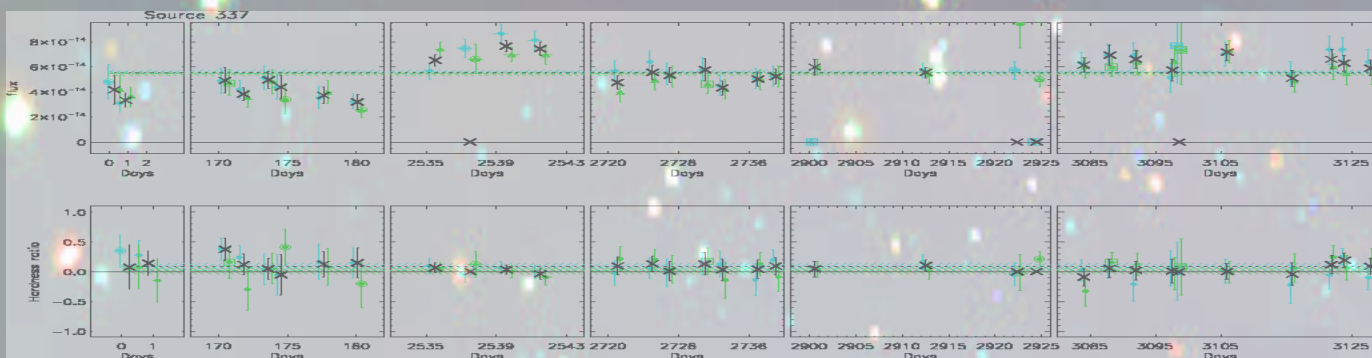


# The variability of the ten brightest AGN in the XMM-CDFS

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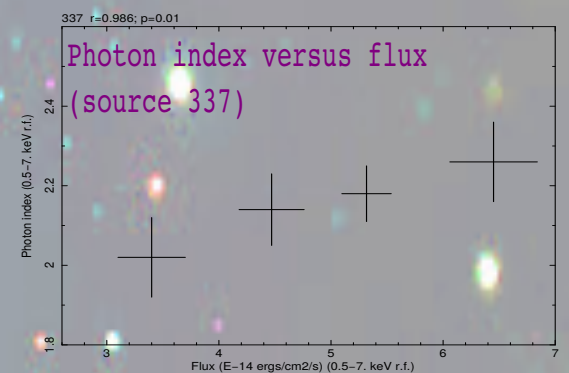
**Abstract.** We investigate time resolved spectra of the ten brightest active galactic nuclei in the XMM-Newton observation of the Chandra Deep Field South (Ranalli+2013) to determine whether the flux variability is connected to any spectral variability (e.g. Papadakis+2009, Sobolewska+2009). Taking advantage of the good counts statistics in the XMM CDFS we search for flux and spectral changes using the hardness ratios techniques and the spectral analysis. We found that X-ray flux fluctuations are ubiquitous in AGN but not commonly associated with significant spectral changes. The photon index variability is found only in one unabsorbed source which is steeper when brighter, as expected in unabsorbed AGN.



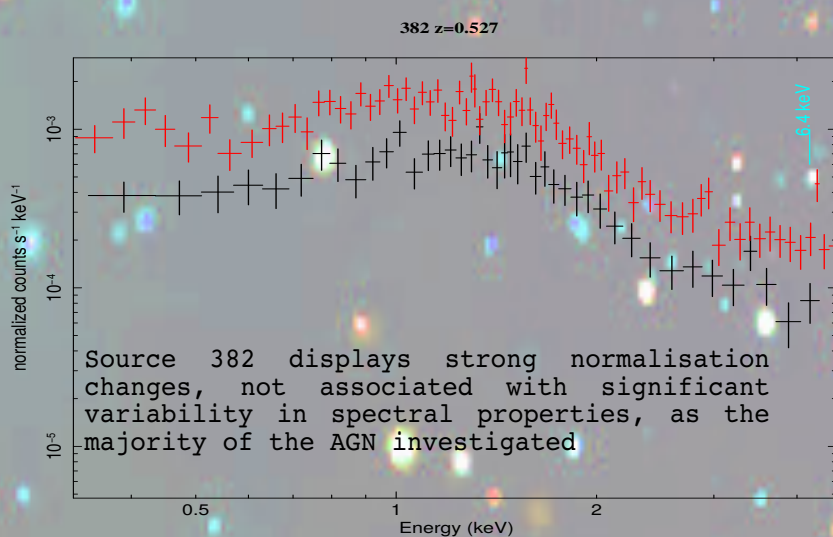
Flux lightcurves (0.5- 8. keV observed frame): significant fluctuations

HR lightcurves: marginal fluctuations

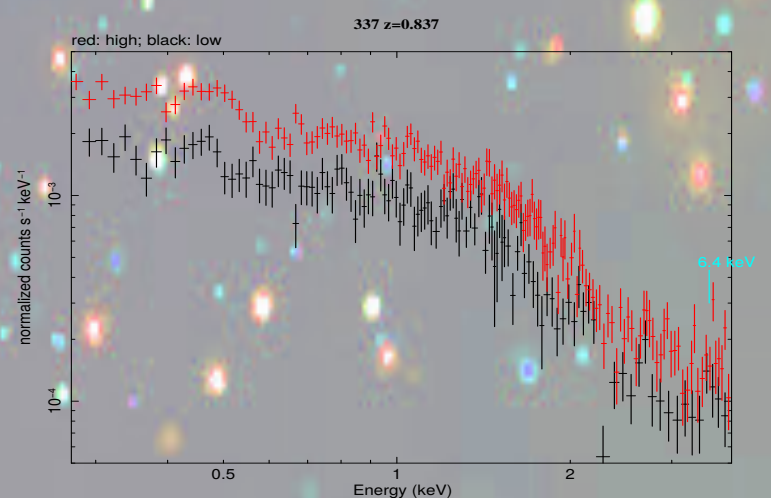
The spectra have been grouped in the six epochs of contiguous observations (the six boxes in the lightcurves) to investigate their spectral variability. The spectral analysis shows evidence for changes in normalisation across the epochs; these are not connected with significant variability in the spectral features for the majority of the sources. Source 337 shows instead a significant photon index variability. The spectra have been also merged in high and low flux states (above and below the average flux).



This correlation has been confirmed by the high and low flux states spectra



Source	coord
(1)	(2)
203	03:32:08.62 -27:47:34.80
319	03:32:26.95 -27:41:06.00
358	03:32:07.85 -27:37:32.16
337	03:32:38.14 -27:39:44.64
359	03:32:11.54 -27:37:27.84
292	03:32:48.05 -27:42:33.12
33	03:33:01.70 -27:58:18.84
382	03:32:28.32 -27:35:35.88
48	03:32:38.93 -27:57:00.72
352	03:32:42.46 -27:38:15.72



We conclude that AGN are strongly variable in flux in the timescales of months-years. The X-ray colors are not significantly variable as the fluxes. From the spectral analysis, the variability in normalisation is more significant than the fluctuations in the spectral features. Only source 337 has a variable photon index, that follows the trend 'steeper when brighter' found previously in local samples. The variability in the column density has not been detected in the timescales considered. The sample has two strongly absorbed sources with a non-variable Compton reflection component.

**References:**  
 Papadakis, 2009, *A&A*, 494, 905  
 Sobolewska, 2009, *MNRAS*, 399, 1597  
 Ranalli, 2013, *A&A*, 555, A42

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