LOW ACTIVITY NUCLEI WITH STRONG [NII] LINES

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1. INTRODUCTION

We present results from the study of six low activity galactic nuclei spectra with strong [NII] λλ6548+6584 emission lines in order to investigate if this characteristic is due to a peculiar chemical abundance. The selected galaxies NGC1358, NGC1386, NGC4941 and NGC6300 present Seyfert 2 (Sy2) activity, NGC3312 is a LINER and NGC7743 can be classified as intermediate between the two categories. All of them are nearby early type galaxies, whose nucleus present a prominent absorption spectrum with no direct evidence of a non-stellar continuum.Observations were made with the Tololo 1m telescope and 2DFRUTTI detector in the spectral region λλ3700 - 7000 A, with 5A (FWHM) resolution.

2. ANALYSIS OF THE ABSORPTION SPECTRUM

In order to study the stellar poppulation of the nuclei, we have used the results from the work of Bica (1988), who defined several templates representative of the stellar poppulation in the nuclei of galaxies. We have measured the equivalent widths (W) of the stronger absorption lines as well as the continuum fluxes at two wavelengths and have compared the obtained values with those measured for the templates metioned above, using the same spectral windows. For each of the selected nuclei it was possible to find one template with W and continuum values within 10% of the measured ones, or two templates, such that the measured values are intermediate between those of the two. Based on the synthesis results for the templates obtained by the above author using a base of star clusters spectra (Bica and Alloin, 1986), we have concluded that more than 80% of the integrated light comes from an old age component ($\sim 10^{10}$ years) and about 12% from an intermediate age component (10^9 to 5×10^9 years). NGC1386, NGC6300 and NGC7743 present also a young component contributing with about 5% of the light. Is is also concluded that the average metallicity of the nuclei is 2 times solar.

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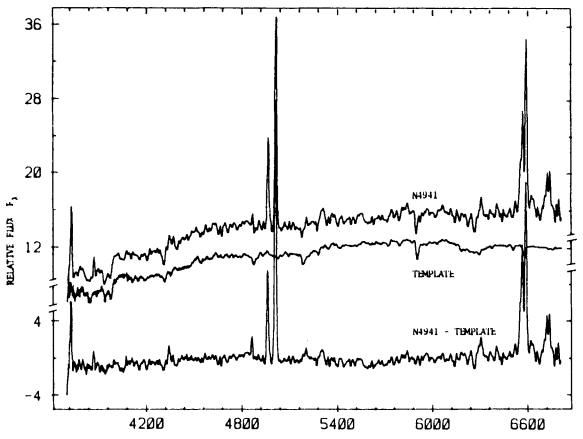

Figure 1. Illustration of one spectrum, the selected template and the emission component obtained from the difference between them.

3. ANALYSIS OF THE EMISSION SPECTRUM

After subtracting the stellar component, we have measured the fluxes of the emission lines relative to Hβ (figure). We have then compared the measured values with those predicted by the models of Stasinska (1984) for gas clouds with heavy element abundances two times solar ($2Z_\odot$) photoionized by a power-law spectrum with index $\alpha=1.5$. We have concluded that no constant density model can explain all the emission line ratios. One needs a range of densities from 10^2 to 10^6 cm^{-3} in order to reproduce both the small [SII] λ6717/λ6731 ratio and relatively high [NeIII] λ3869 flux. For the four Sy2, the high fluxes in the [OIII] λλ4959+5007 lines indicate a ionization parameter $U\tilde{=}10^{-2.5}$, while for the other two, these fluxes are lower and $U\tilde{=}10^{-3.5}$. The [NII] λλ6548+6584 fluxes can be reproduced only for NGC3312 and NGC1386; for the other galaxies the values are always higher than those of the models.

Having checked also the models with $Z_\odot$, we conclude that the only way to reproduce the high [NII] fluxes is with an overabundance of Nitrogen relative to the other heavy elements. Using the models of Gruenwald and Péquignot (1987) with N/O three times solar, $\alpha=1.5$, gas density 10^3 cm^{-3} and $Z_\odot$ we could reproduce the data for NGC7743, but the [OIII] values became lower than the observed for the other Sy2 galaxies, so we will make tests varing other parameters of the models.

4. REFERENCES

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