Investigating the origin of AGN X-ray variability through XMM-Newton and WISE data

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ABSTRACT
An efficient diagnostic method to find local (z < 0.1) Compton-thick AGN consists in selecting sources characterized by hard X-ray colors and low X-ray to mid-IR flux ratio (HR vs. F\emph{\text{\text{\text{\text{x}}}X}}/F\emph{\text{\text{\text{\text{\text{IR}}}2}}}). This has been done efficiently in the past using 2XMM and IRAS data (Severgnini et al. 2012). I will here summarize my master thesis work, in which I tested the stability of the method outlined above using the latest 3XMM and WISE data, and I investigated its potentialities in finding interesting spectrally variable (including changing-look) XMM-Newton sources.

**Diagnostic diagram for AGN classification in the local Universe: HR vs. F\emph{\text{\text{\text{\text{\text{X}}}X}}} / F\emph{\text{\text{\text{\text{\text{IR}}}2}}}**

**Stability of the diagnostic diagram in classifying sources considering their average properties**

Only 7 sources have shown transitions within the diagram

**Confirmation of the past results (e.g. surface density of CT AGN)**

**Diagnostic diagram as a tool to have hints on the origin of the observed X-ray variability**

**HINT:** a significant variation in HR points out a dramatic change in the column density of the neutral gas along the line of sight

**NGC 6860:** Seyfert 1/1.5 (Izzo et al. 2013; Lipari et al. 1995) at z=0.015

**CONTINUED BY SPECTRAL ANALYSIS**

**X-ray variability driven by a crossing along the line of sight of a neutral cloud covering about 90% of the radiation emitted by the AGN (see Figure 5)**

**NGC 4388:** Seyfert 2 (Bottacini et al. 2012) at z=0.00842

**HINT:** the X-ray variability is due to an increasing in the intrinsic emission of the AGN

**CONTINUED BY SPECTRAL ANALYSIS**

Although a little variation in \(N_e\) is clearly visible (see Figure 5), the main driver of the X-ray variability is a significant increase of the AGN intrinsic emission.

**RESULTS**

**Selection of interesting spectrally variable X-ray sources**

The availability of multiple observations in the 3XMM catalogue for ∼54% of the sample has allowed us to extend the use of the diagnostic diagram to variable AGN by plotting individual observations we identified some interesting sources showing transitions between different regions of the diagnostic diagram (i.e. changing-look AGN – see Figure 3).