

DUST-EMBEDDED AGN IN UNUSUALLY WARM IRAS GALAXIES

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The IRAS Point Source Catalog contains only 61 sources identified as galaxies whose energy distribution peaks at 60 μm . The scarcity of such galaxies has prompted a search for possible common properties. This sample of '60 μm peakers', 21 of which are previously identified galaxies, partially overlaps with that of warm IRAS galaxies studied by de Grijp et al. (1987) and contains similar percentages of Seyfert (65%) and starburst galaxies on the one hand, and of strong and weak radio sources on the other hand. A remarkable characteristic is, however, that about half of the 60 μm peakers seem to be early-type galaxies. The fact that such galaxies are rarely IRAS sources and, if so, have FIR energy distributions peaking at 100 μm similar to those of spirals, implies that we are sampling active or nuclear starburst early-type galaxies with a very large success rate. The observational data accumulated so far further show that:

(i) objects with smaller FIR to near-IR flux ratios have redder J-K colors and warmer 60 to 25 μm colors, i.e., an infrared spectrum dominated by warmer dust and/or a nonthermal source (Figs. 1a,b);

(ii) out of 32 objects with radio data, the 5 compact radio sources with luminosities intermediate between those of radio-quiet and radio-loud AGN have among the warmest 60 to 25 μm colors (Fig. 2). Such warm FIR colors are not a common characteristic of radio galaxies and quasars (Golombek et al. 1987, Neugebauer et al. 1986).

(iii) the 60 μm luminosities range from 10^9 to 10^{12} L_{\odot} , and are largest for Mkn 231, 2306+0505 (Hill et al. 1987) and 2046+1925 (Frogel et al. 1988). The latter 2 objects, along with 0052-7054 (Frogel and Elias 1987) which also belongs to our sample, are Seyfert 2 galaxies with evidence for the presence of a dust-obscured broad line region.

These results strongly suggest that 60 μm peakers include a well-defined set of AGN in morphologically relaxed galaxies with a developing radio source that may be on the verge of breaking out through a significantly depleted interstellar medium. Such objects may be post-merger systems and precursors of radio galaxies. The remarkable preponderance of both early-type and double nucleus/interacting systems among 60 μm peakers suggests merging as an evolutionary link. A detailed morphological study is under way to investigate this possibility (Heisler and Vader 1988).

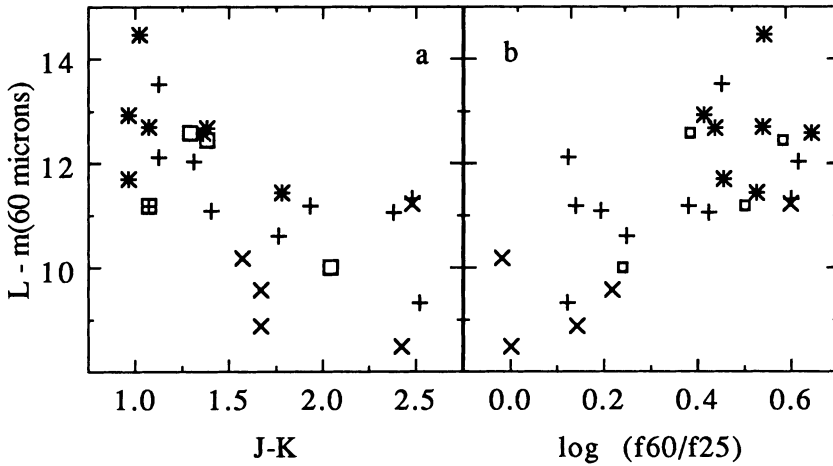


Fig. 1a,b: near-IR vs FIR colors.

Symbols: X = Sy 1, + = Sy 2, * = starburst; square = unknown type

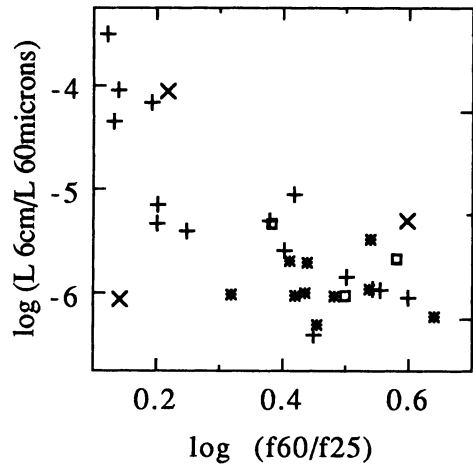


Fig. 2: ratio of 6 cm continuum radio to 60 μ m luminosity against FIR color.

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