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PAH EMISSION IN AGN AND STARBURSTS, AND THEIR RELATION WITH THE MID-INFRARED CONTINUUM EMISSION

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We present partial results of an ongoing work aimed at studying the source of the PAH emission in active galactic nuclei. The correlation found between the 7.7 μm PAH and the mid-infrared continuum allows us to propose that star formation and nuclear activity are closely related, strengthening the so-called AGN-starburst connection.

In order to explore the relationship between the PAH features, dust, continuum emission and galaxy inclination, we use archival data for Seyfert 1, Seyfert 2 and SB objects in the NIR and MIR regions published by Clavel et al. (2000), Brand et al. (2006), Imanishi (2003), Imanishi & Wada (2004), Rodríguez-Ardila et al. (2003), Gezari (1999) and the NASA/IPAC Extragalactic Database, NED. In total, 22 starburst, 26 Seyfert 1 and 29 Seyfert 2 were selected for this analysis. We discuss the correlations found between the starburst and the continuum characteristics in order to determine the relationships expected in objects whose IR emission is entirely dominated by recent and on-going episodes of star formation. This analysis will then be applied to galaxies that harbor an AGN to evaluate the role of starburst in their observed characteristics.

The correlation found between L(12 μm) and L(25 μm) (not shown) with the L(7.7 μm) PAH line (Figure 1), and also with 3.3 μm, 6.2 μm and 8.6 μm PAH lines (not shown) suggests that there is a close link between the AGN activity formation. In this context, AGN with more powerful activity tend to display vigorous star formation (Imanishi 2003).

With the information available, we plot the b/a axis ratio vs. the equivalent width of the 7.7 μm PAH band. Here, we assume that the b/a ratio and the inclination angle between the torus axis and the observer has a direct relationship. For Seyfert galaxies, star formation processes are originating in an extended host region, and are not angle dependent (Figure 2). The larger equivalent widths detected in Seyferts 2 are due to the attenuation of the continuum flux in the range of 7–8 μm (Imanishi 2003).

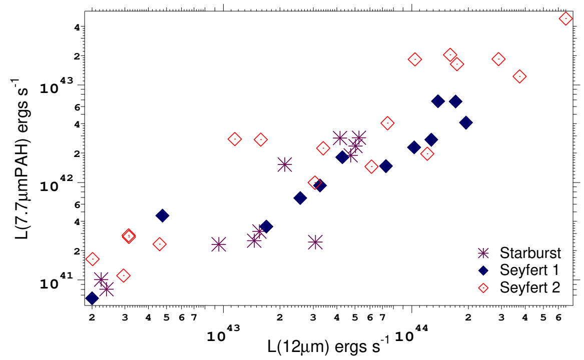

Fig. 1. Relation between the IRAS 12 μm luminosity and the 7.7 μm PAH emission.

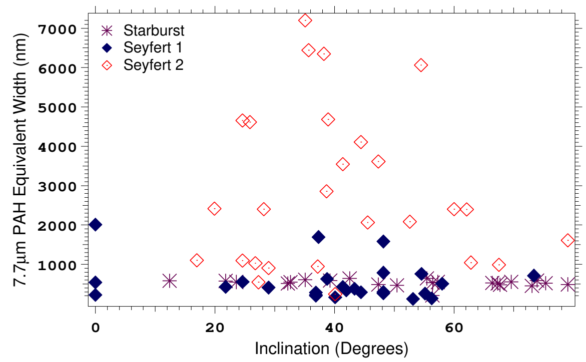

Fig. 2. Relation between the 7.7 μm PAH emission with the inclination angle.

The results allow us to conclude that the PAH emission is associated with star formation in Seyfert 1 and 2 galaxies. This gives further support to the so-called AGN-starburst connection proposed in the literature.

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