



I N T E G R A L
S C I E N C E D A T A C E N T R E

Centre attaché à l'Observatoire de Genève



UNIVERSITÉ DE GENÈVE

ASTROPHYSICS SEMINAR



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The Hard X-ray 20–40 keV AGN Luminosity Function

Volker Beckmann

NASA Goddard Space Flight Center

Abstract. We present the first luminosity function of active galactic nuclei (AGN) in the 20–40 keV energy range, based on 70 extragalactic objects detected by the imager IBIS/ISGRI on-board INTEGRAL. It was obtained by compiling a complete, significance limited sample based on 25,000 square degrees to a limiting flux of $3 \cdot 10^{-11}$ ergs/cm²/sec (7,000 square degrees to a flux limit of 10^{-11} ergs/cm²/sec) in the 20–40 keV band with INTEGRAL. We have constructed a detailed exposure map to compensate for effects of non-uniform exposure. The flux-number relation is best described by a power-law with a slope of 1.66 ± 0.11 . Integration of the cumulative flux per unit area leads to $f_x = 2.6 \cdot 10^{-10}$ ergs/cm²/sec, which is about 1% of the known 20–40 keV X-ray background.

The AGN luminosity function shows a smoothly connected two power-law form, with an index of $\Gamma_1 = 0.9$ below, and $\Gamma_2 = 2.2$ above the turn-over luminosity of $L_x = 4.6 \cdot 10^{43}$ ergs/sec. The emissivity of all INTEGRAL AGNs per unit volume is $W(> 10^{41} \text{ ergs/sec}) = 2.8 \cdot 10^{38}$ ergs/sec/Mpc³. These results are consistent with those derived in the 2–20 keV energy band and do not show a significant contribution by Compton-thick objects. Because the sample used in this study is truly local ($z = 0.022$), only limited conclusions can be drawn for the evolution of AGNs in this energy band. But the objects explaining the peak in the cosmic X-ray background are likely to be either low luminosity AGN ($L_x < 10^{41}$ ergs/sec) or of other type, such as intermediate mass black holes, clusters, and star forming regions.

Additional Information

The seminars are given in the ISDC “Pavillon” building
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