ROSAT-DETECTED GALAXIES IN THE IRAS FAINT SOURCE DATABASE (FSDB)

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We present the first results of cross-correlating the IRAS FSDB with the ROSAT All-Sky Survey. From the IRAS FSDB (~ 750,000 entries) a sample of 10,317 IRAS galaxies has been extracted using the following selection criteria:

1) moderate or high quality for flux densities at both 25 and 60 μm employing the increased sensitivity limit with respect to the IRAS PSC;
2) $f_{12} / f_{25} < 2.0$ to reject stars;
3) $0.2 < f_{25} / f_{60} < 3.0$ to select warm IRAS galaxies expected to be more commonly AGN than normal or starburst galaxies;
4) $|b_{II}| > 10°$ to avoid contamination by galactic sources.

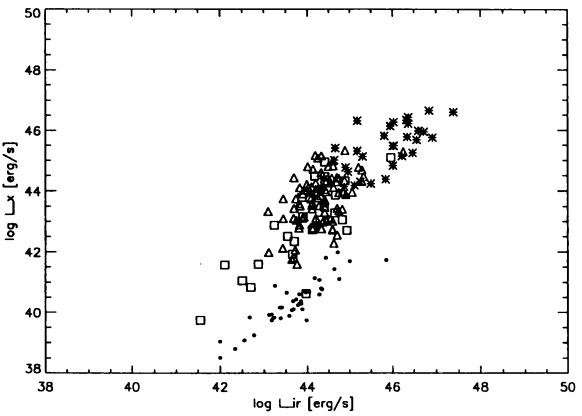

Figure 1. X-ray vs. far-infrared luminosity for ROSAT detected IRAS galaxies in the Faint Source Catalogue (rectangles = non-Seyferts; triangles = Seyferts; stars = QSOs). For comparison the data for normal and starburst galaxies (filled circles) collected from the IRAS Bright Galaxy sample (Soifer et al. 1987; David et al. 1992) have been plotted. Most of the normal and starburst galaxies in the FSDB (rectangles) are stronger emitters in the X-ray band than expected from their optical classification. We suppose that optical follow-up spectroscopy of these objects will confirm for some of the objects the non-Seyfert classification similar to the results found by correlating the Point Source Catalogue with the ROSAT survey (see Boller et al. these proceedings).

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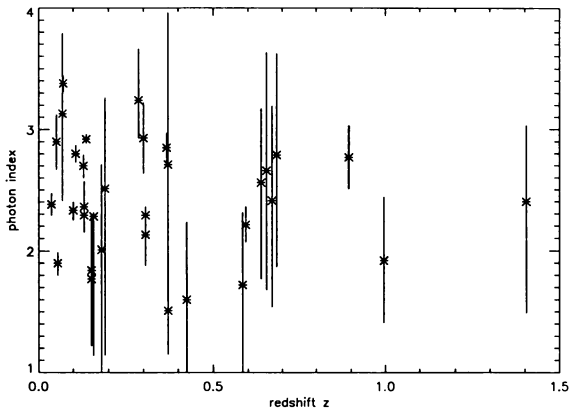

Figure 2. Photon index from a powerlaw fit versus redshift z for QSOs in the Faint Source Catalogue. At low redshifts (z < 1.0) no dependence of the photon index with redshift is present. At higher redshifts a decrease of the photon index with increasing redshift has been found for QSOs detected by ROSAT probably due to the redshift dependent shift of the quasar spectrum into the ROSAT band (Schartel 1993).

456 out of the selected 10,317 IRAS galaxies are positionally coincident with ROSAT X-Ray sources. This approximately doubles the number of IRAS galaxies with reported X-ray emission, in comparison with the earlier sample of IRAS/X-ray galaxies found by correlating the IRAS Point Source Catalogue with the ROSAT All-Sky Survey (Boller et al. 1992). It is of interest that we detect a substantial number of X-ray luminous objects classified in optical catalogues as non-Seyfert galaxies (Fig. 1). The X-ray luminosities are up to a few orders of magnitude above those detected by previous X-ray satellites. Some of these objects may not have been recognized as Seyfert galaxies, but follow-up observations of similar objects from the Point Source Catalogue confirmed for about half of these objects the non-Seyfert (HII or LINER) classification. It has been proposed that the high X-ray luminosity of these objects is produced by an active nucleus which is hidden at optical wavelengths. These objects can be considered as very dusty AGN. Within the redshift range up to about z ~ 1.0 no flattening of the X-ray photon index with redshift has been detected (Fig. 2). This is an independent confirmation of the results found by Schartel et al. (1993) that a flattening of the photon index appears at higher redshifts. We intend to use this sample of ROSAT-detected IRAS galaxies for further detailed studies, e.g. the relation between starburst and AGN or the process of X-ray heating of dust grains near the nuclear source.

References

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