Luminous X-Ray Sources in a Volume Limited Sample of Low-Luminosity AGN

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Abstract

We report on a survey of 42 low-luminosity AGN (LLAGN) conducted by *Chandra* through Cycles 1 and 2. The target galaxies were selected from the Palomar survey, and are all considered to be AGN candidates, a group which includes LINERs, LINER/HII transition objects, and Seyferts. Thirty-five targets out of the whole comprise a complete, distance-limited sample of such objects out to 13 Mpc; the balance were included as archetypes of the aforementioned classes (Ho et al.) The observations were conducted as part of the Guaranteed Observer program for the Advanced CCD Imaging Spectrometer (ACIS).

Exposures were nominally 2 ks in length; however, the actual exposure duration varies from 1 to 3 ks. The estimated detection threshold for a target at 13 Mpc is then roughly L_X(2–10 keV) = 10^{38} erg sec^{-1}; this assumes a source photon index of $\Gamma = 1.8$ and a column density $N_H = 2 \times 10^{20}$ cm^{-2}. The detector response at energies of up to 8 or 10 keV allows detection of faint AGN even in heavily obscured environments. Astrometry has been refined, where possible, by locating reference stars from the USNO A-2 catalog in the field.

We discuss the extrapolation of the $L_X/L_{H\alpha}$ relation to low X-ray luminosities, with the implication that LLAGN are driven by the same physical mechanism as their brighter cousins. Also of interest are the extranuclear sources that pepper almost all of the target fields (typically 5–20 sources per field). The sources vary widely in luminosity, from the detection limit to 10^{40} erg sec^{-1}. Indeed, a few of these sources outshine the nucleus of the target galaxy. We attempt a categorization of the brighter sources, where hardness ratios and even very rough spectra can point to the underlying phenomenon.

CATEGORY: ACTIVE GALAXIES AND QUASARS