relative strength varies along the slit, and seem to be correlated with the jet; (2) the coronal lines have only one component and appear only in the central extractions; (3) the absorption lines indicate the presence of intermediate-age stellar features, which might be a significant contributor to the NIR spectra; (4) through some simple photoionization models, we find that photoionization is the main mechanism powering the emitting gas; and (5) calculations using stellar features indicate a mass inside the central 100–200 pc of about $10^{10}\ M_{\odot}$.

References

Antonucci, R. R. J. & Miller, J. S. 1985, *ApJ*, 297, 621
Evans, I. N., *et al.* 1991, *ApJ*, 369, L27
Thatte, N., Quirrenbach, R., Maiolino, R., & Tecza, M. 1997, *ApJ*, 490, 238
Telesco, C. M. & Decher, R. 1988, *ApJ*, 334, 573