

A 5.5–35 μm Spectral Analysis of Active Galactic Nuclei

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The spectroscopic properties of a sample of nine Seyfert 1, six NLS1, 26 Seyfert 2, and three starburst galaxies have been studied at mid-infrared wavelengths in order to determine if the frequency of detection of the brightest emission lines and the continuum shape are correlated with the degree of activity. The raw data were obtained from the *Spitzer* Infrared Spectrograph (IRS) archive and reduced with the pipeline (version 17.2). The spectra of the galaxies were grouped by type of activity. We conclude through this study that in general the continuum shape of the active galactic nuclei (AGN) is flat between 5 μm and 12 μm , and strong variations are found at longer wavelengths in this sample.

We find that the [Ne III] $\lambda 15.5 \mu\text{m}$ line is present in all the Sy 1 galaxies of our sample. The PAH band (6–15 μm), [S III] $\lambda 18.7 \mu\text{m}$, [O IV] $\lambda 25.8 \mu\text{m}$, and the [S III] $\lambda 33.4 \mu\text{m}$ emission lines are detected in about 60%, 70%, 90% and 70% of the Sy 1 sample, respectively. In the case of Seyfert 2 galaxies, the PAH band is detected in about $\sim 40\%$ of the spectra. The [Ne III] $\lambda 15.5 \mu\text{m}$, [S III] $\lambda 18.7 \mu\text{m}$, [O IV] $\lambda 25.8 \mu\text{m}$, [S III] $\lambda 33.4 \mu\text{m}$ lines are found, respectively, in 60%, 40%, 50% and 60% of the Sy 2 sample. The most frequently detected line in NLS1 spectra is [O IV] $\lambda 25.8 \mu\text{m}$, which is observed in $\sim 90\%$ of the spectra, but the other lines are below the detection limit. In all three of the starburst galaxies in our sample the PAH band, [Ne III] $\lambda 15.5 \mu\text{m}$, [S III] $\lambda 18.7 \mu\text{m}$ and [S III] $\lambda 33.4 \mu\text{m}$ emission lines are all present, while the [O VI] $\lambda 25.8 \mu\text{m}$ line remains undetected.