

# The X-ray weak state of Narrow-line Seyfert 1 galaxies

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Milano, 05 April 2011

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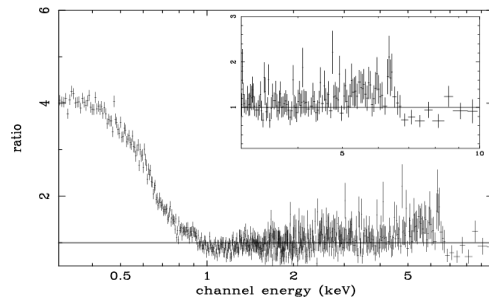
# *Outline*

*\* Motivation for studying the X-ray weak state  
in AGN: sample study*

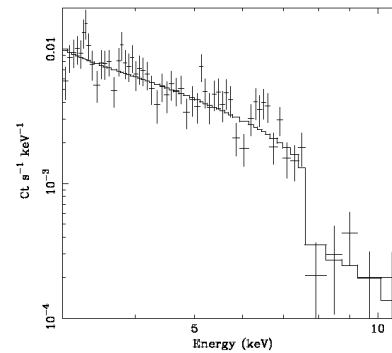
*\* Case studies:  
PHL 1092, PG 0844+349, Mrk 335*

# Early XMM-Newton days: High-energy complexity in some NLS1

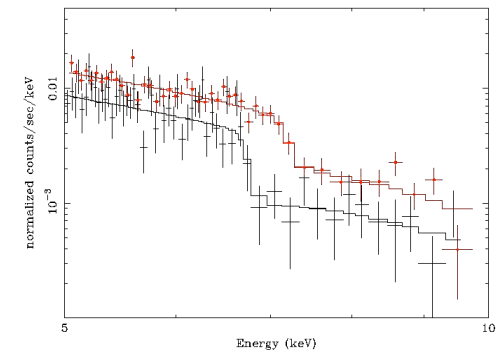
IRAS 13349+2438 (Longinotti et al. 2003)



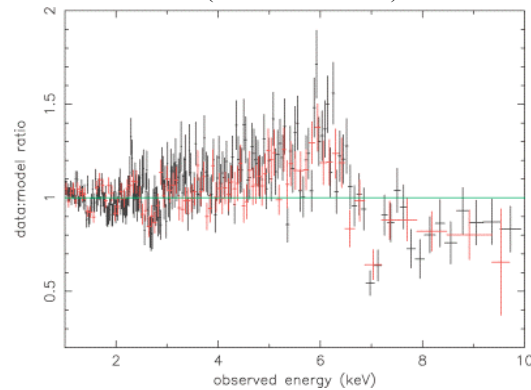
IRAS 13224-3809 (Boller et al. 2003)



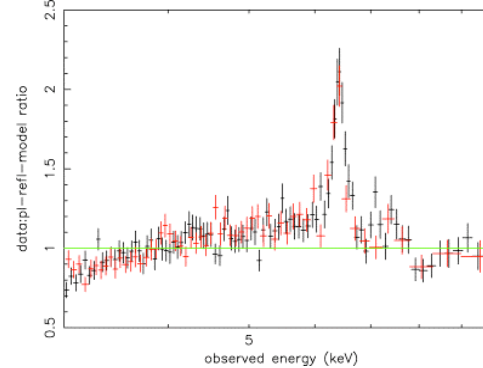
1H0707-495 (Gallo et al. 2004)



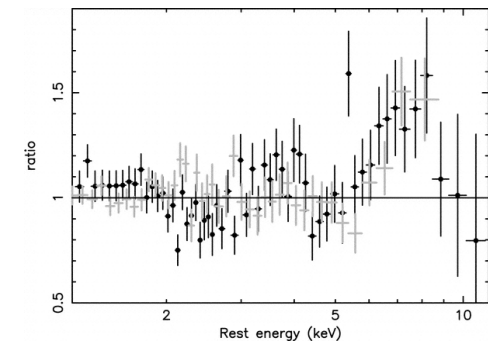
PG1211+143 (Pounds et al. 2003)



NGC4051 (Pounds et al. 04; Uttley et al. 04)



PG1402+261 (Reeves et al. 2004)

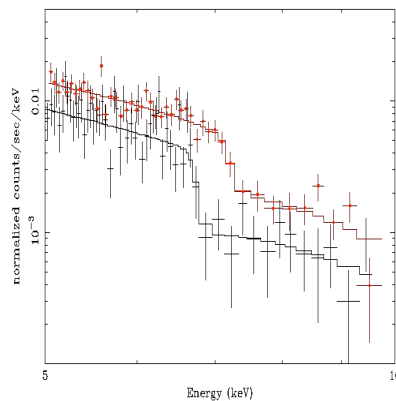


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# *Early XMM-Newton days: High-energy complexity in some NLS1*

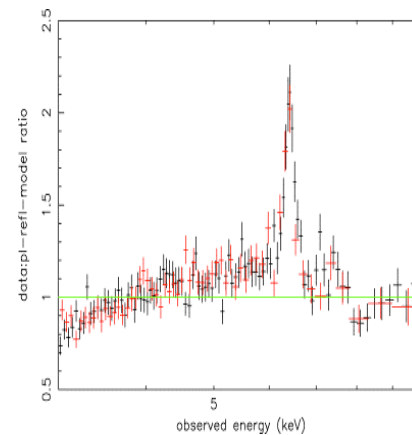
*Extreme*



1H0707-495



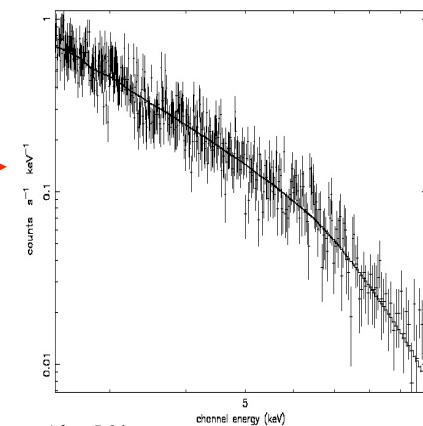
*Moderate*



NGC4051



*Minimal*



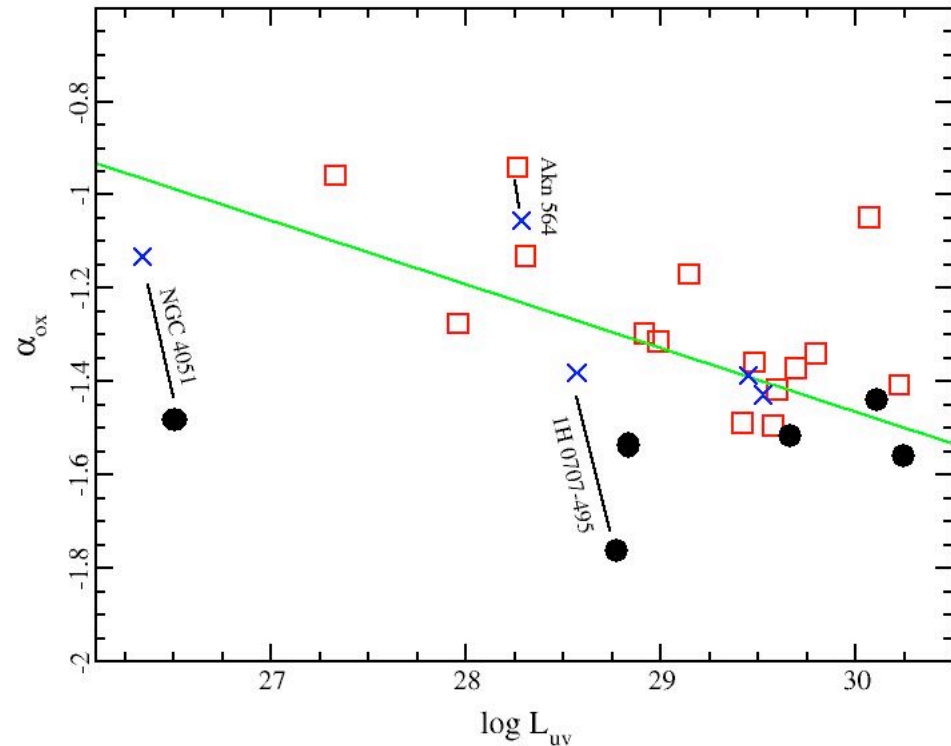
Akn 564

*Varying degree of complexity from object-to-object  
and epoch-to-epoch (in same source)*

# Level of complexity depends on X-ray weakness

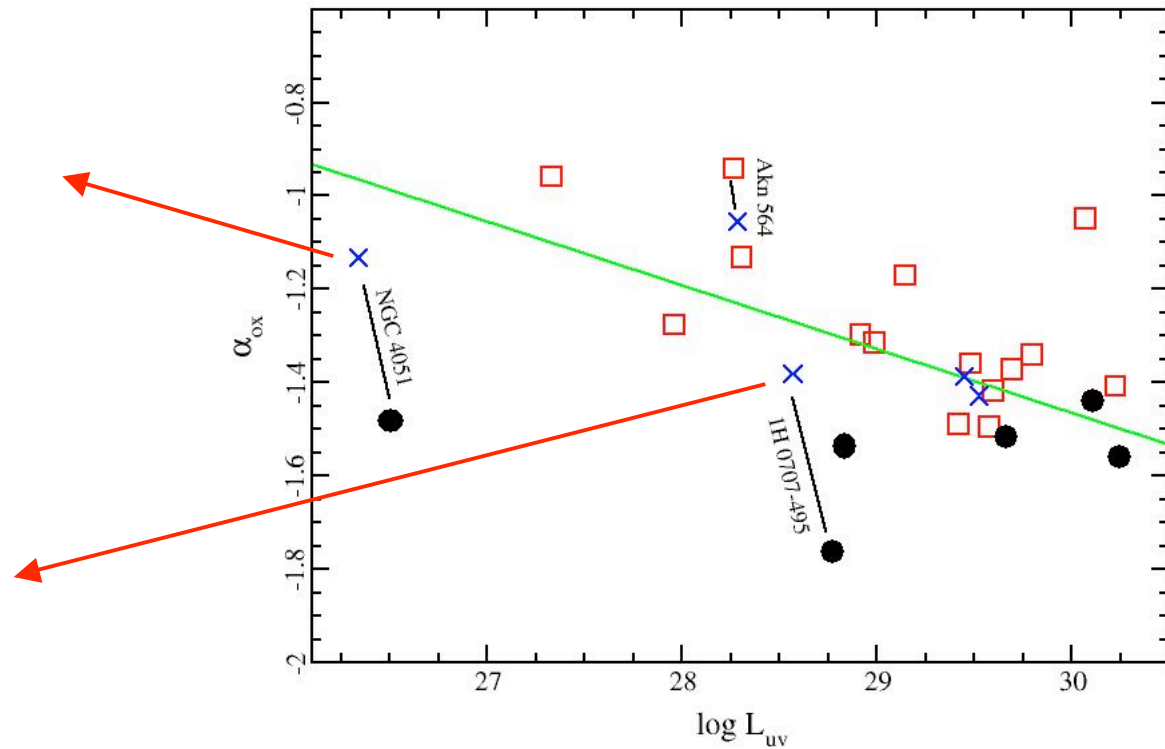
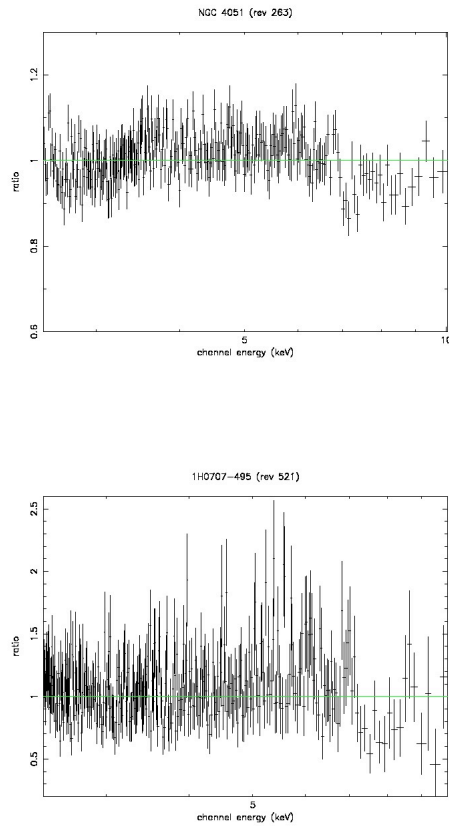
Gallo 2006

- *Strateva et al. (2005)*  
 $\alpha_{\text{ox}}-L_{\text{uv}}$  relation
- No 2-10 keV complexity  
(i.e. power law)
- 2-10 keV complexity



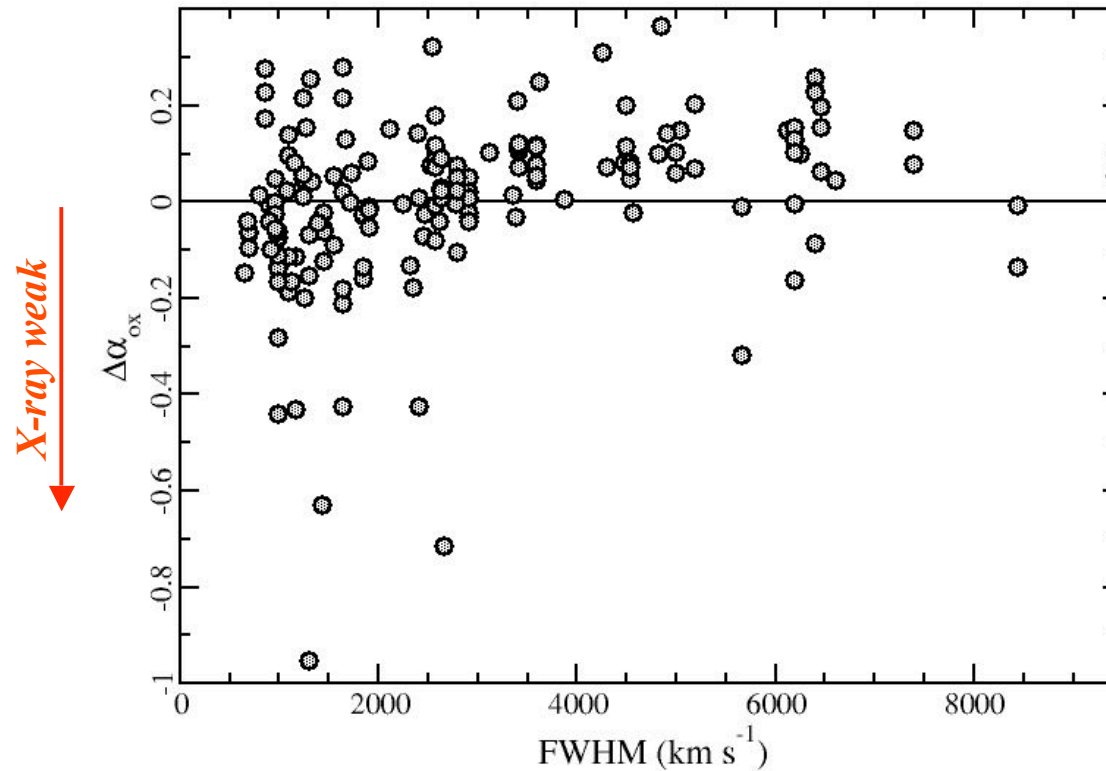
*Need to catch objects in  
low-X-ray flux state*

# *Level of complexity depends on X-ray weakness*



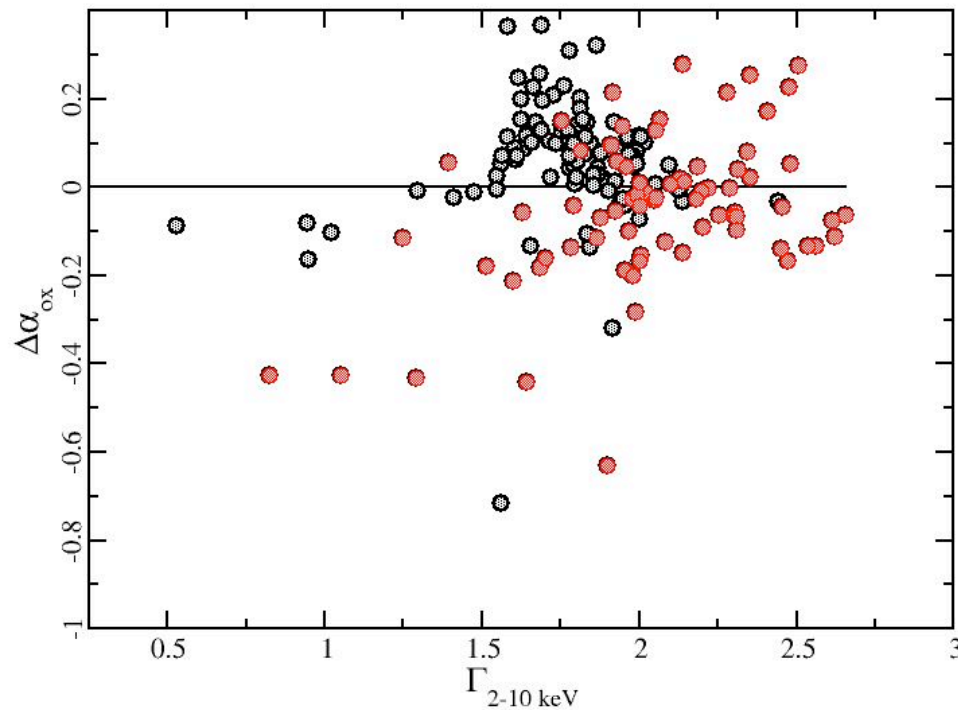
*Level of complexity diminishes with increasing X-ray flux*

# *Level of complexity depends on X-ray weakness*



*NLS1 are easier to catch in X-ray weak state*

## *Spectral properties of sample: spectral slope*

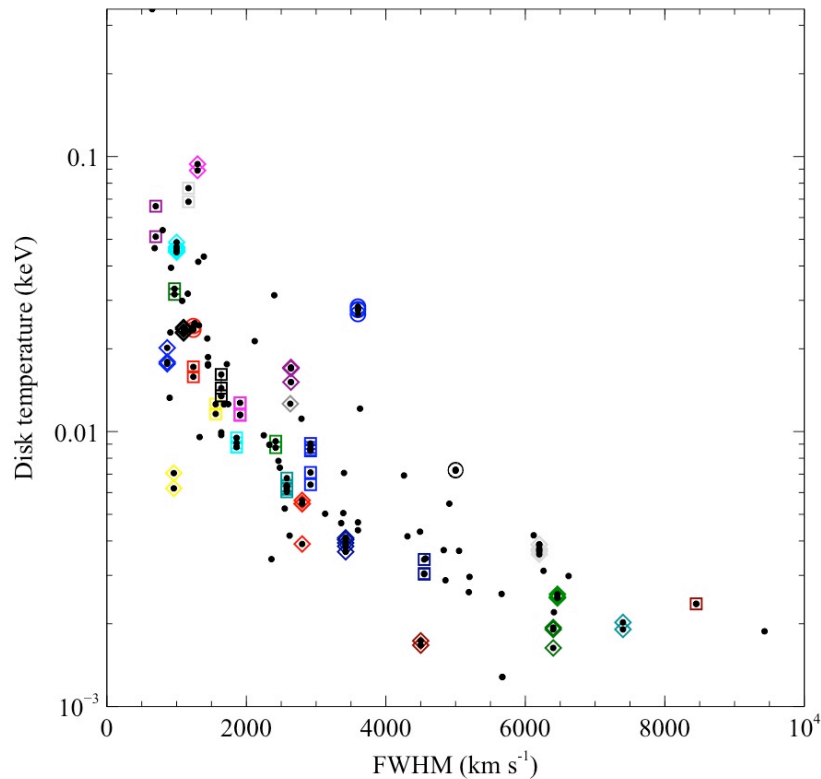


*Flat spectral source  
are only seen in X-ray  
weak state*

*See Ranjan Vasudevan's poster*



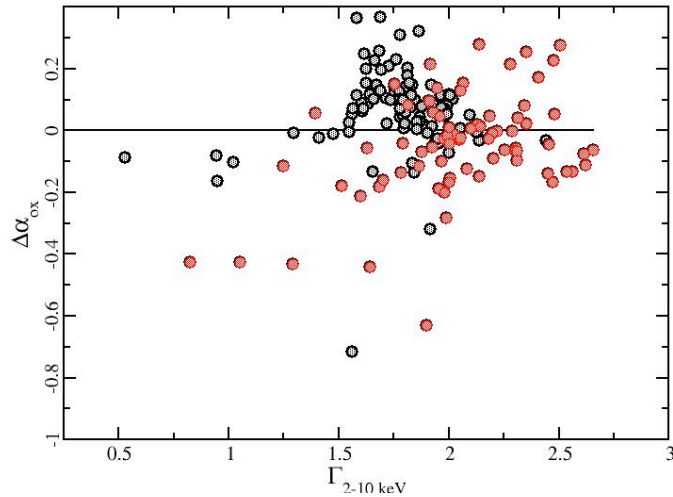
# *Spectral properties of sample: disc temperature*



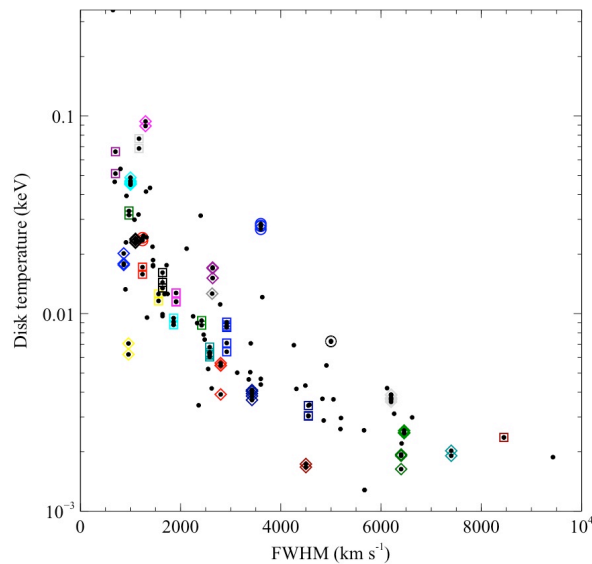
*No significant fluctuation in  
disc temperature in X-ray  
weak state*

*See Ranjan Vasudevan's poster*

# *Spectral properties of sample*



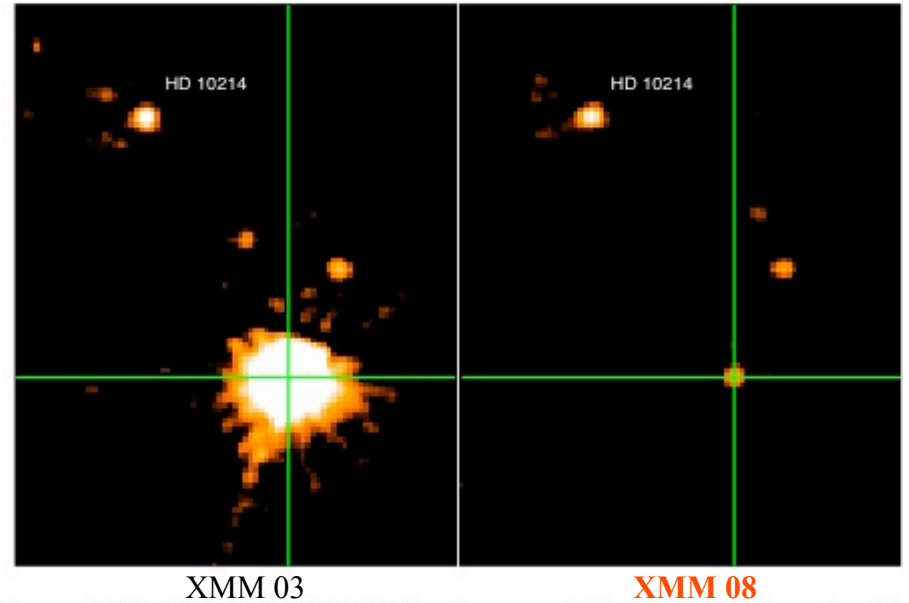
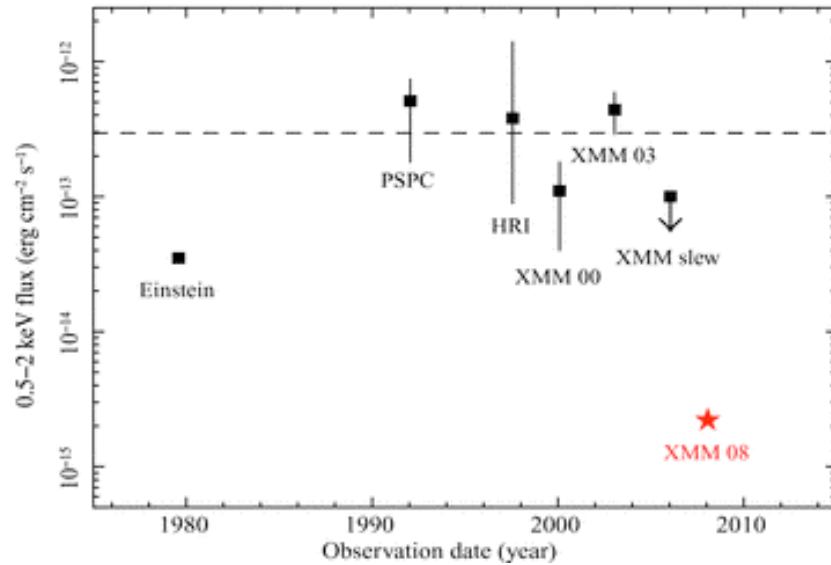
*X-ray weakness driven by changes in the power law component (i.e. the corona), either intrinsic or apparent*



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# Catch NLS1 in X-ray weak state: PHL 1092

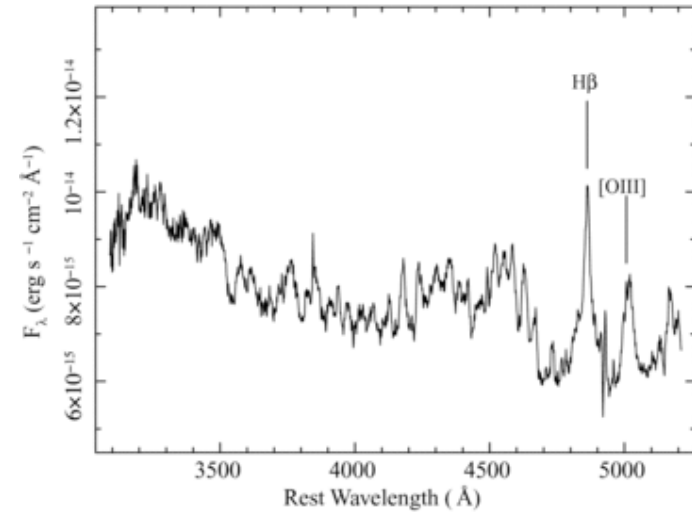
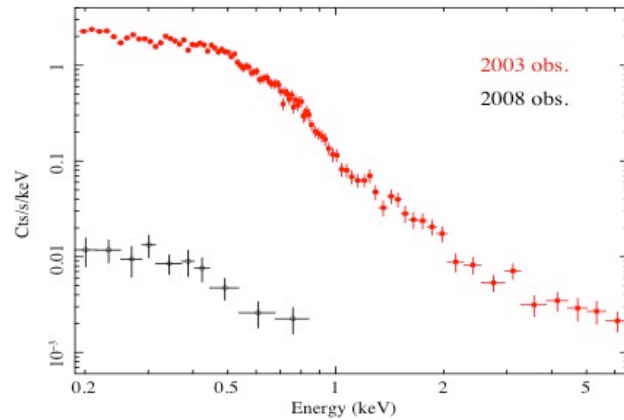


*Miniutti et al. (2009)*

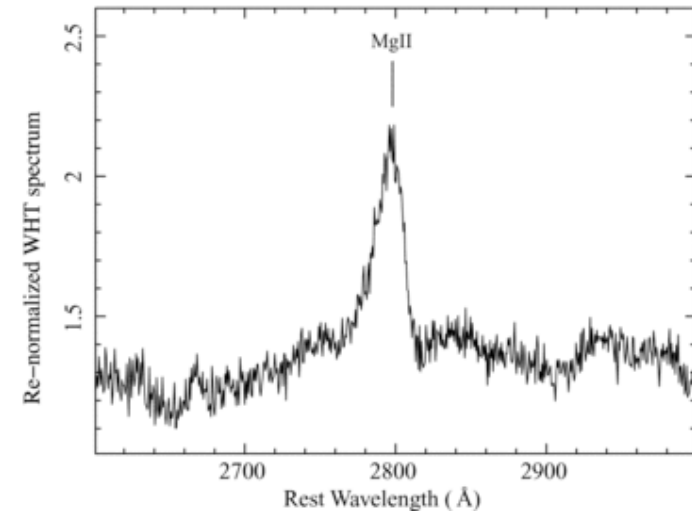
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# *Catch NLS1 in X-ray weak state: PHL 1092*



*No apparent change in optical*

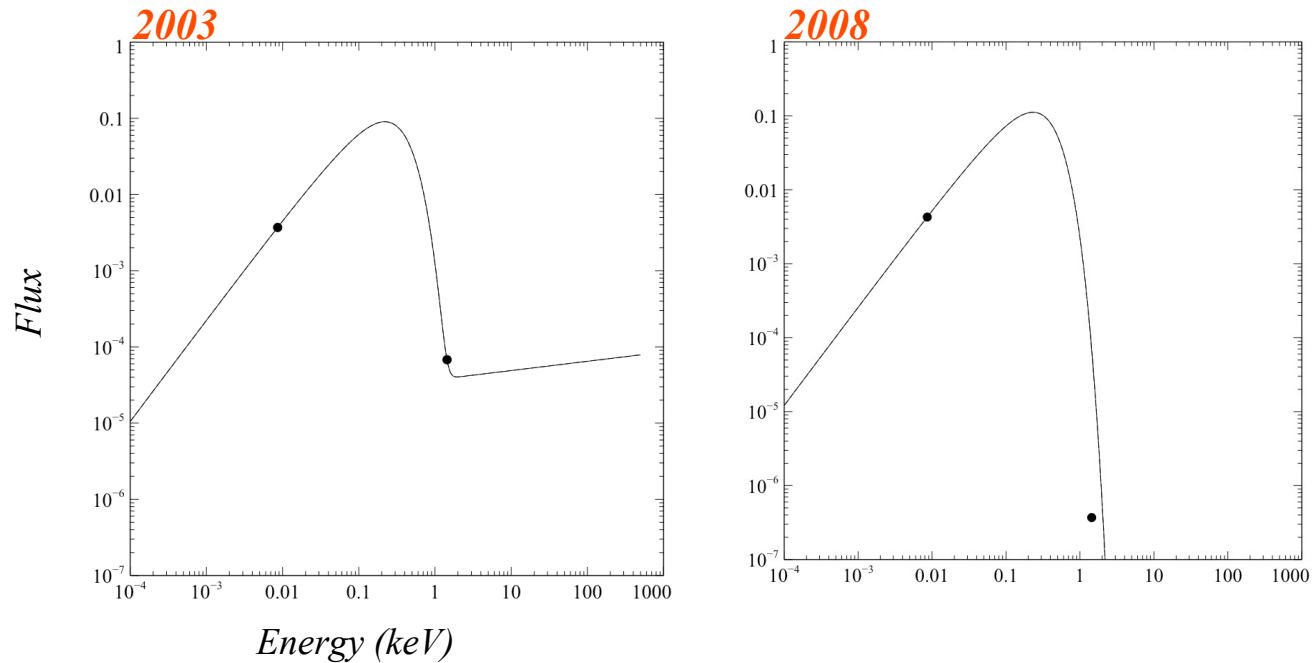


*Miniutti et al. (2009)*

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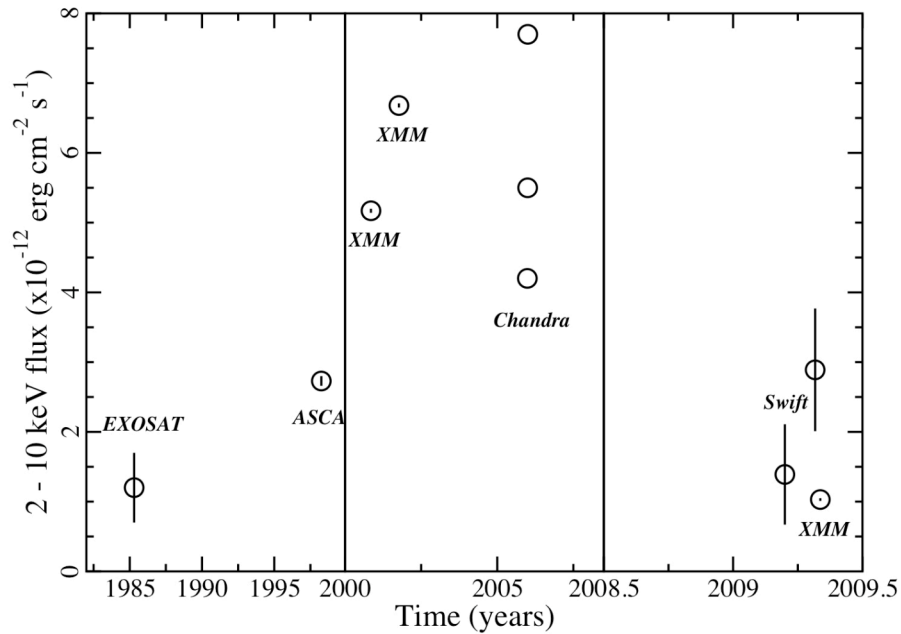
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# *Catch NLS1 in X-ray weak state: PHL 1092*

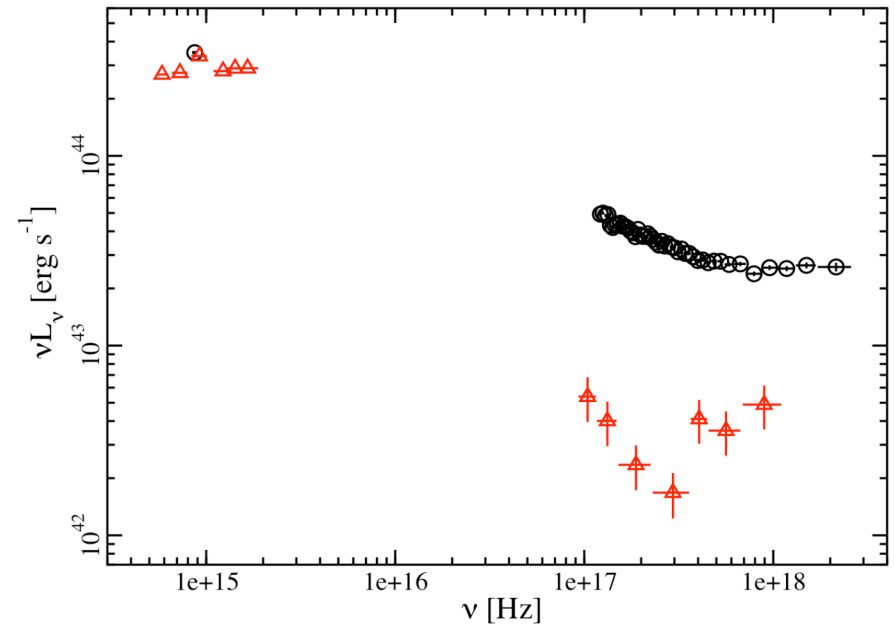


*X-ray weakness due to  
intrinsic changes in the nature  
of the corona (power law)*

# Catch NLS1 in X-ray weak state: PG 0844+349



*Low X-ray flux states are common  
in PG 0844+349*

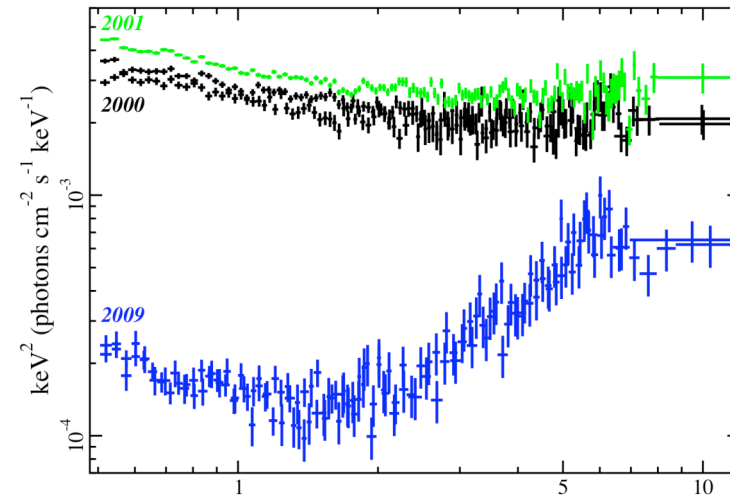


*Again, no change in the optical*

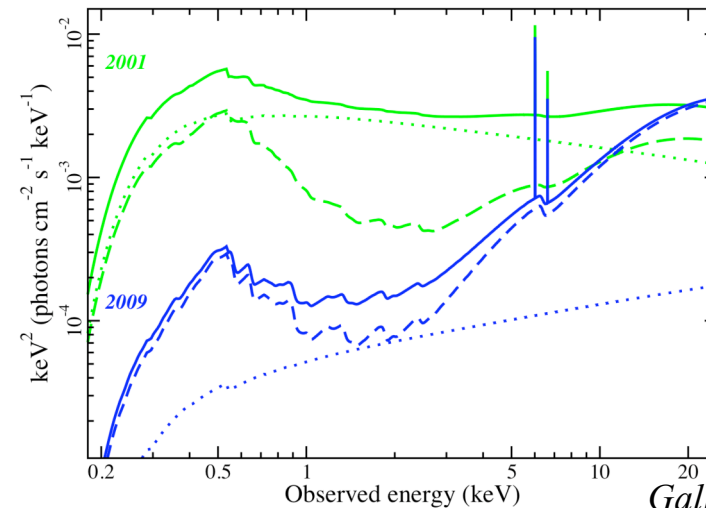
*Gallo et al. (2011)*

# Catch NLS1 in X-ray weak state: PG 0844+349

*Reflection dominated  
in the low-flux state.*

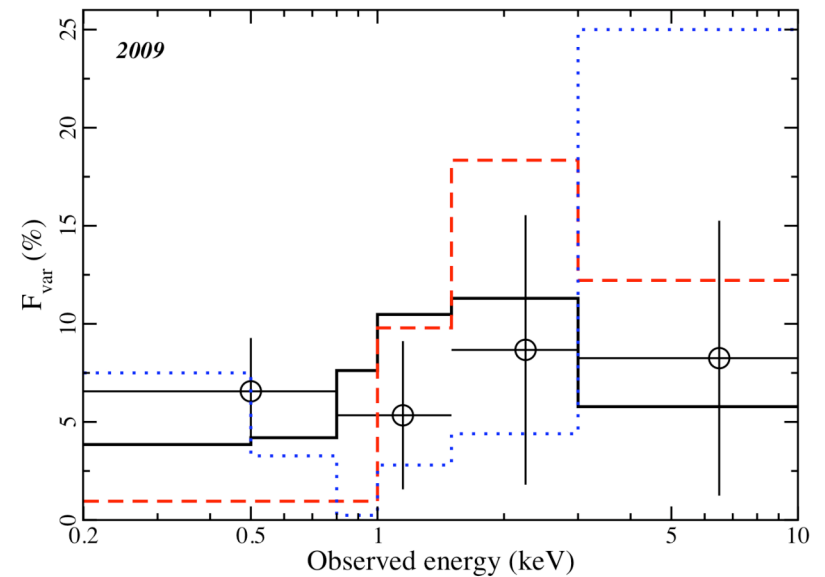
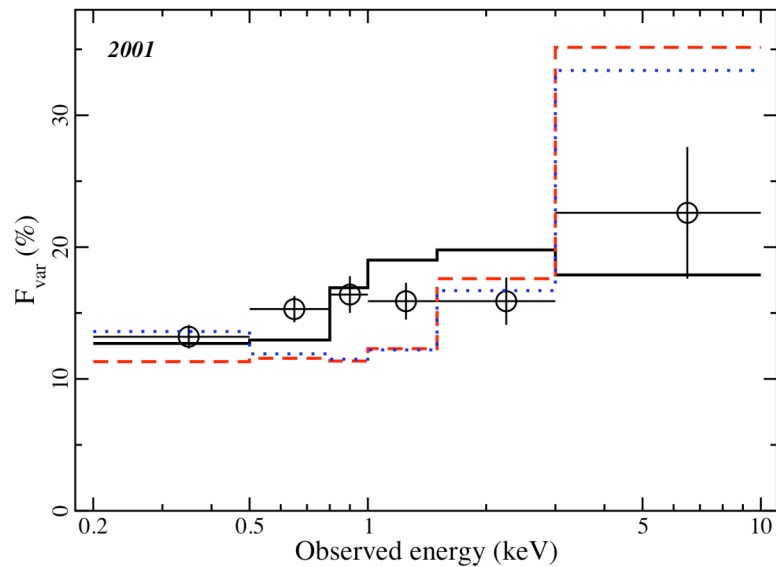


*X-ray weakness mostly  
due to diminished flux from  
power law component*



*Gallo et al. (2011)*

# *Catch NLS1 in X-ray weak state: PG 0844+349*



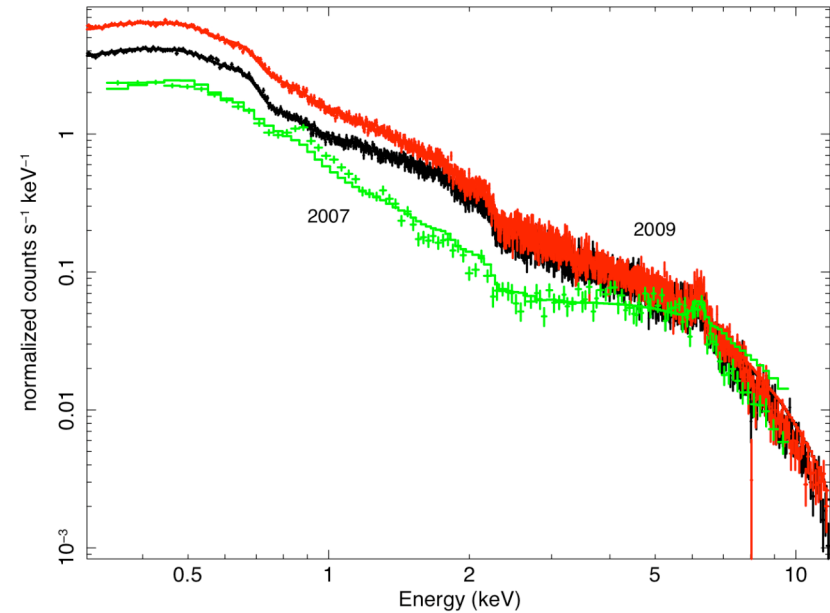
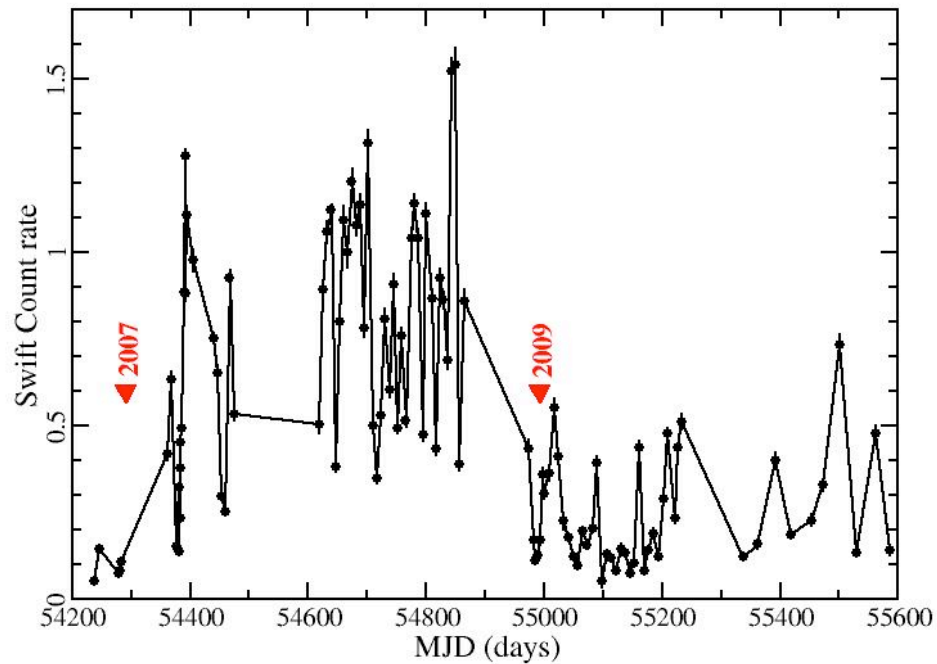
*Variability can be used to distinguish  
models (talks by ACF, LM, AZ)*

*Gallo et al. (2011)*



# *Catch NLS1 in X-ray weak state: Mrk 335*

*(reflection interpretation is work in progress)*



*See Dirk Grupe's poster  
(absorption interpretation)*

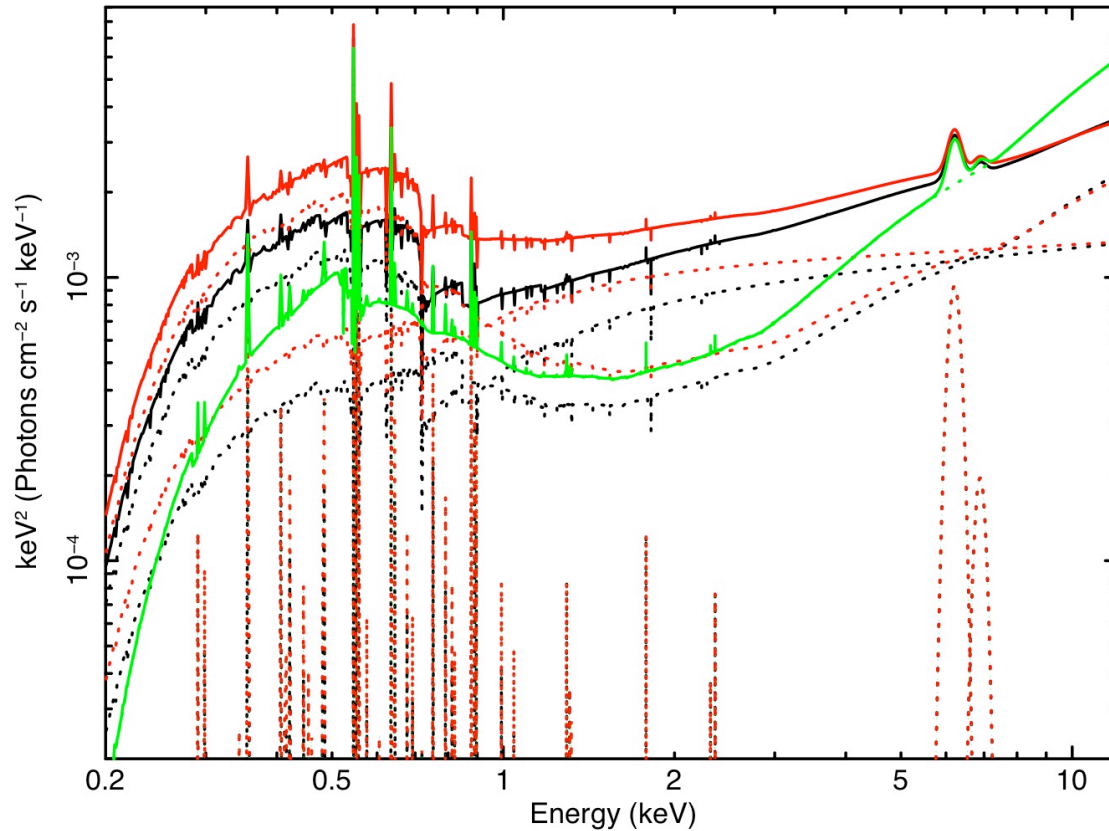
*More complex system with  
ionised emission and absorption*

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# *Catch NLS1 in X-ray weak state: Mrk 335*

*(reflection interpretation is work in progress)*



*Reflection dominated  
in the low-flux state*

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# Summary

*\*NLS1 ideal systems to study the low X-ray flux state in AGN*

*\* X-ray weak state appear driven by the changes in the power law component (corona). Changes can be either intrinsic to the corona or apparent to the observer*

*\* PHL 1092: disc is unchanged while corona is absent (changes in jet output; disruption of corona; magnetic field in transition...)*

*\* PG 0844+349: consistent with a reflection dominated scenario (some changes in corona cannot be ruled out)*

*\* Mrk 335: (work in progress) complicated system, but the reflection dominated scenario is possible*

***Thank you!***

Milano, 05 April 2011

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