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Hard X-ray surveys and the X-ray background ⋆

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Abstract. The spectrum of the hard X–ray background records the history of accretion processes integrated over the cosmic time. Several observational and theoretical evidences indicate that a significant fraction of the energy density is obscured by large columns of gas and dust. X–ray surveys are the most efficient way to trace accretion onto supermassive black holes, since obscured, accreting sources are more difficult to select at all other wavelengths.
The study of the hard X–ray source population is being pursued combining deep sensitive *Chandra* observations with medium–deep (i.e. the Lockman Hole) and shallow large area (i.e. the HELLAS2XMM serendipitous survey) XMM–*Newton* surveys, which nicely complement the high spatial resolution *Chandra* observations and allow to collect enough X–ray photons to perform spectral analysis. These studies confirm, at least qualitatively, the predictions of standard AGN synthesis models for the XRB: the high energy background radiation is mostly due to the integrated contribution of obscured and unobscured AGN folded with the corresponding evolution of their luminosity function over the cosmic time.
According to these models, most (i.e. 70–80 %) of the X–ray light produced by accretion onto supermassive black holes is obscured by large columns of gas and dust. Although obscured AGN are common in the local Universe and several examples of distant objects are being found in the optical follow–up observations of hard X–ray surveys the space density, cosmological evolution and absorption distribution of the energetically dominant component of the XRB is still subject to several uncertainties which prevent us from a better understanding of their physical nature and their role in models of galaxy evolution. Since we know that basically all spheroidal galaxy in the nearby Universe contains a massive black hole, the study of the evolutionary properties of active galaxies would provide key information on the assembling and feeding of supermassive black holes over the cosmic time. Here we review the status of hard X–ray surveys and associated multiwavelength program and how they can help in solving some of the issues outlined above.

Key words. X-ray surveys, diffuse radiation, Active Galactic Nuclei

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⋆ Talk at http://sait.oat.ts.astro.it/MSAIS/3/POST/Comastri_talk.pdf

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