

Multi-wavelength campaign on NGC 7469: the broad-band X-ray spectrum

*Sesto 2017,
From the Dolomites to the event horizon: sledging down the black
hole potential well*

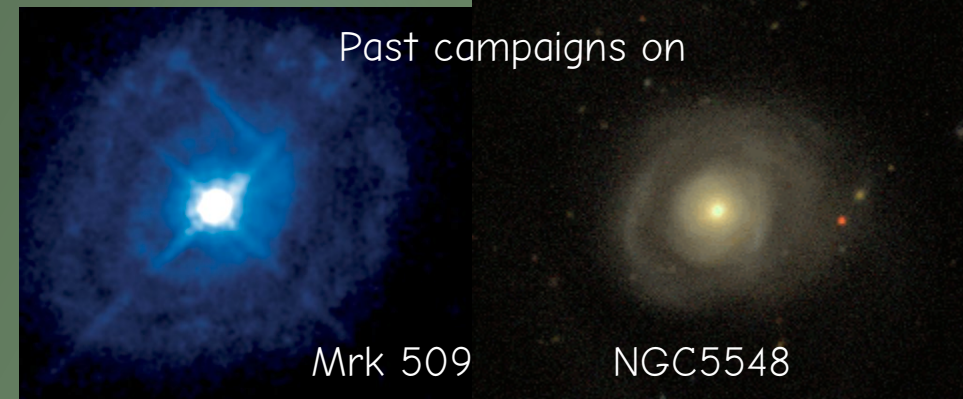
**Riccardo
Middei
on behalf of
the NGC 7469
consortium**



The campaign on NGC 7469

>properties of the outflow

>understand the nature of the continuum emission



7 observations

NGC 7469

>Seyfert 1 galaxy

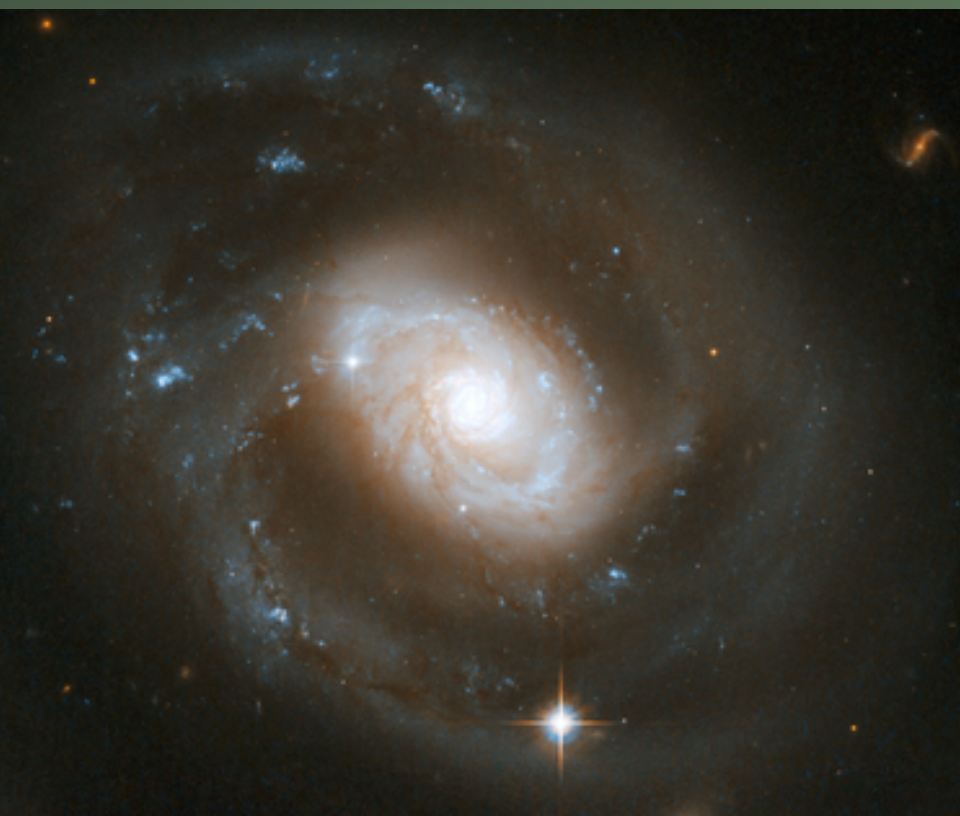
> $z=0.016268$

> $M_{bh} \sim 10^7 M_{\odot}$

>variable source

>bright in the X-rays

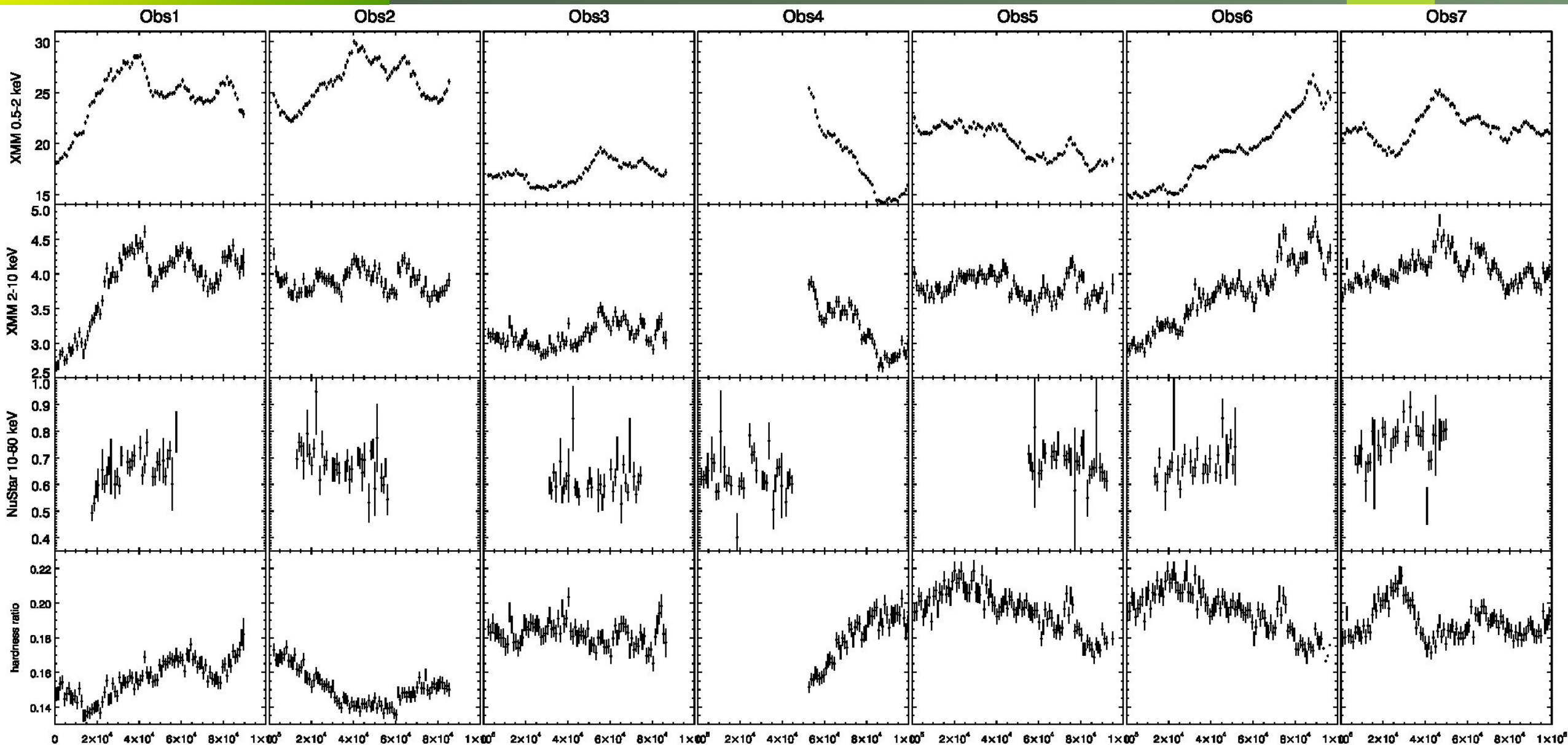
Obs. Satellites	Obs. ID	Star time	Net Exp. (s)
XMM-Newton	0760350201	2015-06-12	6.3e+04
Nustar	60101001002	2015-06-12	2.1e+04
XMM-Newton	0760350301	2015-11-24	5.9e+04
Nustar	60101001004	2015-11-24	2.0e+04
XMM-Newton	0760350401	2015-12-15	5.9e+04
Nustar	60101001006	2015-12-15	2.2e+04
XMM-Newton	0760350501	2015-12-23	6.2e+04
Nustar	60101001008	2015-12-22	2.3e+04
XMM-Newton	0760350601	2015-12-24	6.5e+04
Nustar	60101001010	2015-12-25	2.1e+04
XMM-Newton	0760350701	2015-12-26	6.7e+04
Nustar	60101001012	2015-12-27	2.1e+04
XMM-Newton	0760350801	2015-12-28	7.0e+04
Nustar	60101001014	2015-12-28	2.3e+04



Timing analysis

NGC 7469 is
a variable source

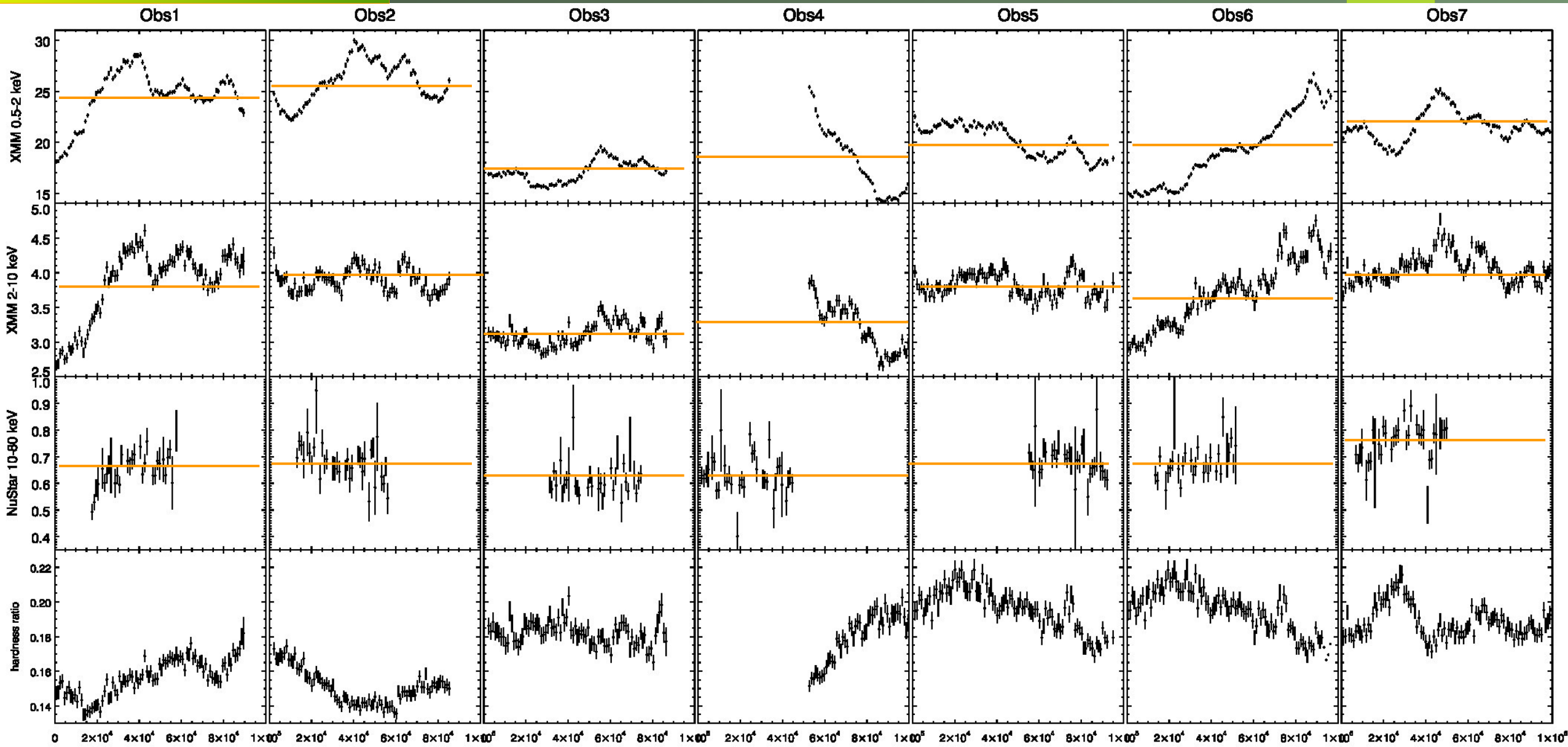
Middei et al. in prep.



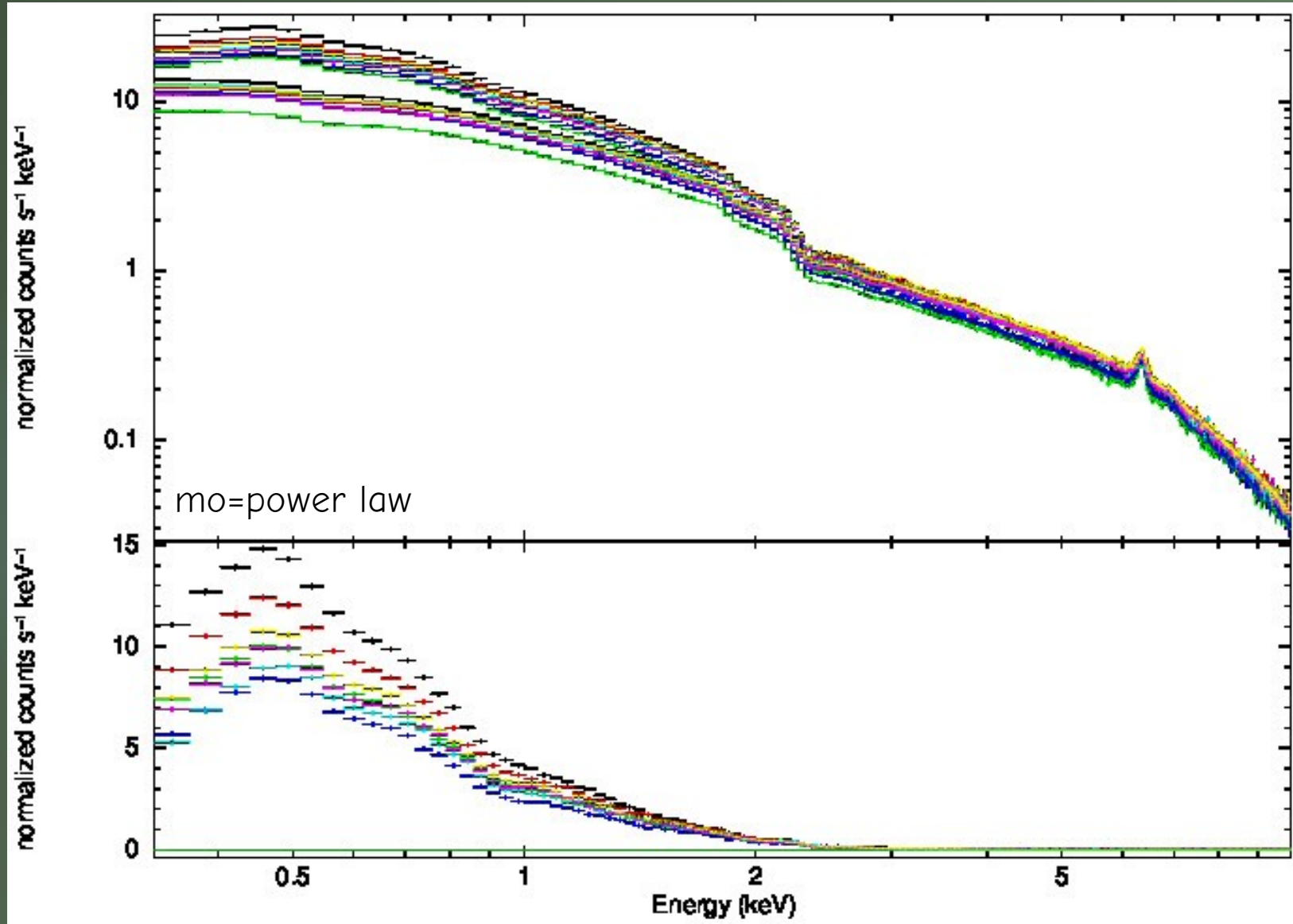
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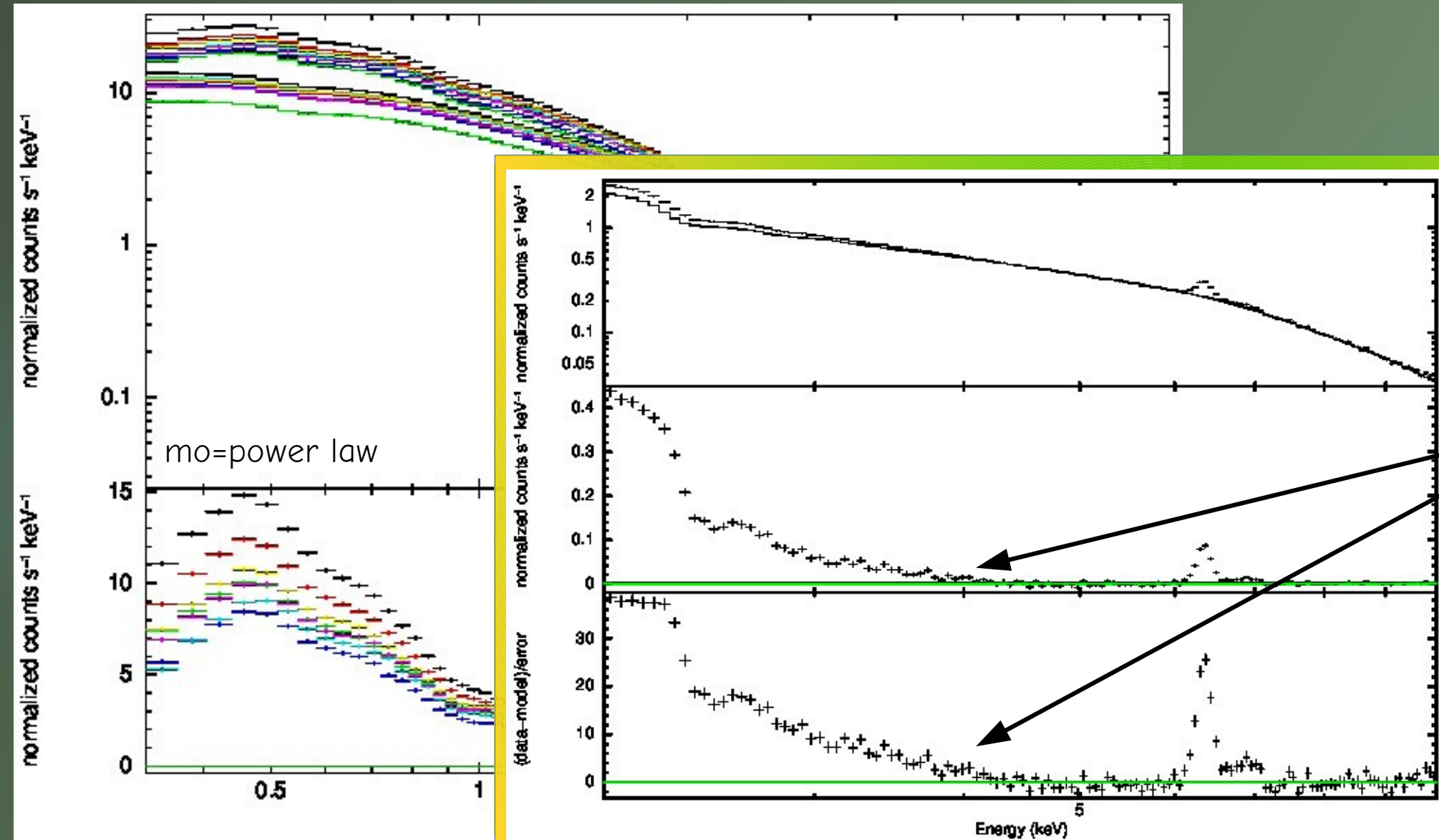
The XMM-Newton spectra



At least one more component is needed to fit the soft band

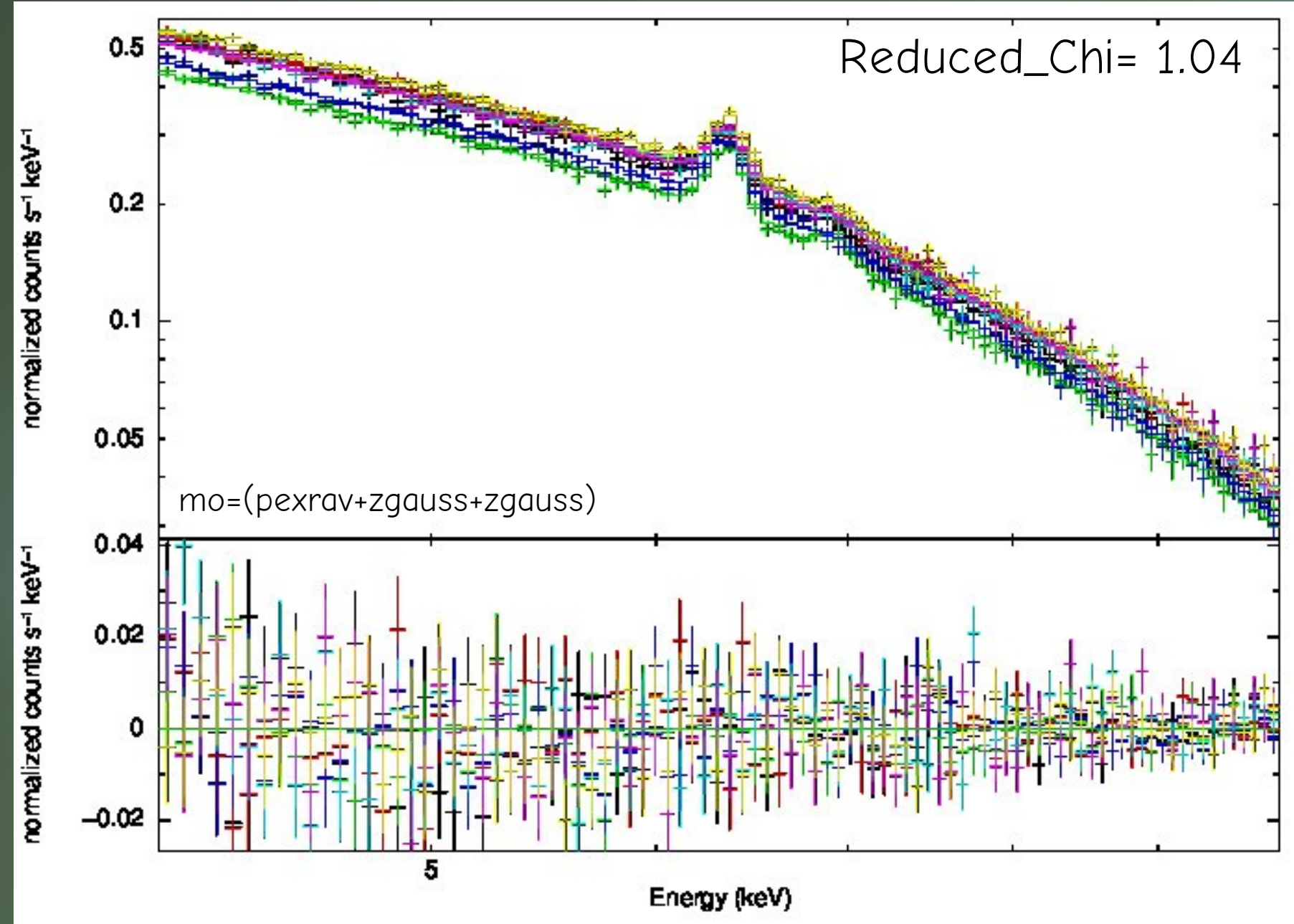
This soft excess extends up to 4 keV

The XMM-Newton spectra



*First step:
We study
XMM-
Newton
spectra in
the
4-10 keV
band*

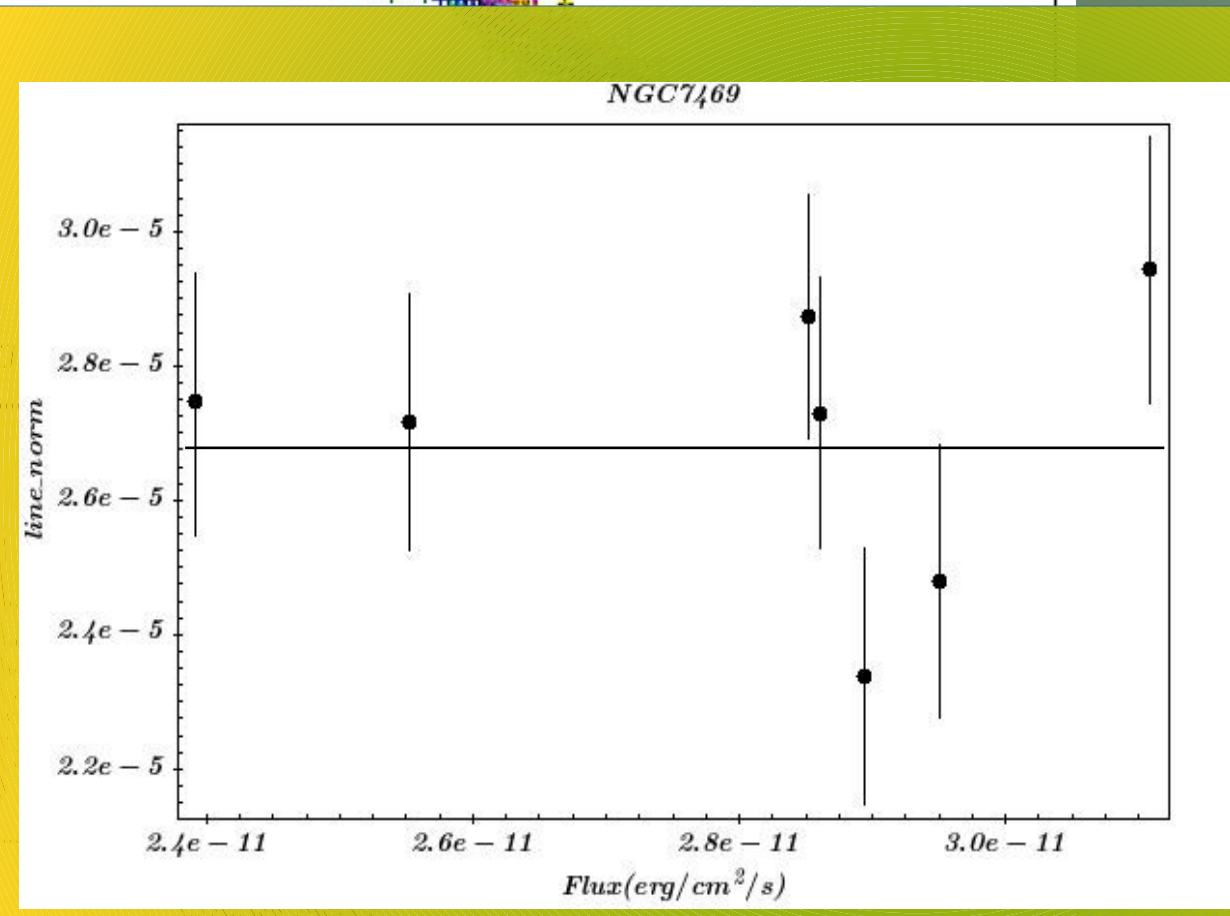
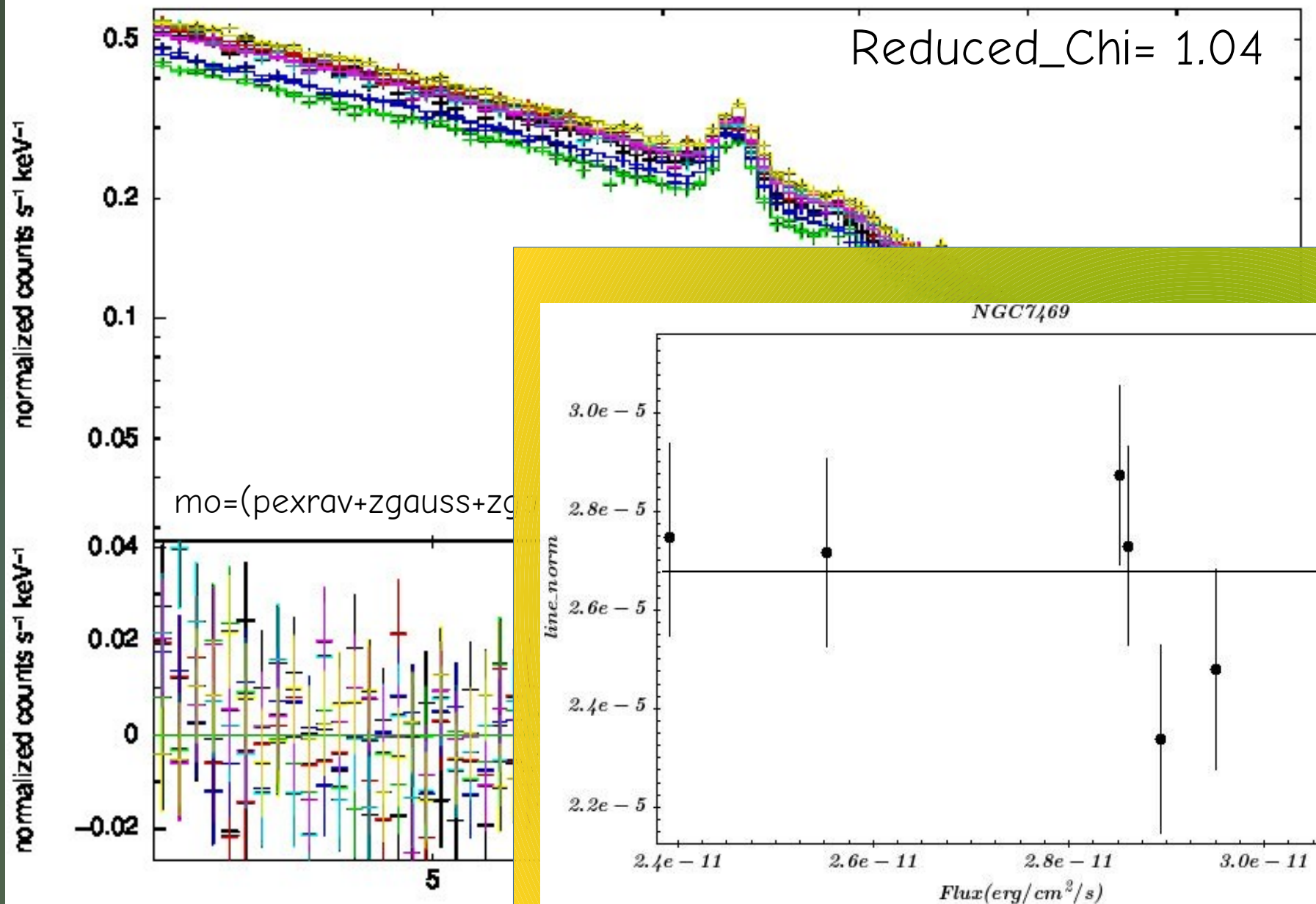
The XMM-Newton best-fit



Neutral FeK α

FeXXVI Ly α

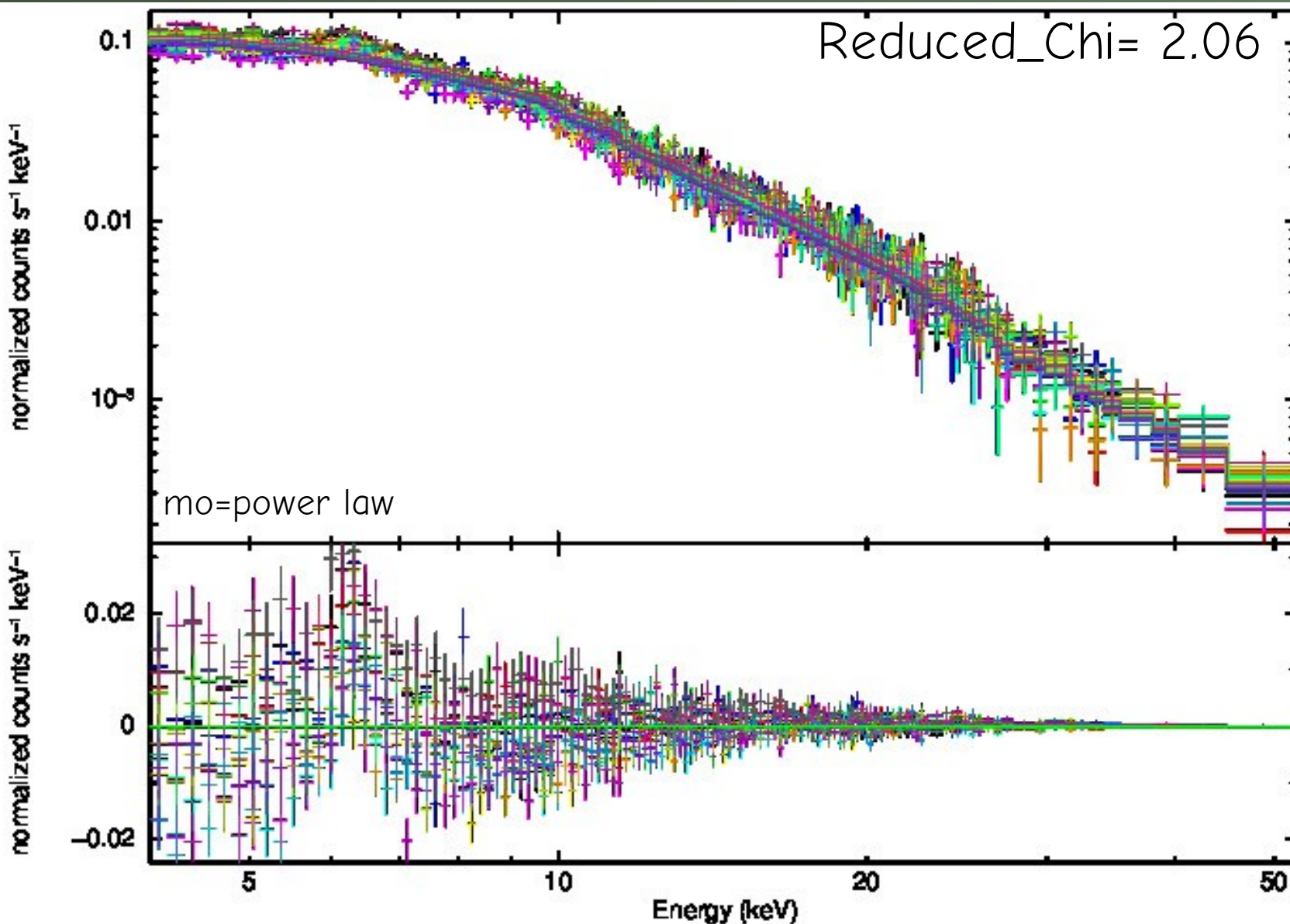
The XMM-Newton best-fit



The neutral iron line

- > constant
- > narrow (no relativistic broadening)
- > EQW ~ 90 eV

NuSTAR spectral analysis:



*Using information
obtained from previous
XMM-Newton analysis*

-no relativistic effects

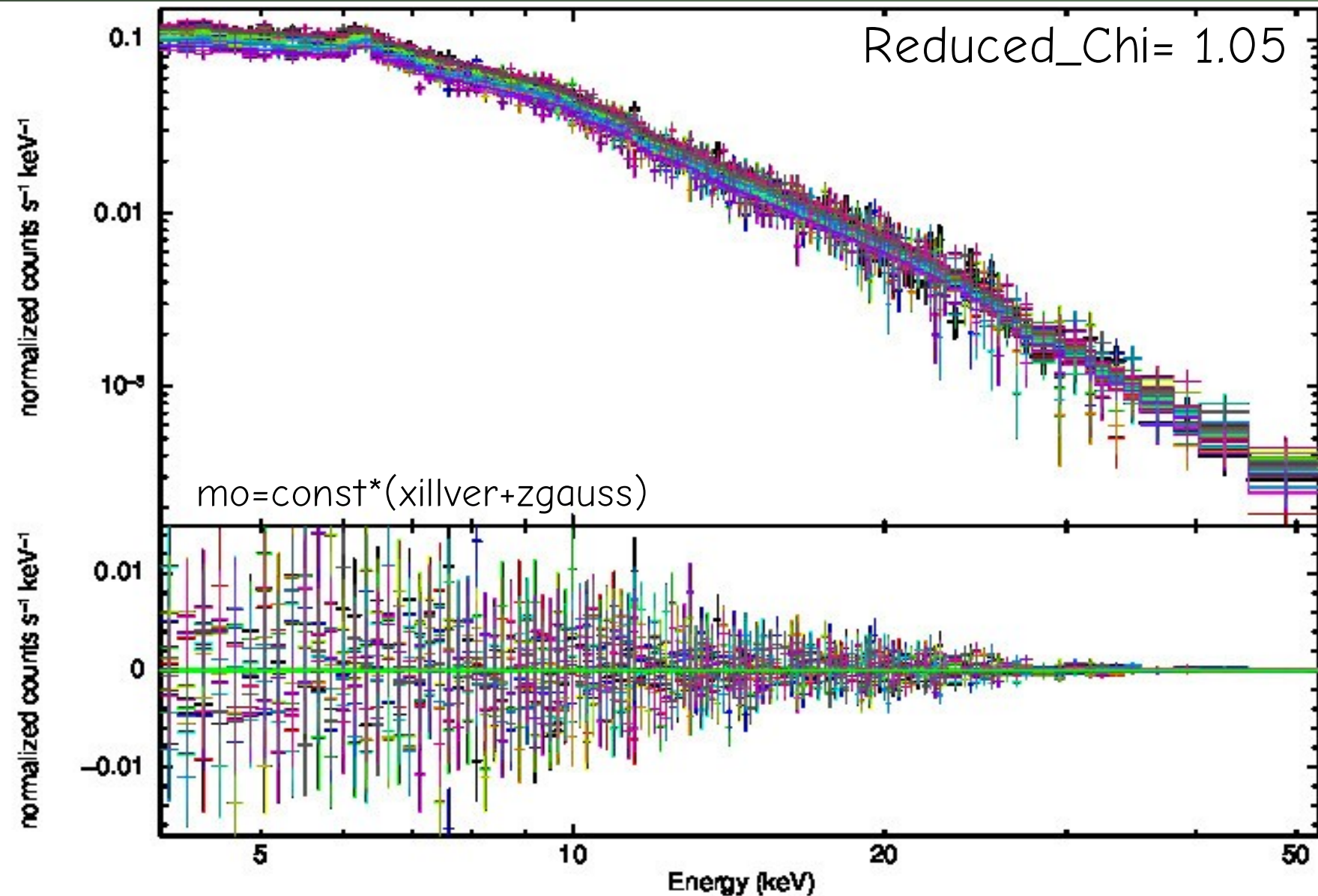
*-consistent reflection
model:*

*hump + narrow iron line
at 6.40 keV*

*-narrow iron line at 6.966
keV*

-high energy cut-off

NuSTAR spectral analysis:



Information on

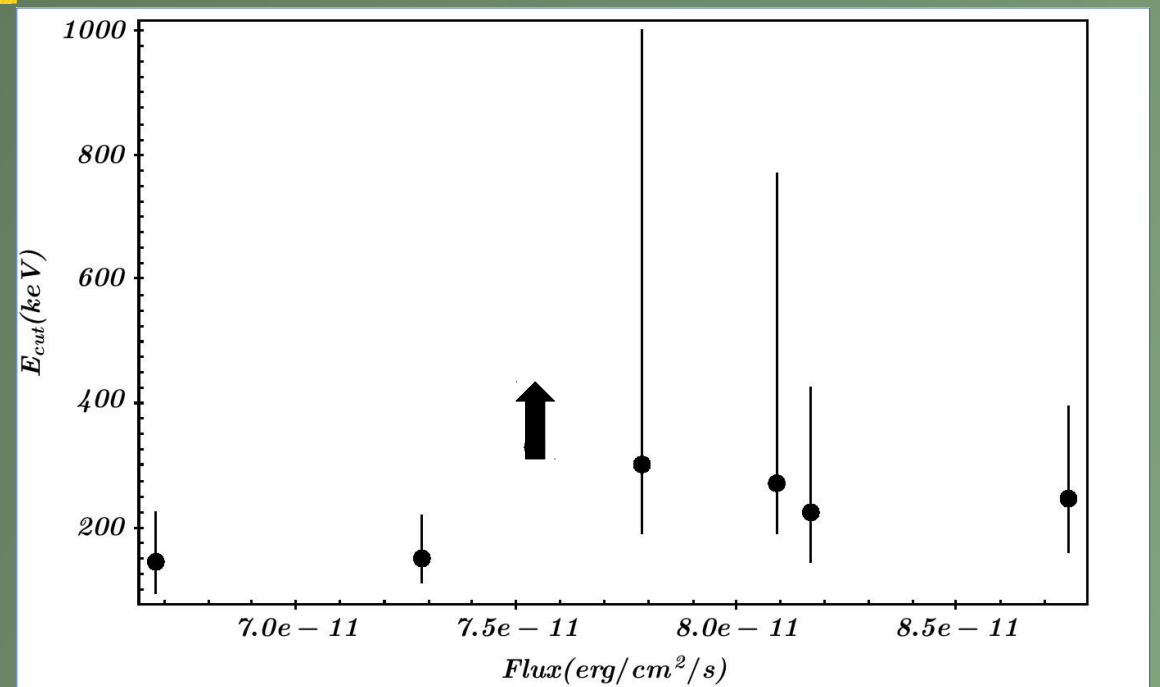
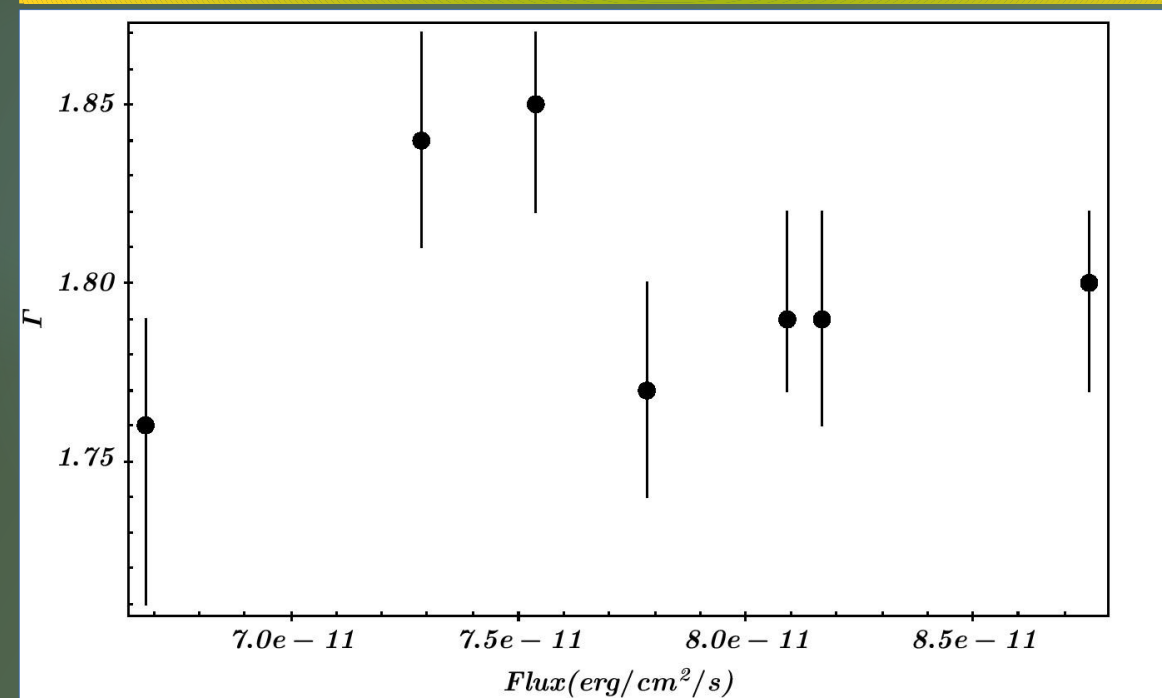
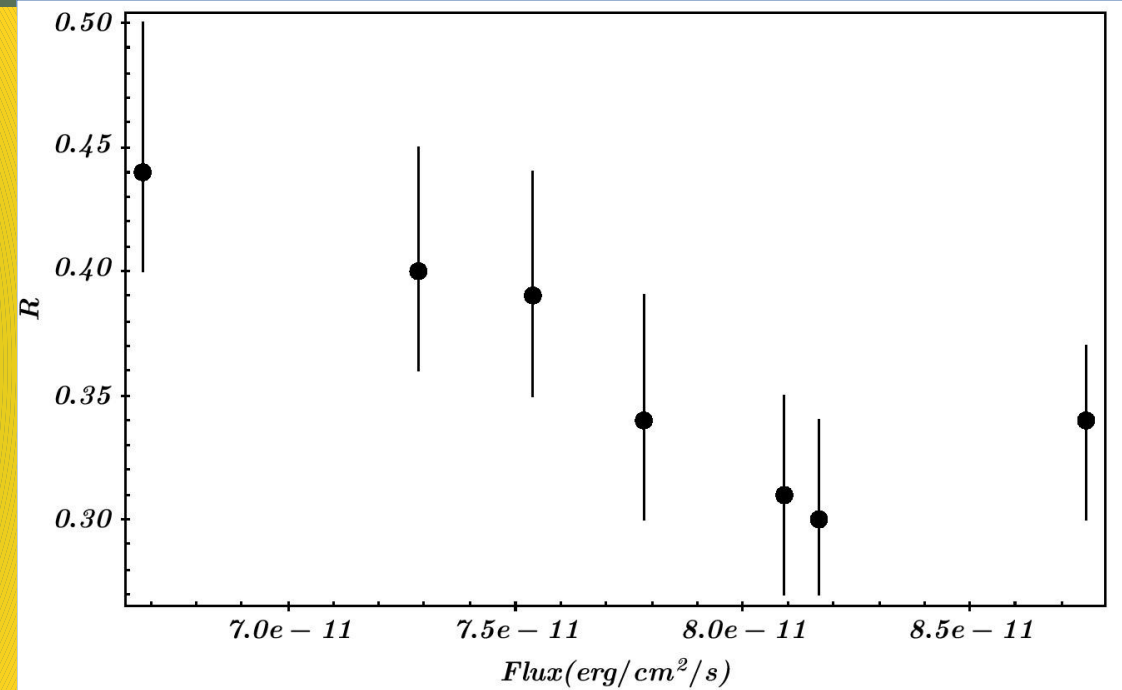
- > high energy cut-off*
- > reflection component*

NuSTAR spectral analysis some results:

>High energy cut-off ~ 220 keV

>Reflection ~ 0.40

>Gamma ~ 1.80

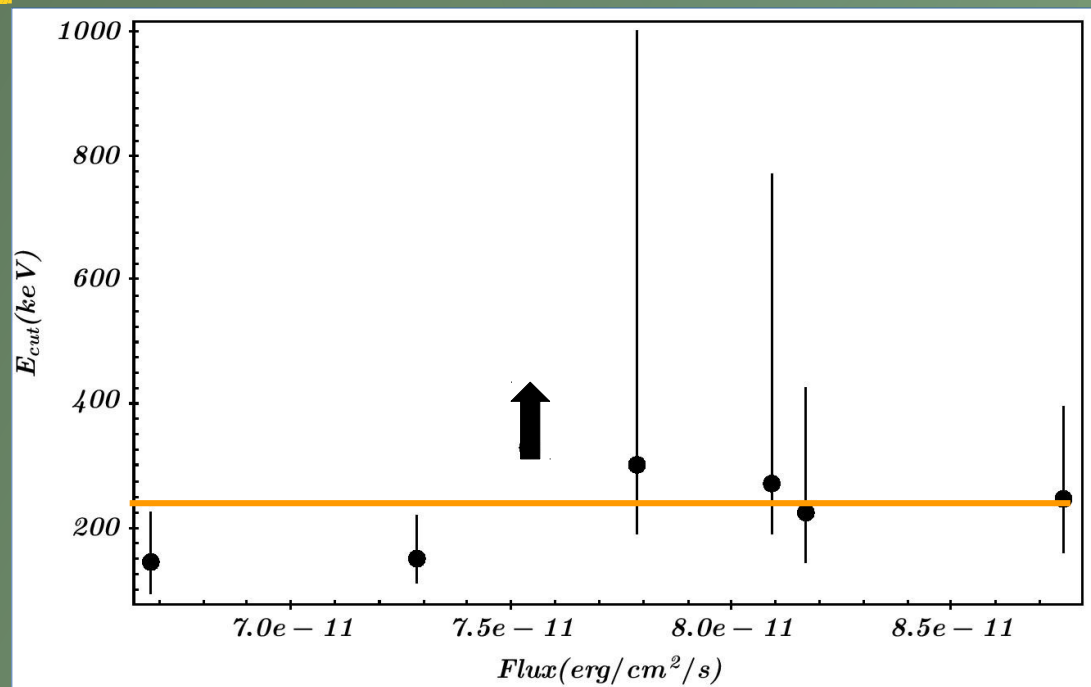
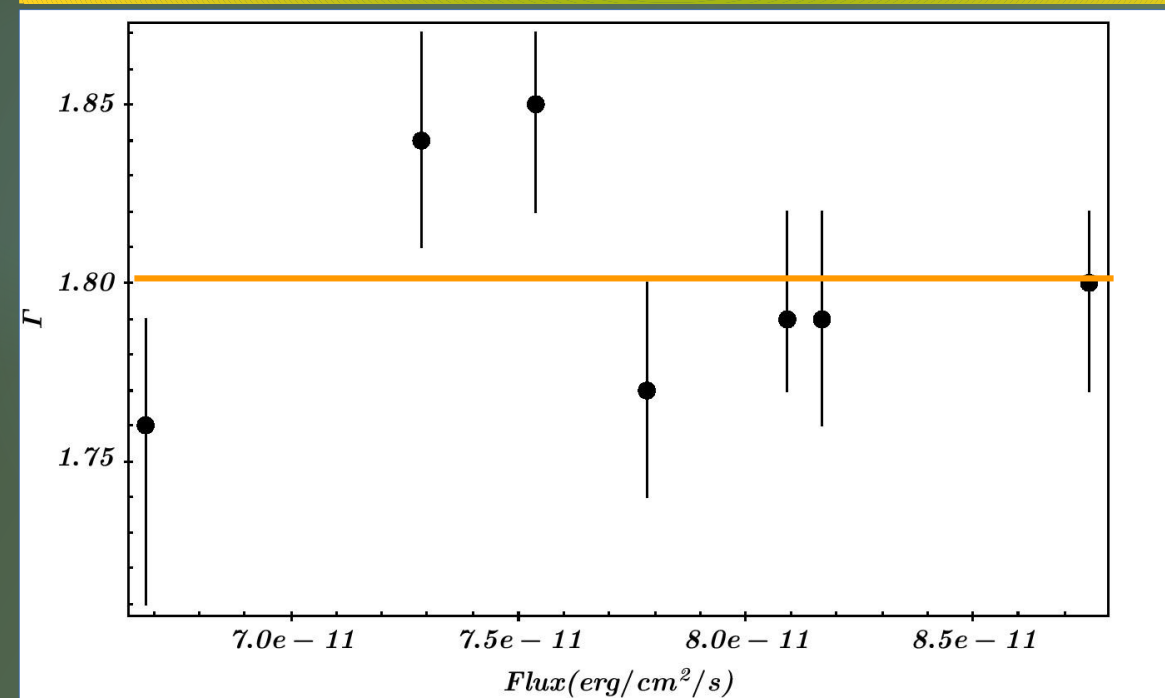
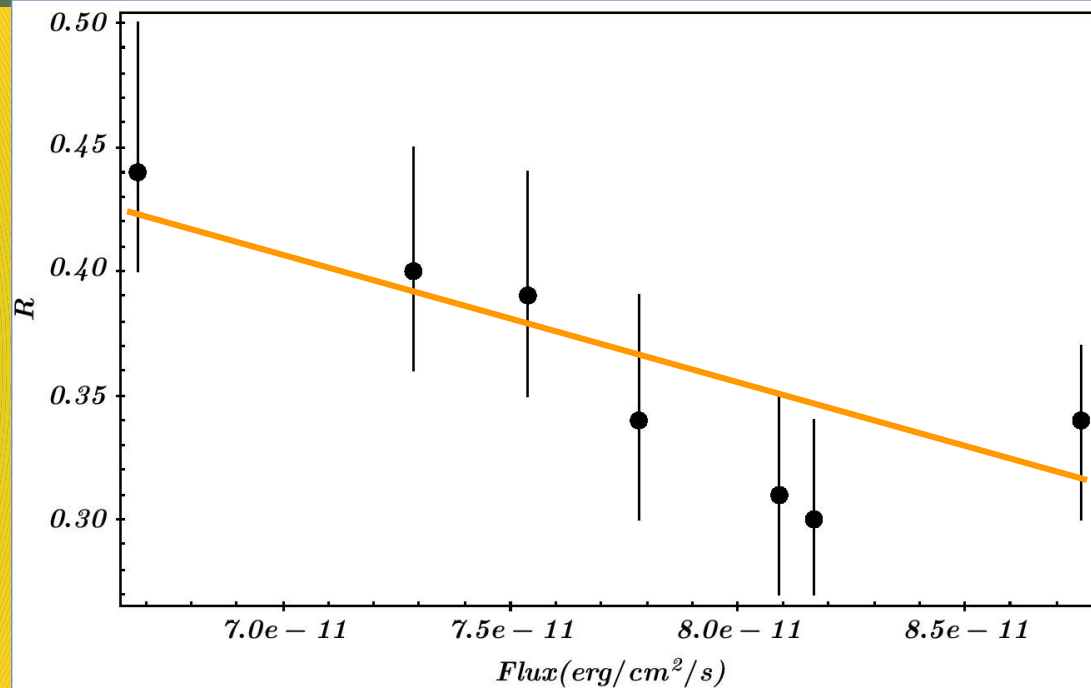


NuSTAR spectral analysis some results:

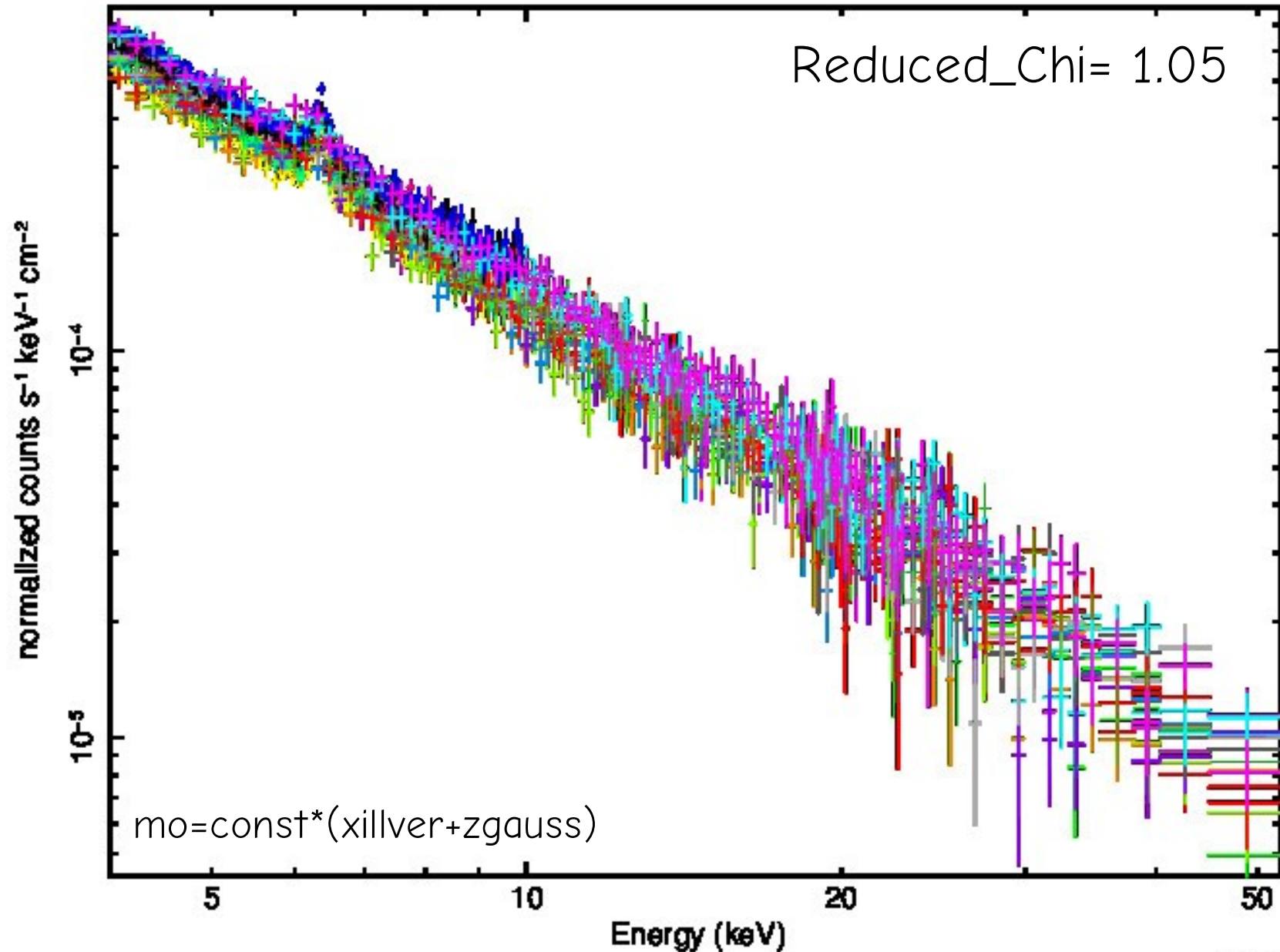
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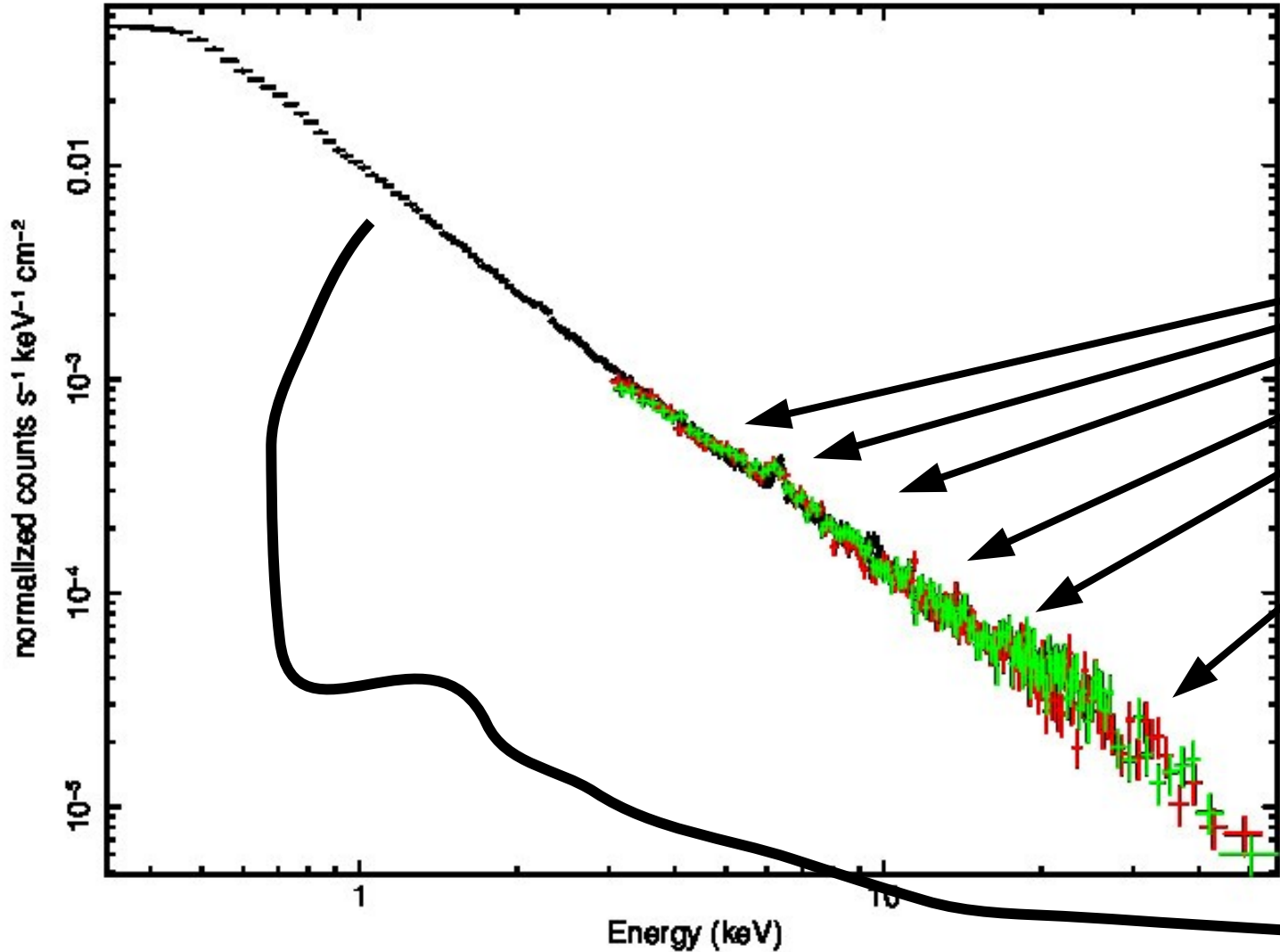
XMM-Newton & NuSTAR 4-78 keV analysis



Inter-calibration:

*A difference (~ 0.17)
between the
XMM-Newton and
NuSTAR Γ
is found*

XMM-Newton & NuSTAR 4-78 keV analysis

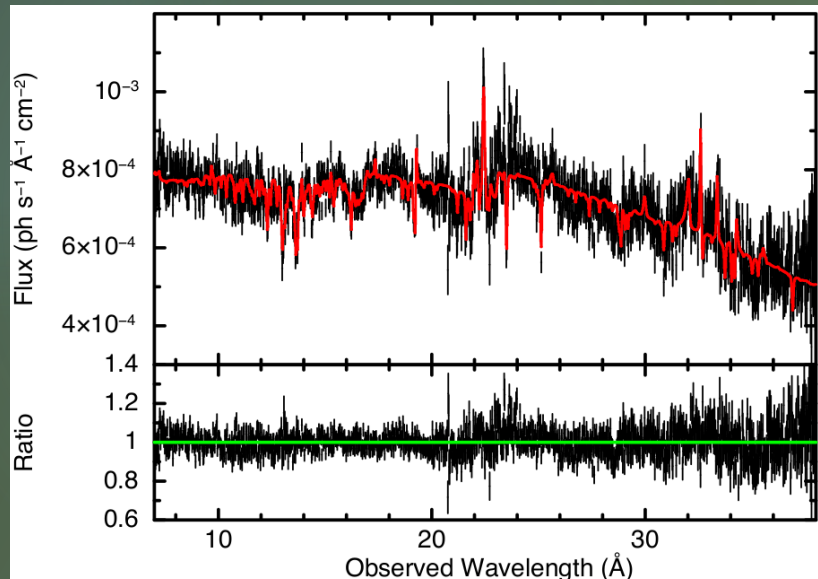


4-78 keV band
already constrained

0.5-78 keV
First results

Constraining the soft-excess (Very preliminary!!!)

Many absorbing
and emitting
components

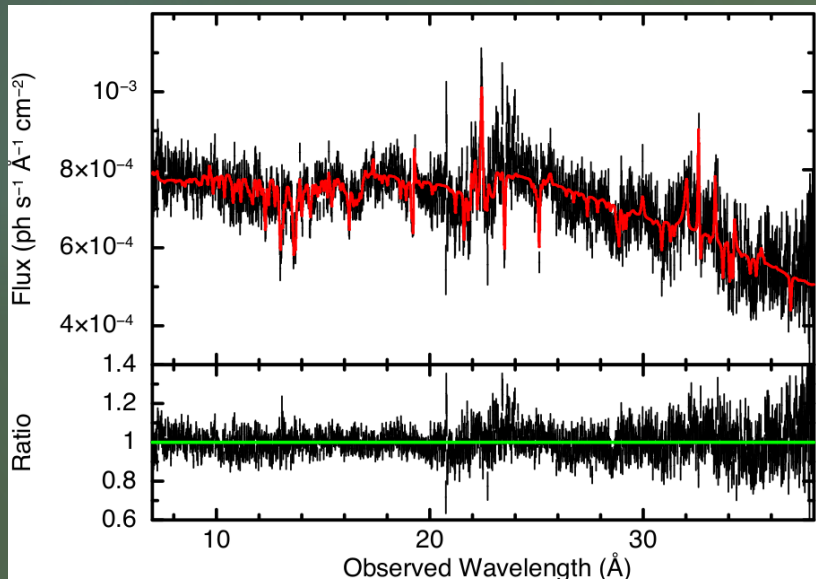
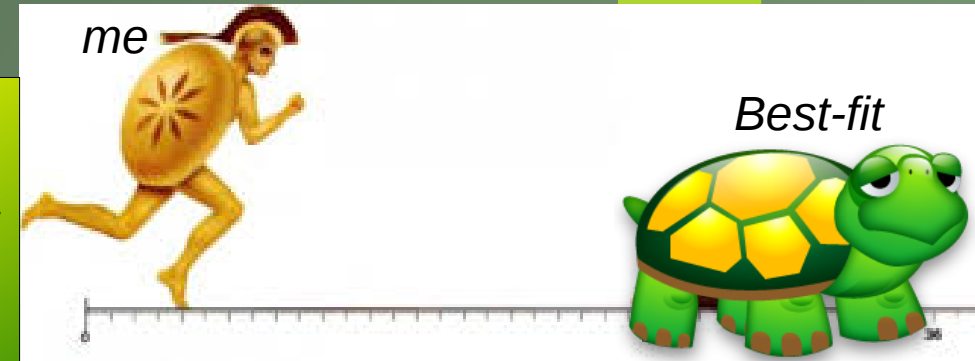


Behar et al. 2016

Constraining the soft-excess (Very preliminary!!!)

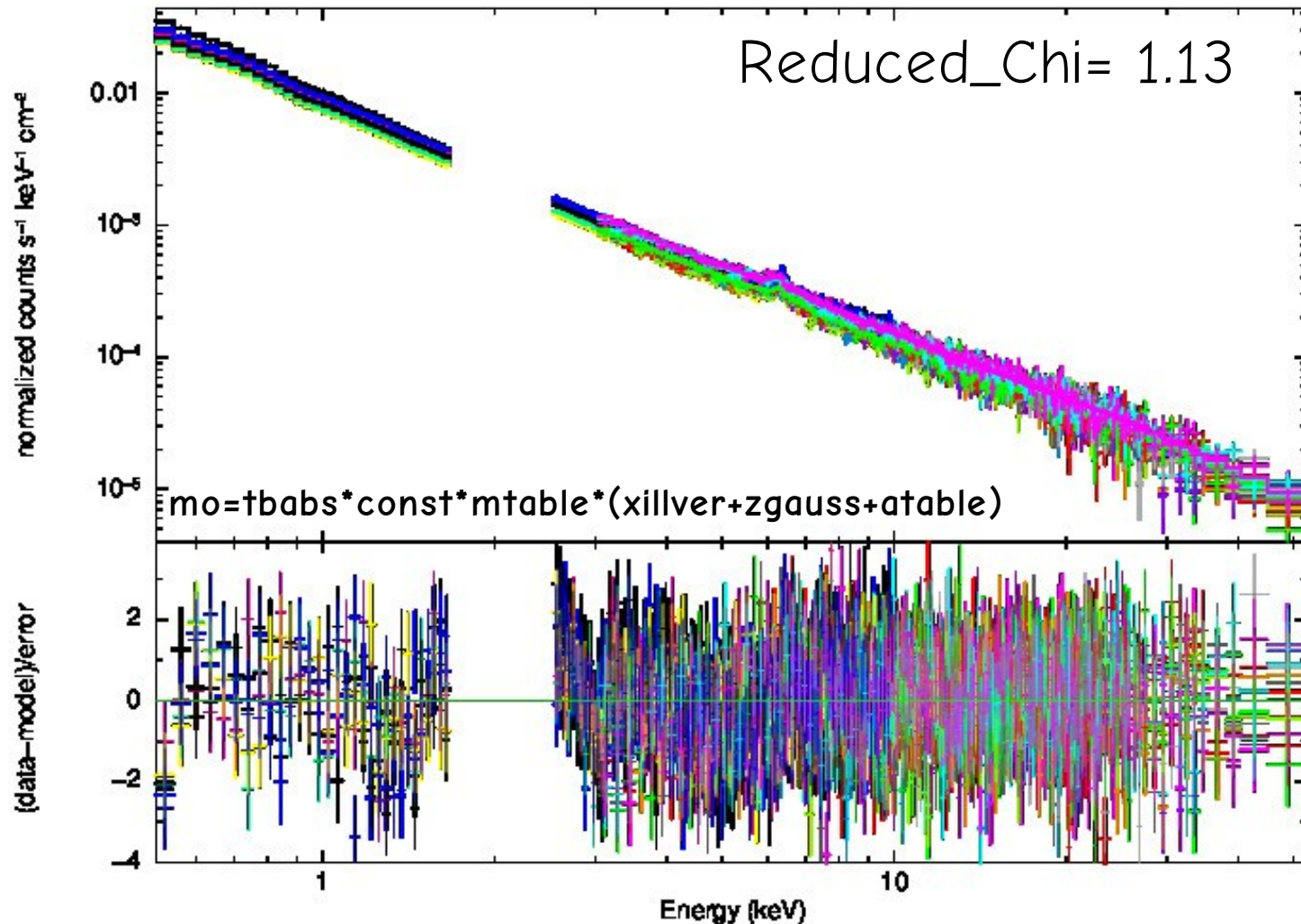
Many absorbing and emitting components

Adding this model to the one used for the hard spectra



Behar et al. 2016

Constraining the soft-excess (Very preliminary!!!)

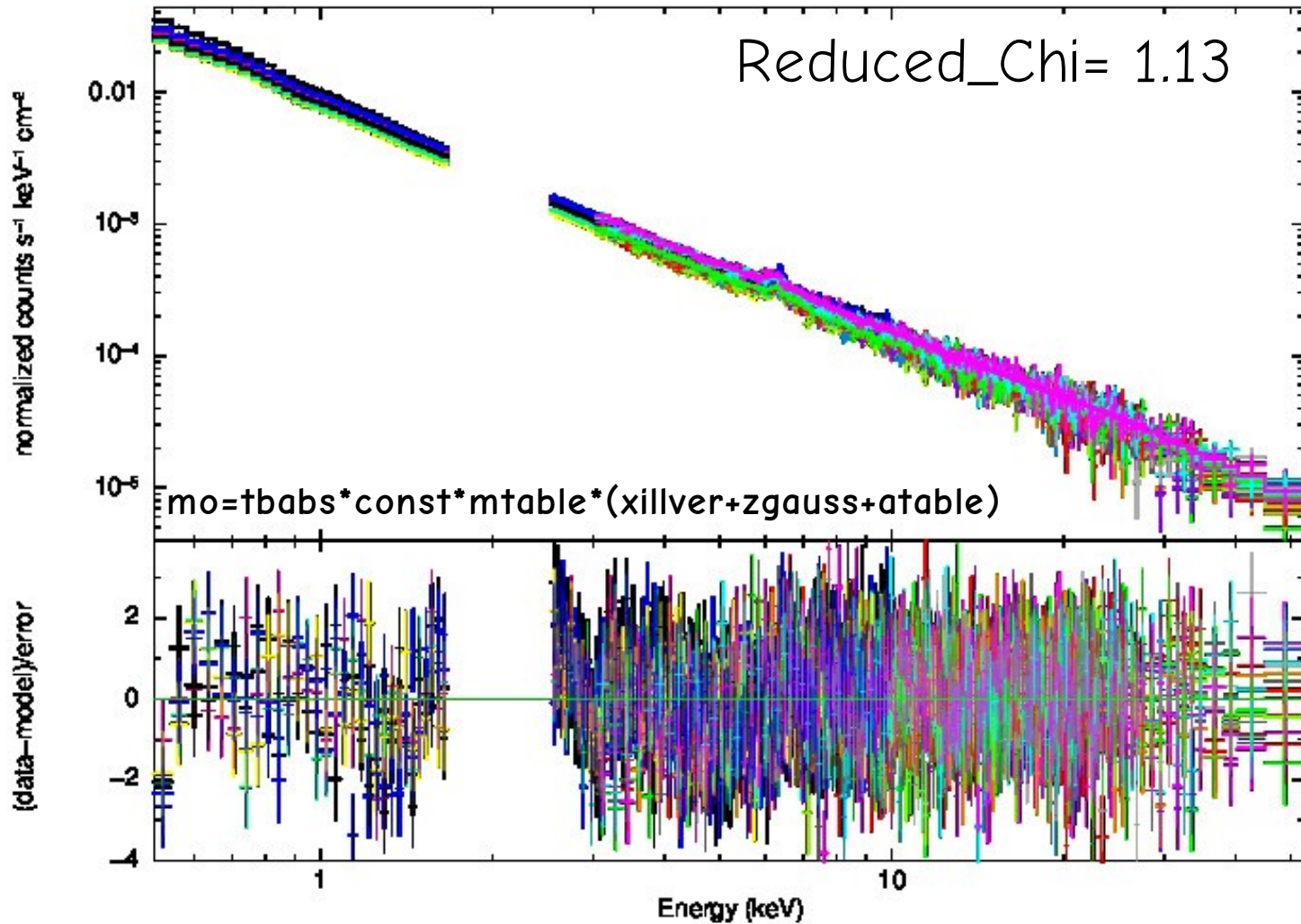


**First attempt:
Power-law
It does not fit**

**Second attempt:
Black body
It does not fit**

**Third attempt:
Nthcomp
It fits !**

Constraining the soft-excess (Very preliminary!!!)



Obs	Γ	kT_e	norm
1	2.75	0.57	6.1e-3
2	2.72	0.64	5.5e-3
3	2.67	0.57	4.3e-3
4	2.71	0.62	4.2e-3
5	2.63	0.60	5.1e-3
6	2.66	0.60	4.6e-3
7	2.68	0.63	5.1e-3

Summary

- >NthCompt fits the soft-band while others do not!*
- >NGC 7469 varies much on short time-scales while hardness ratios do not vary a lot*
- >No evidence of relativistic effects on the iron line which is constant along with its associated reflection component*
- >Cut-off at ~ 180 keV, constant among the observations*
- >No evidence of variability of Gamma among the observations*