EXTREME STARBURST OR CENTRAL ACTIVITY IN X-RAY LUMINOUS IRAS GALAXIES

Th. BOLLER[1] and M. DENNEFELD[2]
[1] *Max-Planck Institut für Extraterrestrische Physik, D-85748 Garching bei München, Germany*
[2] *Institut d'Astrophysique, 98 bis Boulevard Arago, F-75014 Paris, France*

ABSTRACT. ROSAT All Sky Survey observations of IRAS galaxies have revealed up to now a number of (10) optically non-Seyfert galaxies with X-ray (0.1 - 2.4 keV) luminosities up to a few $10^{43} erg \cdot s^{-1}$ (Boller et al. 1992). The sources are brighter than previous detection limits of a few $10^{41} erg \cdot s^{-1}$ as found by Stocke et al. (1991) or Green, Anderson & Ward (1992) for Einstein sources. The optical classification is based on follow-up observations which indicate clearly the non-Seyfert (LINER and HII region-like galaxies) nature. Our investigations reveal that galaxies classified as non-Seyferts on the basis of optical spectroscopy may reach exceptionally high X-ray luminosities which are similar to that of Seyfert galaxies. On the basis of the present observational material we suppose a hidden low luminosity AGN in the centre of these objects as the source of energy production. The objects are of interest when evaluating starburst versus central activity.

1. X-Ray Luminous Galaxies

A number of ROSAT spiral galaxies (10) classified by follow-up spectroscopy as HII or LINER galaxies reach X-ray luminosities up to a few $10^{43} erg \cdot s^{-1}$ at least one order of magnitude higher than that detected with Einstein ($4 \cdot 10^{41} erg \cdot s^{-1}$ [Stocke et al. 1992] or $3 \cdot 10^{41} erg \cdot s^{-1}$ [Green et al. 1992]). The object names, the X-ray luminosities and the classification from optical follow-up spectroscopy can be found in Boller et al. (1993).

2. Starburst versus Central Activity

We perform model calculation on how much X-ray emission can come from a starburst. We find that the integrated emission of stellar X-ray emitters can not exceed about $9 \cdot 10^{48}$ *erg* per one solar mass of gas consumed into stars (Fig. 1). This result is compared with observations of normal and Seyfert galaxies, as well as high X-ray luminous ($L(0.1 - 2.4\ keV) > 10^{42} erg \cdot s^{-1}$) HII and LINER galaxies detected in the ROSAT All Sky Survey. The HII and LINER galaxies reach up to a few $10^{50} erg \cdot M\odot^{1}$. This amount of emitted energy can not be explained with stellar X-ray emitters even by changing the model parameters within reasonable limits. It can be explained if we assume a contribution of an active nucleus in addition to the X-ray emission of stellar contributors.

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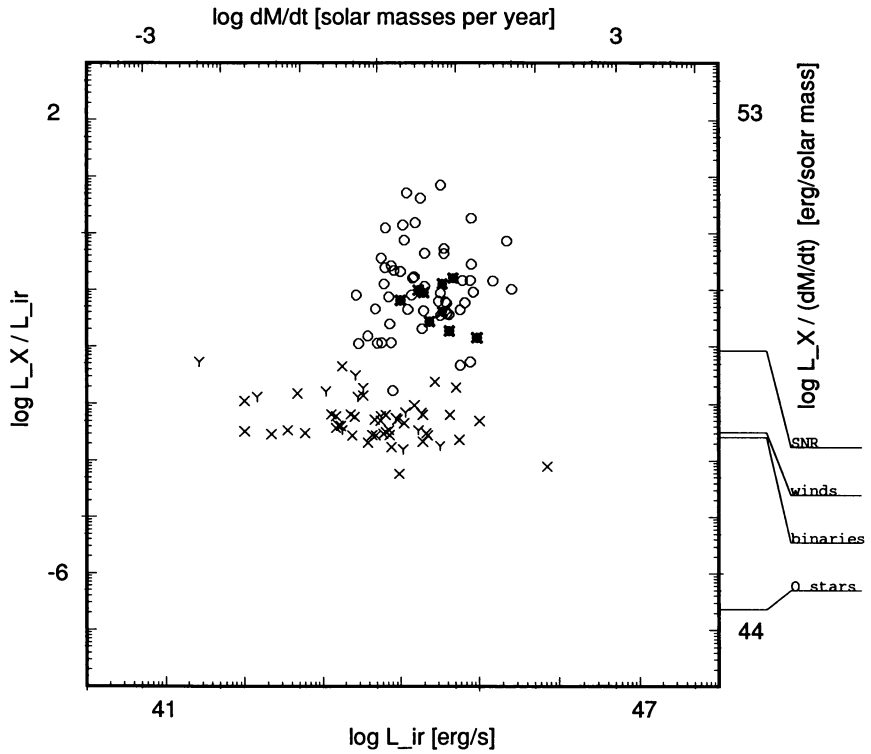

Figure 1. Ratio of X-ray to far-infrared luminosity versus far-infrared luminosity. The X-ray luminous HII and LINER galaxies (fat stars) show a similar distribution of Seyfert galaxies (open circles). The efficiency of producing X-rays per one solar mass of gas consumed into stars is marked for different stellar X-ray contributors.

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