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THE NATURE AND ORIGIN OF NARROW LINE AGN ACTIVITY IN A SAMPLE OF ISOLATED SDSS GALAXIES

R. Coziol,[1] J. P. Torres-Papaqui,[1] I. Plauchu-Frayn,[2] J. M. Islas-Islas,[1]
R. A. Ortega-Minakata,[1] D. M. Neri-Larios,[1] and H. Andernach[1]

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RESUMEN

Discutimos la naturaleza y origen de la actividad nuclear observada en una muestra de 292 galaxias con líneas de emisión angostas del SDSS, cuya formación y evolución se considera que ha ocurrido en aislamiento. La fracción de galaxias con un núcleo activo (AGNs) o de objetos de transición (TOs; un AGN con formación estelar circunnuclear) alcanza 64% de la muestra. Verificamos que la probabilidad de que una galaxia muestre un núcleo activo aumenta con la masa de su bulbo (Torres-Papaqui et al. 2011). También encontramos evidencia de que dicha tendencia es realmente un subproducto de la morfología, y sugiere que el fenómeno AGN está íntimamente ligado al proceso de formación de galaxias. Los AGNs con líneas de emisión angostas en nuestra muestra son consistentes con una versión a menor escala o menor energía de cuásares y AGNs con líneas de emisión anchas.

ABSTRACT

We discuss the nature and origin of the nuclear activity observed in a sample of 292 SDSS narrow-emission-line galaxies, considered to have formed and evolved in isolation. The fraction of Narrow Line AGNs (NLAGNs) and Transition type Objects (TOs; a NLAGN with circumnuclear star formation) amounts to 64% of the galaxies. We verify that the probability for a galaxy to show an AGN characteristic increases with the bulge mass of the galaxy (Torres-Papaqui et al. 2011), and find evidence that this trend is really a by-product of the morphology, suggesting that the AGN phenomenon is intimately connected with the formation process of the galaxies. The NLAGNs in our sample are consistent with a scaled-down or powered-down versions of quasars and Broad Line AGNs.

Key Words: galaxies: active — galaxies: formation

1. INTRODUCTION

Spectroscopic surveys, like the Sloan Digital Sky Survey (SDSS) (York et al. 2000; Stoughton et al. 2002), have revealed that a large fraction of galaxies in the nearby universe show emission lines consistent with some kind of nuclear activity. Using diagnostic diagrams that compare various emission line ratios, different classification criteria were proposed to classify these galaxies based on the possible sources of excitation of the gas (Baldwin, Phillips, & Terlevich 1981; Veilleux & Osterbrock 1987; Kewley et al. 2001; Kauffmann et al. 2003). These classification criteria imply that there are two possible main sources: thermal sources, which are associated with star forming activity, and non-thermal sources, which are produced by the accretion of matter onto a Super-Massive Black Hole (SMBH) in the nucleus of the galaxies–the so called Active Galactic Nuclei (AGNs).

The majority of the emission line galaxies in the SDSS turn out to be star forming galaxies (SFGs). However, recent studies (e.g., Miller et al. 2003; Martínez et al. 2010; Torres-Papaqui et al. 2011) inferred that the actual number of galaxies with a non-thermal ionization source in their nucleus could be much higher than previously believed, but the evidence was somewhat obscured by the large variation of characteristics presented by AGNs. For ex-

[1]Departamento de Astronomía, Universidad de Guanajuato, Guanajuato, Mexico.
[2]Instituto de Astrofísica de Andalucía (CSIC), Granada, Spain.