

Radio Loud AGN in the 2XMMi catalogue

Alvaro Labiano¹, Matteo Guainazzi¹, and Stefano Bianchi²

¹European Space Astronomy Centre of ESA, Madrid, Spain
email: Alvaro.Labiano@esa.int, Matteo.Guainazzi@esa.int

²Dipartimento di Fisica, Università degli Studi Roma Tre, Rome, Italy
email: bianchi@fis.uniroma3.it

Abstract. We are carrying out a search for all radio loud Active Galactic Nuclei observed with *XMM-Newton*, including targeted and field sources to perform a multi-wavelength study of these objects. We have cross-correlated the Verón-Cetty & Verón (2010) catalogue with the *XMM-Newton* Serendipitous Source Catalogue (2XMMi) and found around 4000 sources. A literature search provided radio, optical, and X-ray data for 403 sources. This poster summarizes the first results of our study.

Keywords. Galaxies: active - Galaxies: Seyfert - quasars: general - X-rays: general

1. Introduction and sample

Bianchi *et al.* (2009a,b) presented the Catalogue of Active Galactic Nuclei (AGN) in the *XMM-Newton* Archive (CAIXA). They focused on the radio-quiet, X-ray unobscured ($N_{\text{H}} < 2 \times 10^{22} \text{ cm}^{-2}$) AGN observed by *XMM-Newton* in targeted observations. We are carrying out a similar multiwavelength study, for both targeted and field radio-loud AGN observed by *XMM-Newton*. We cross-correlated the Verón-Cetty & Verón (2010) catalogue (Quasars and Active Galactic Nuclei, 13th edition) with the *XMM-Newton* Serendipitous Source Catalogue (2XMMi, Watson *et al.* 2009) Third Data Release, and obtained a list of around 4000 sources. However, only 10% of the sources have published

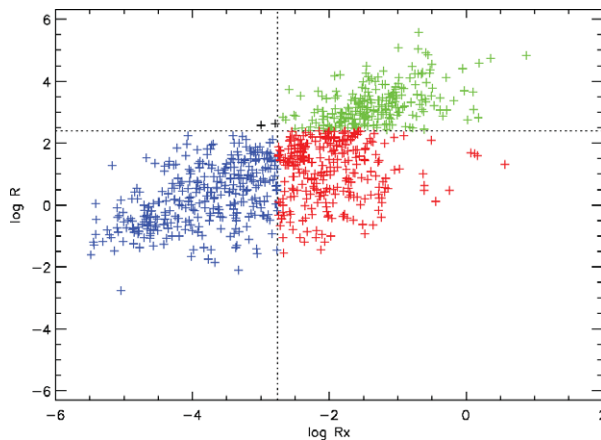


Figure 1. Radio loud (green) and radio quiet (blue and red) AGN. Rx is the ratio between 5 GHz and 2-10 keV emission. R is the ratio between 5 GHz and B-band emission. Boundaries from Panessa *et al.* 2007. Blue points are sources classified as radio quiet by R and Rx parameters. Red points are sources classified as radio quiet by the R parameter and radio loud by the Rx parameter.

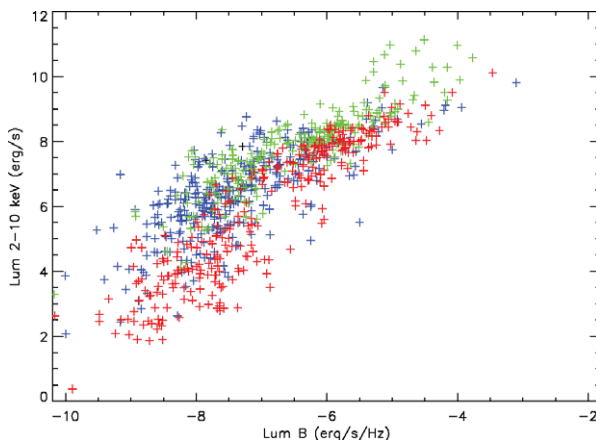


Figure 2. X-ray versus B-band luminosities. For optical luminosities higher than 10^{-6} erg/s/Hz radio loud (green) AGN are brighter in X-rays than radio quiet (red and blue). This effect is stronger at higher luminosities (10^{-5} - 10^{-4} erg/s/Hz), where radio loud AGN deviate from the low luminosities correlation. X-ray emission in radio loud sources could have larger contributions from the jet.

optical and radio data. Our sample consists of all AGN (403 total, Figures 1 and 2) with available X-ray (2-10 keV), optical (B-band) and radio (5 GHz) data.

2. First results and ongoing work

Radio loud sources show jet contribution to optical and X-ray emission, and are brighter in X-rays than radio quiet. Optical and X-rays are AGN dominated with small contribution from host. For optical luminosities higher than 10^{-6} erg/s/Hz radio loud AGN are brighter in X-rays than radio quiet. This effect increases for higher luminosities ($10^{-5} - 10^{-4}$), where loud AGN deviate from the low luminosities correlation. X-rays in radio loud sources could have higher contributions from the jet. The sample seems to be missing faint, radio loud AGN, although at this point it is not clear if this is due to selection or astrophysical effects.

While X-rays in radio loud AGN seem to come mainly from jets, other mechanisms of X-ray emission are being studied (e.g. ADAF)? A complete spectral optical and X-ray analysis, including also the 0.2-2 keV band will bring light to the origin of the X-rays in these sources. We are currently studying the sample properties according to different classifications (Seyfert and QSO or FR I and FR II morphologies), and will include IR data when available, with the goal of carrying out a systematic analysis in as many wavelengths as possible.

References

- Bianchi, S., Bonilla, N. F., Guainazzi, M., Matt, G., & Ponti, G. 2009a, *A&A*, 501, 915
 Bianchi, S., Guainazzi, M., Matt, G., Fonseca Bonilla, N., & Ponti, G. 2009b, *A&A*, 495, 421
 Panessa, F., Barcons, X., & Bassani L. *et al.*, 2009, *A&A*, 467, 519
 Véron-Cetty, M. & Véron, P. 2010, *A&A*, 518, A10
 Watson, M. G., Schröder, A. C., Fyfe, D., *et al.* 2009, *A&A*, 493, 339