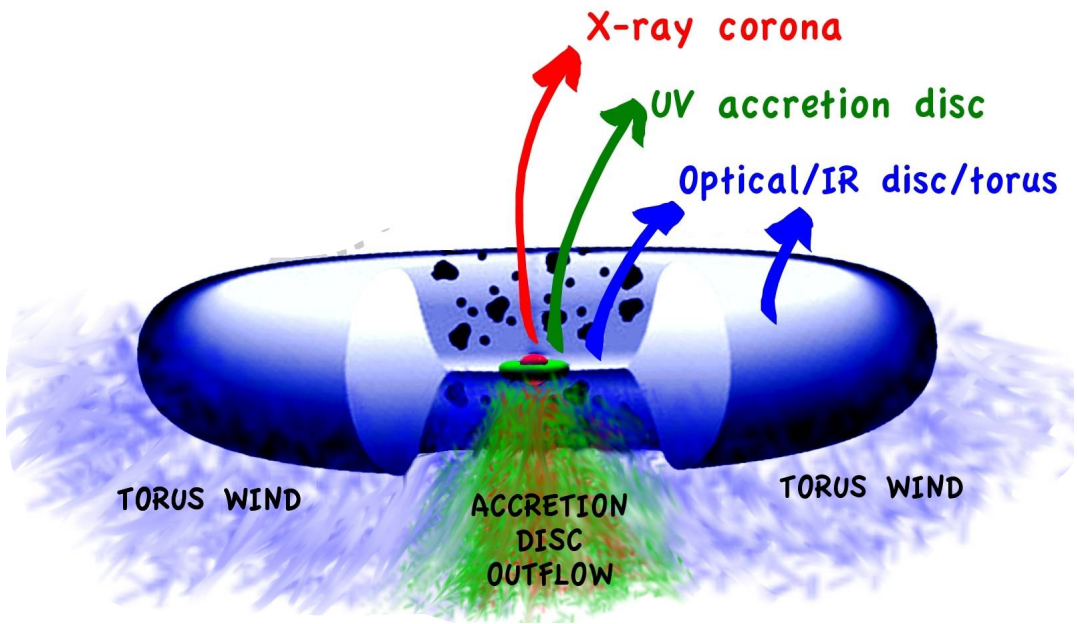
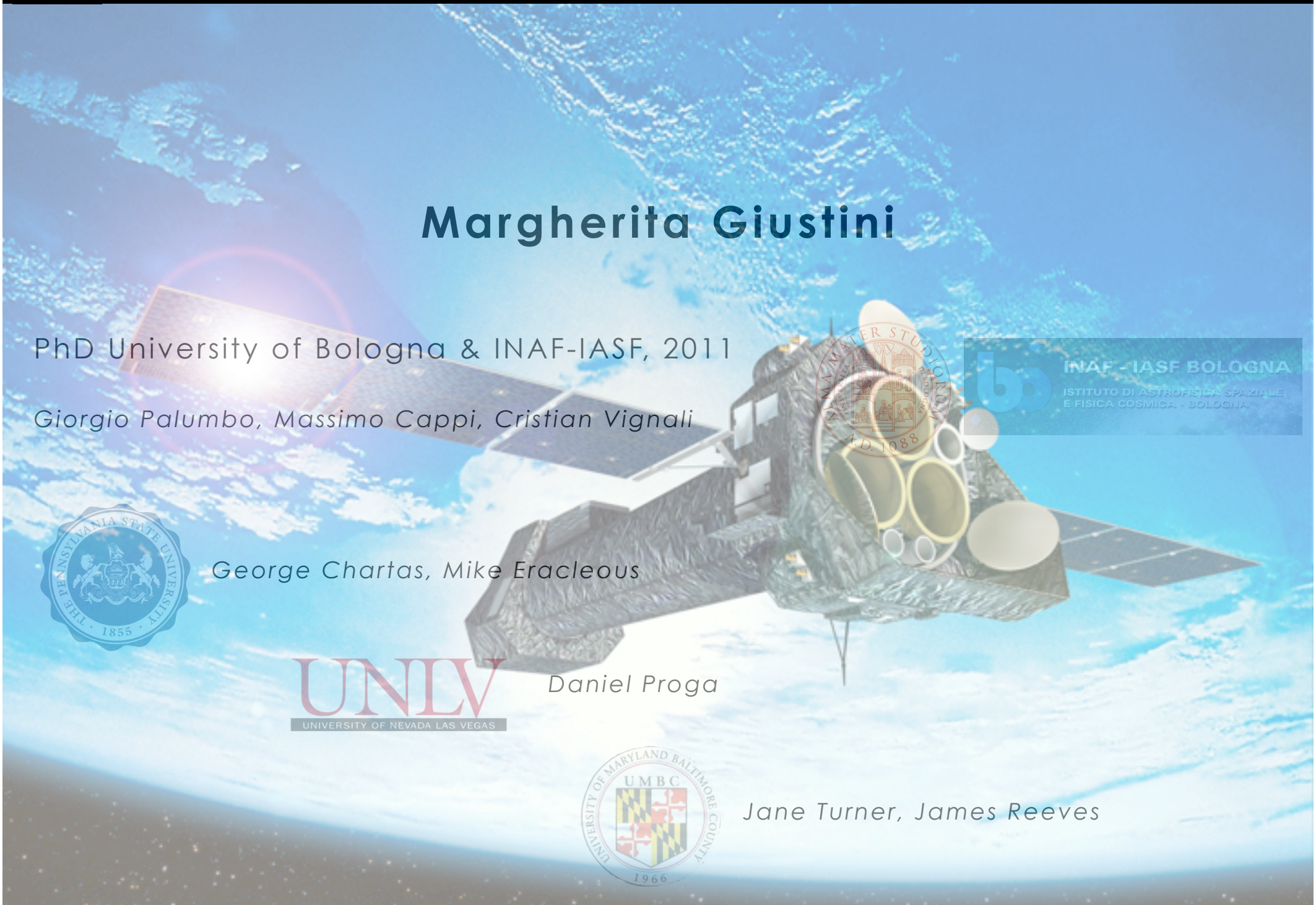
Outbursting Super Massive Black Holes : XMM-Newton looks at NGC 2617

Margherita Giustini (ESA/SRE-S)



MASS ACCRETION and EJECTION around SUPERMASSIVE BLACK HOLES



Margherita Giustini

PhD University of Bologna & INAF-IASF, 2011

Giorgio Palumbo, Massimo Cappi, Cristian Vignali

George Chartas, Mike Eracleous

Daniel Proga

Jane Turner, James Reeves

Margherita Giustini

Norbert Schartel

PhD University of Bologna & INAF-IASF, 2011

Giorgio Palumbo, Massim[illegible] Cristian Vignali

Andy Pollock

Sara Elisa Motta

Matteo Guainazzi

Richard Saxton

George Chartas, M[illegible]

Giovanni Miniutti

Dirk Grupe

Anna Lia Longinotti

Stefanie Komossa

Daniel Proga

Jan-Uwe Ness

Smita Mathur

Pedro Rodriguez Pascuál

Maria Santos Lleó

Jane Turner, James Reeves

MASS ACCRETION and EJECTION around SUPERMASSIVE BLACK HOLES

Outbursting Super Massive Black Holes : XMM-Newton looks at NGC 2617

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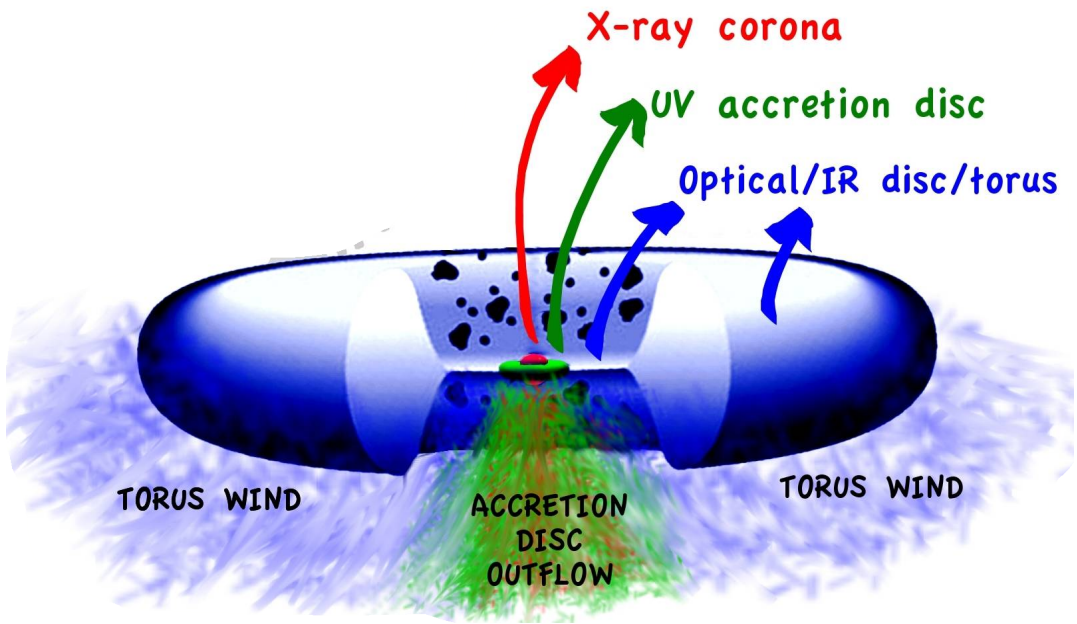
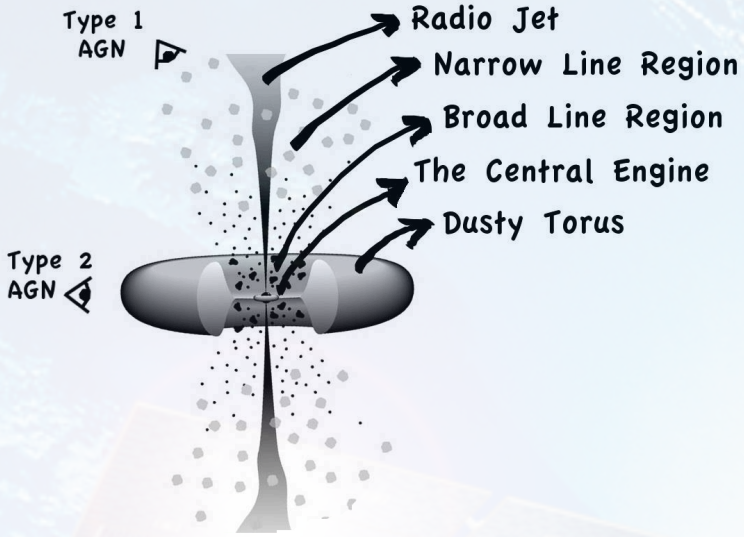
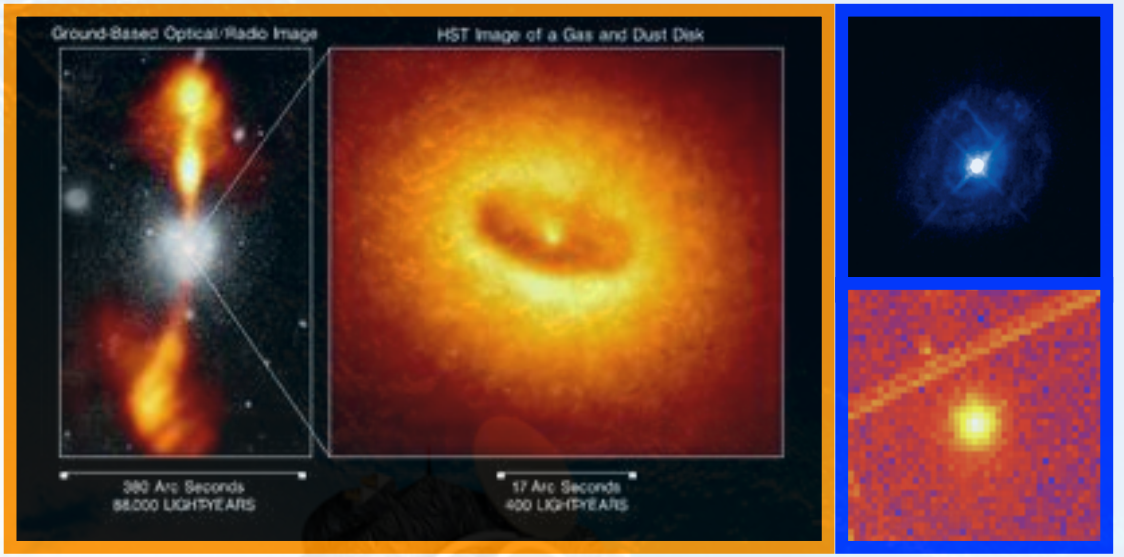
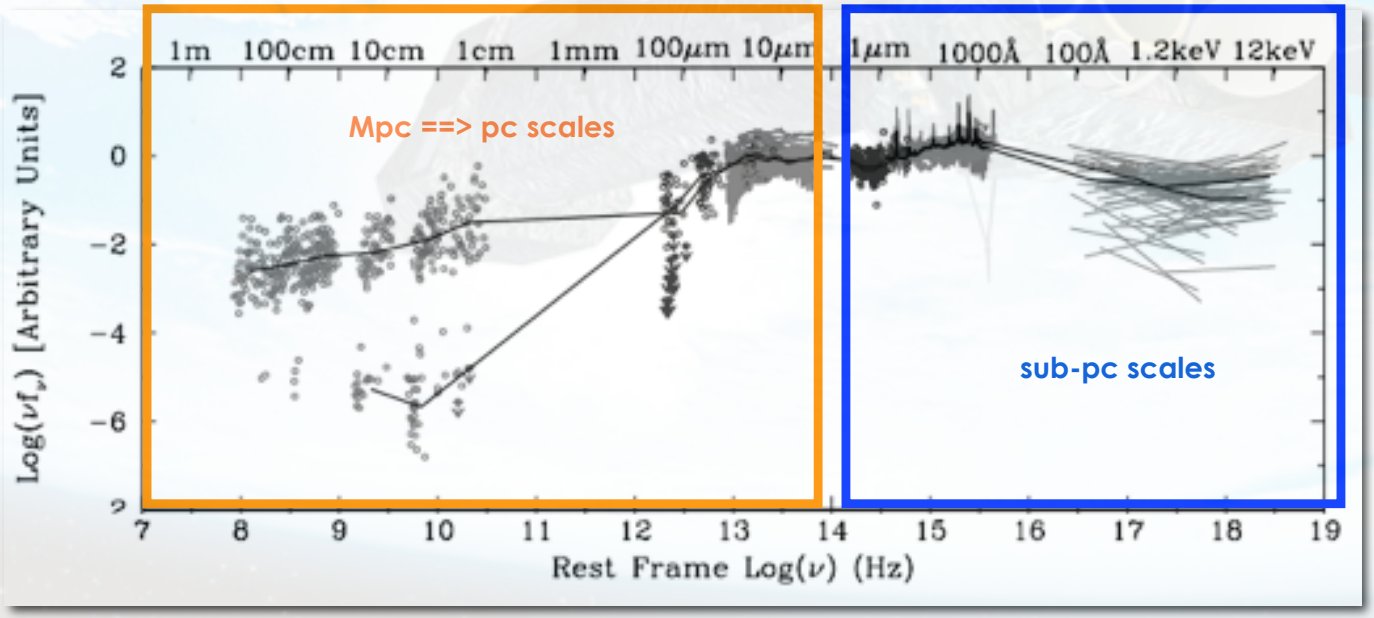
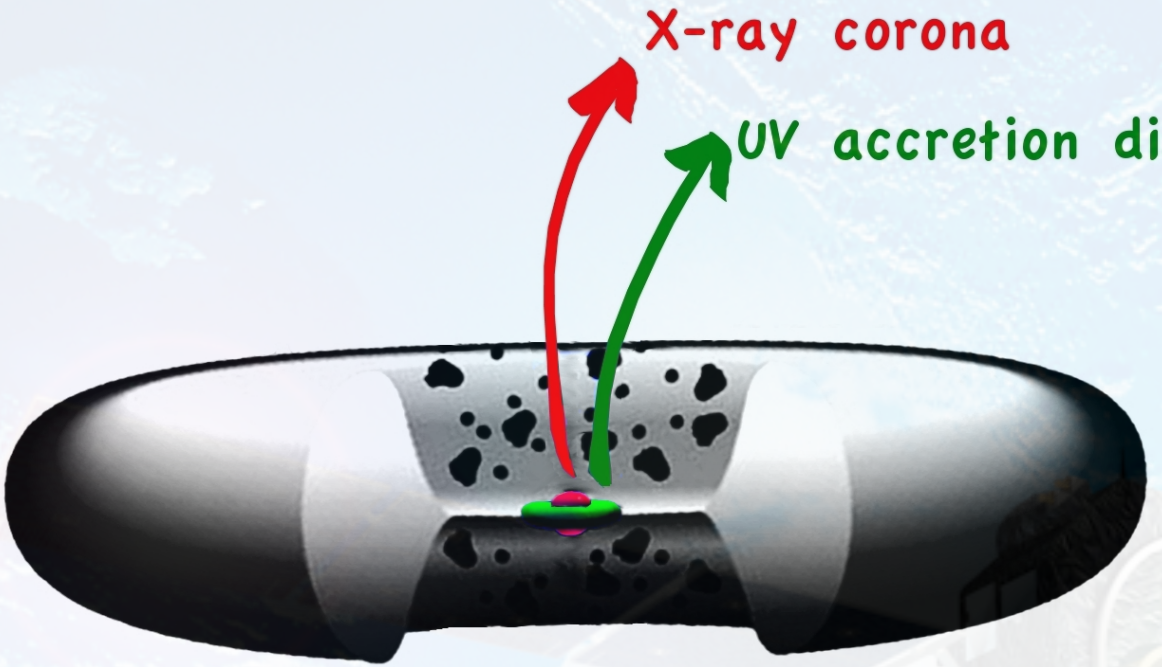
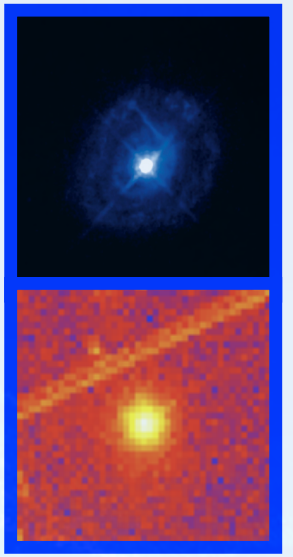



Type 1
AGN
Radio Jet
Narrow Line Region
Broad Line Region
The Central Engine
Dusty Torus
Type 2
AGN

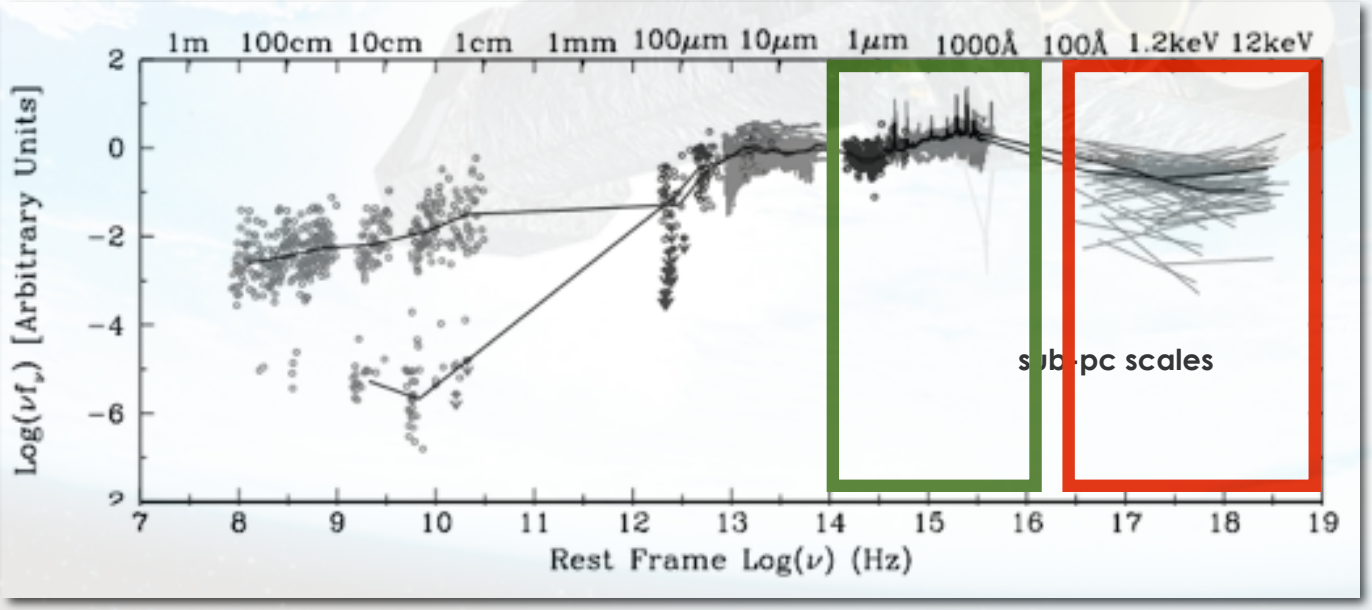

Ground-Based Optical/Radio Image
HST Image of a Gas and Dust Disk
380 Arc Seconds
17 Arc Seconds
400 LIGHTYEARS


Radio/mm/IR
Optical/UV/X-rays
1m
100cm
10cm
1cm
1mm
100μm
10μm
1μm
1000Å
100Å
1.2keV
12keV
Mpc ==> pc scales
sub-pc scales
Log(νf_ν) [Arbitrary Units]
Rest Frame Log(ν) (Hz)

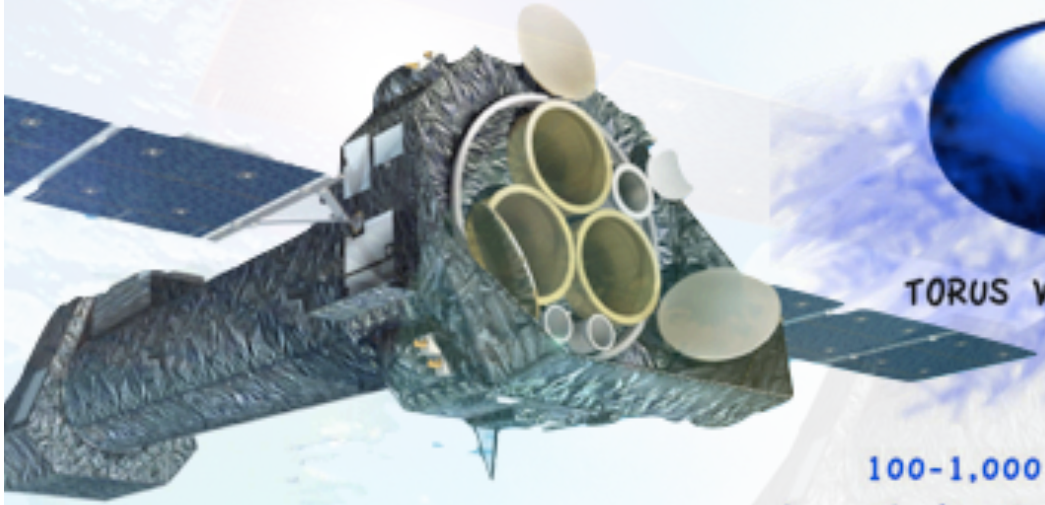

X-ray corona
UV accretion disc

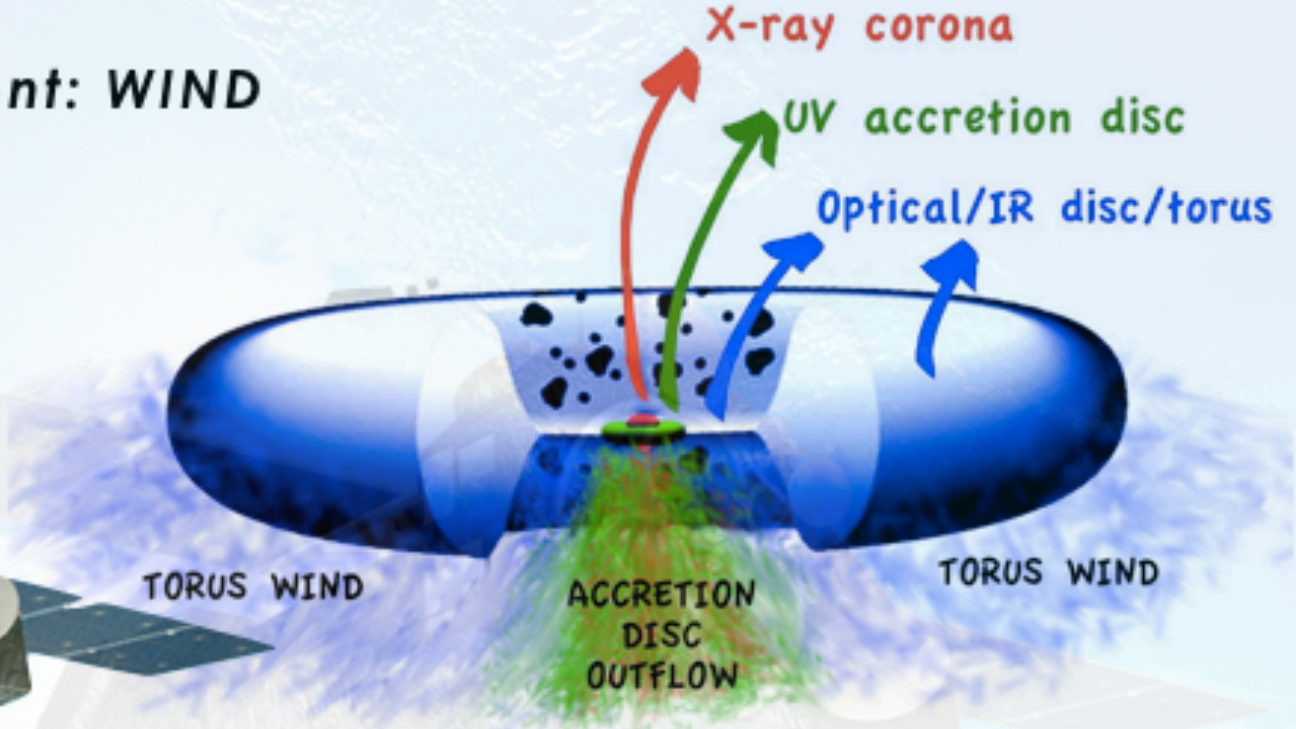


UV X-rays

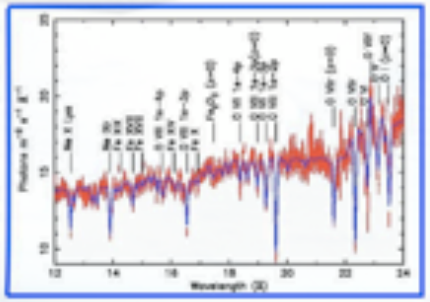

1m 100cm 10cm 1cm 1mm 100μm 10μm 1μm 1000Å 100Å 1.2keV 12keV
Log(νf_ν) [Arbitrary Units]
Rest Frame Log(ν) (Hz)
sub-pc scales

The missing ingredient: WIND

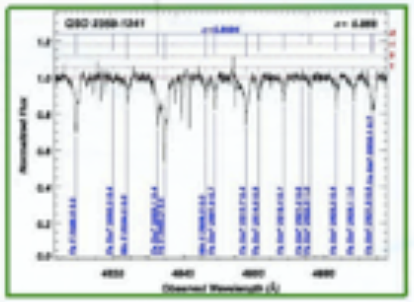




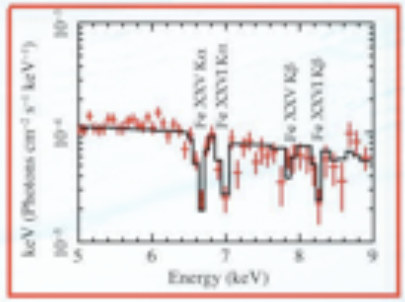
100-1,000 km/s
low-velocity X-ray warm absorbers and UV NALs



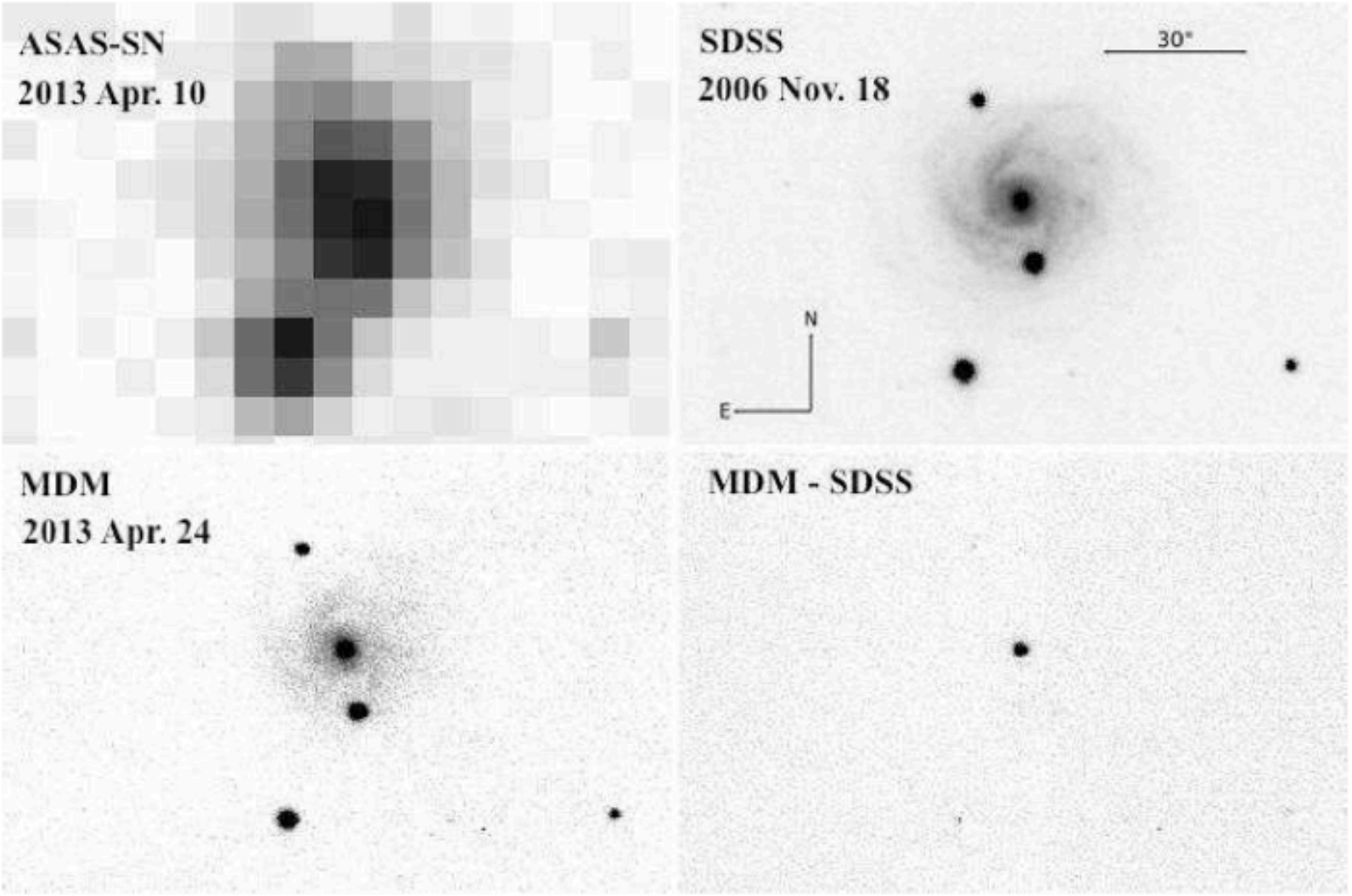
1,000-50,000 km/s
high-velocity UV BALs, mini-BALs, and NALs

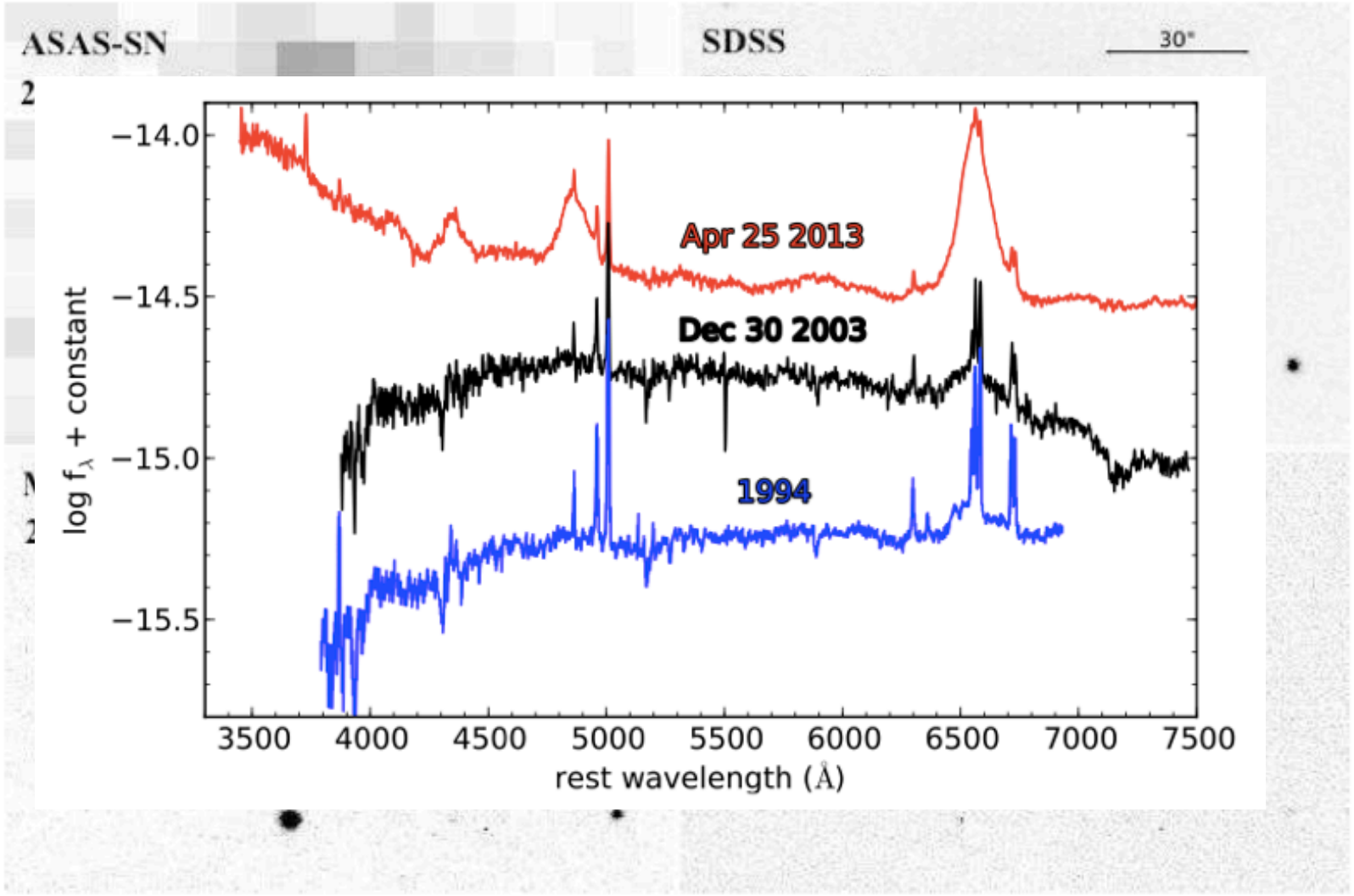


10,000-100,000 km/s
high-velocity X-ray absorbing outflows

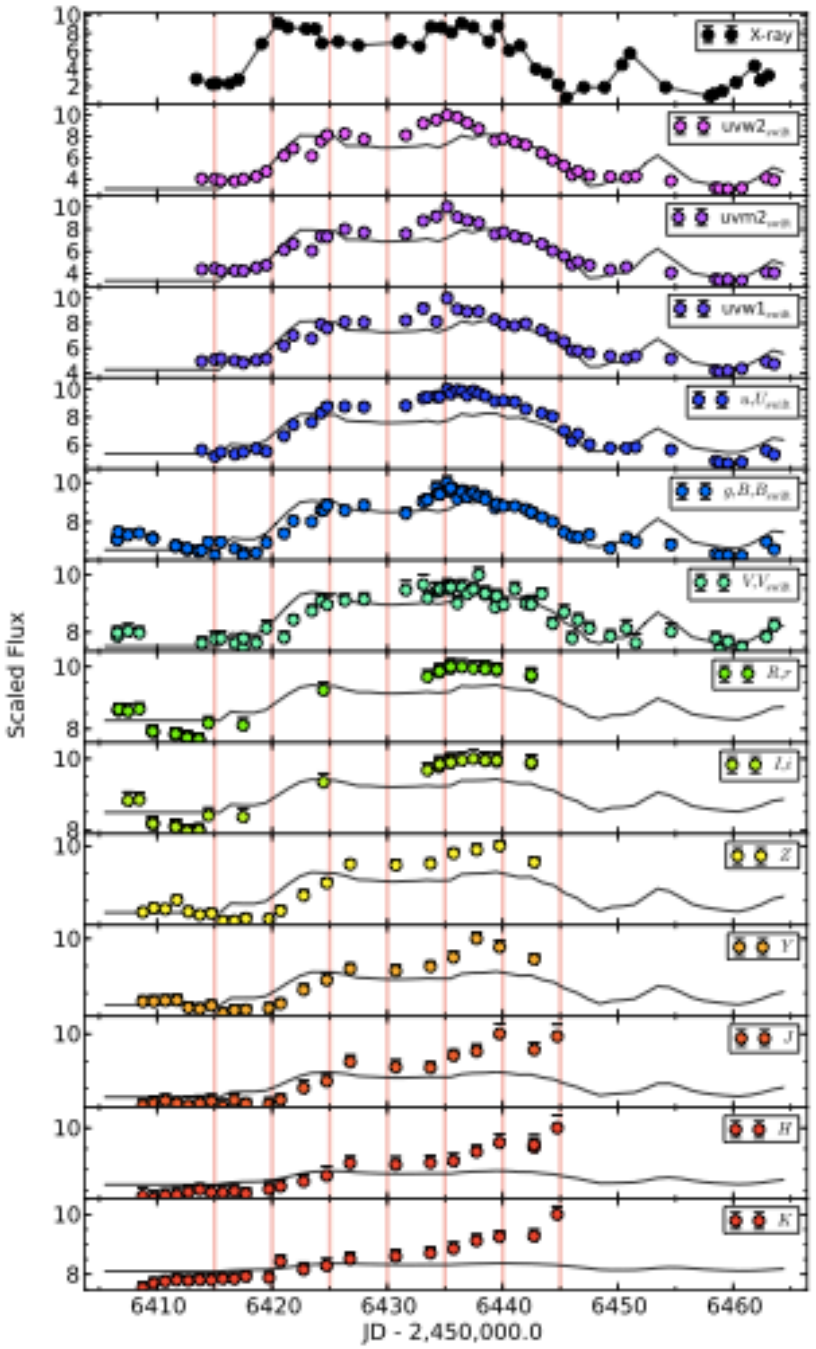


NGC 2617

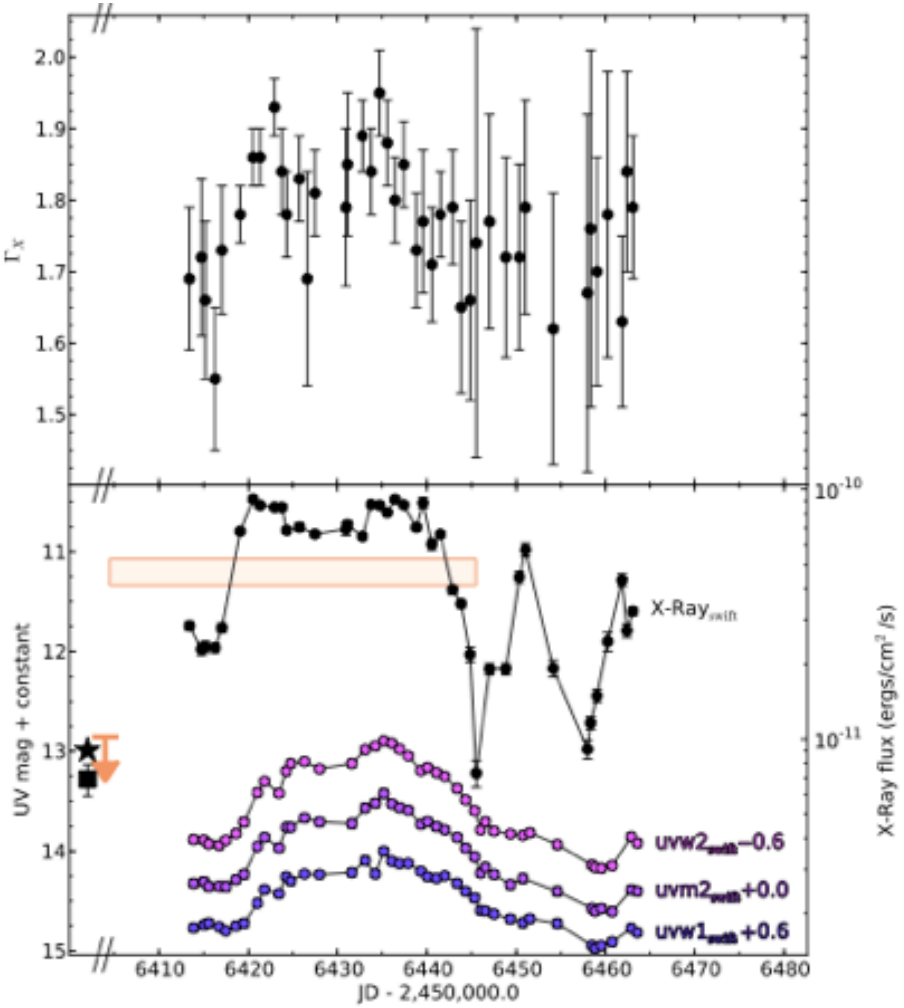

ASAS-SN
2013 Apr. 10
SDSS
2006 Nov. 18
30"
N
E
MDM
2013 Apr. 24
MDM - SDSS



Seyfert 1.8 --> Seyfert 1!

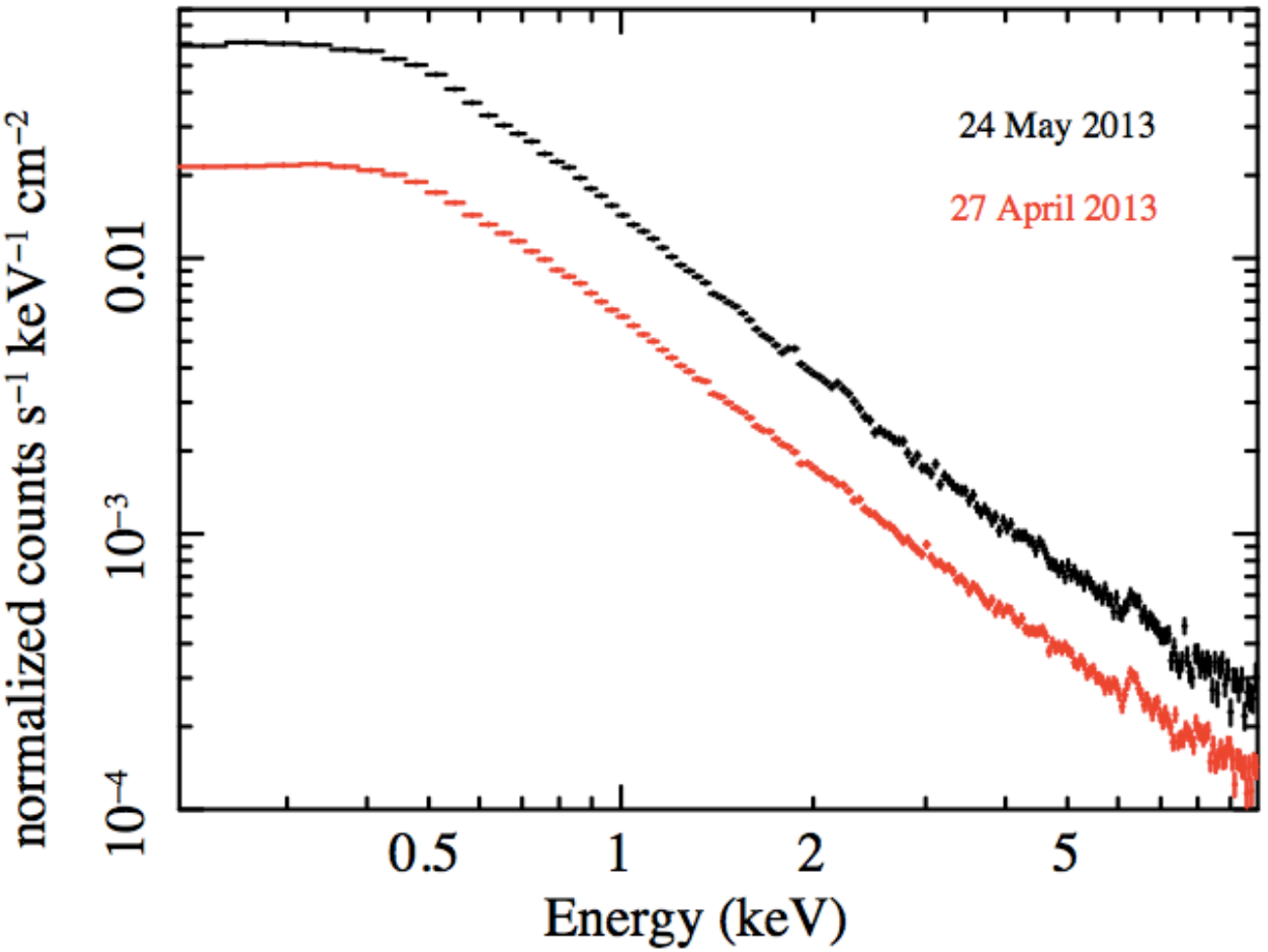


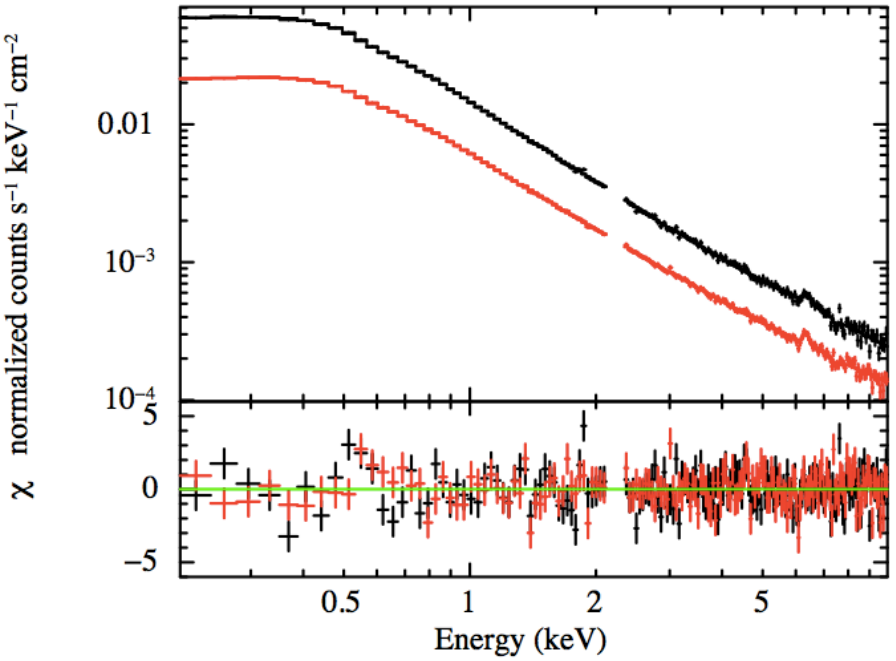
Changes in X-ray flux drive changes at longer wavelengths!

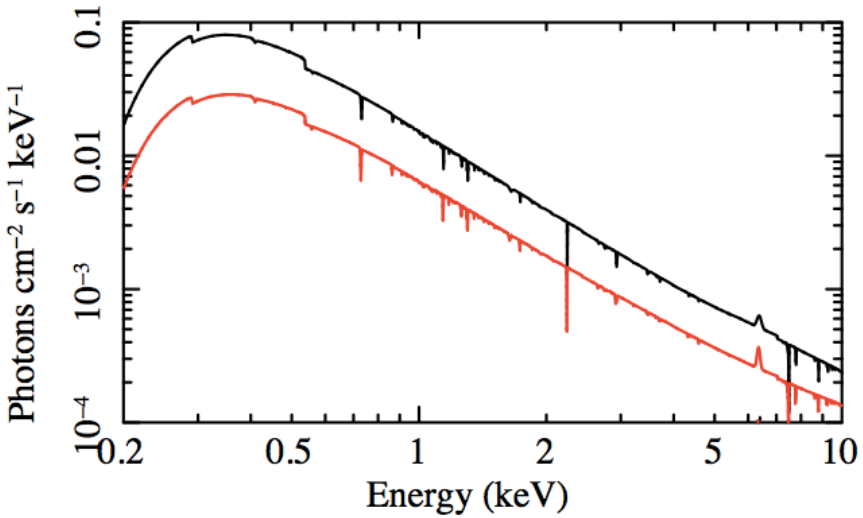


Shappee et al. 2013, (arXiv:1310.2241)

XMM-Newton comes into the game and...







Intrinsic continuum

Gamma~2.05, Gamma~2.22

Double partially covering absorber

Cf~ 0.5, logx~-2.2, NH~3e23 cm-2, NH~1.7e23 cm-2

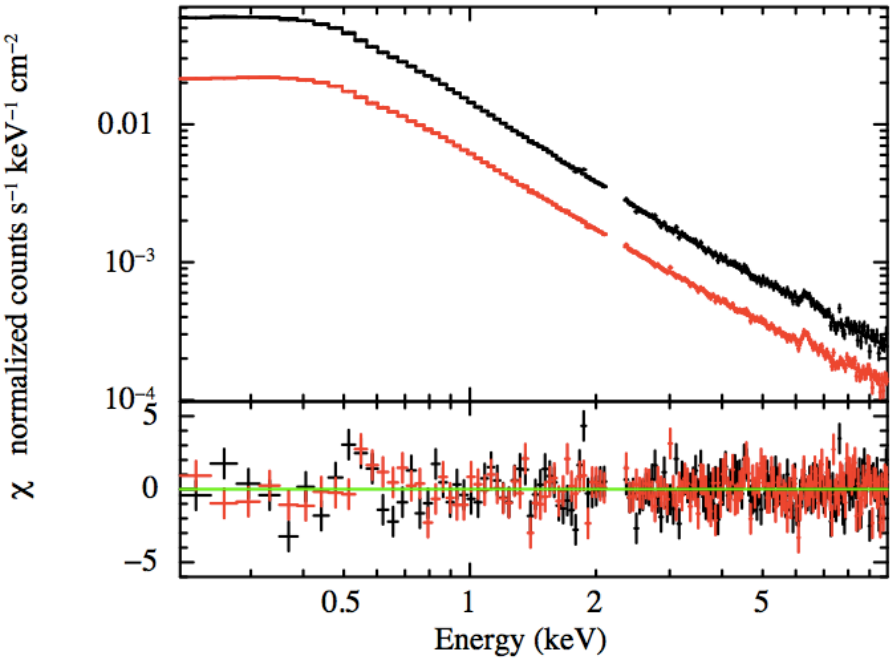
Cf~ 0.3, logx~-0.9, NH~3.5e22 cm-2, NH~2e22 cm-2

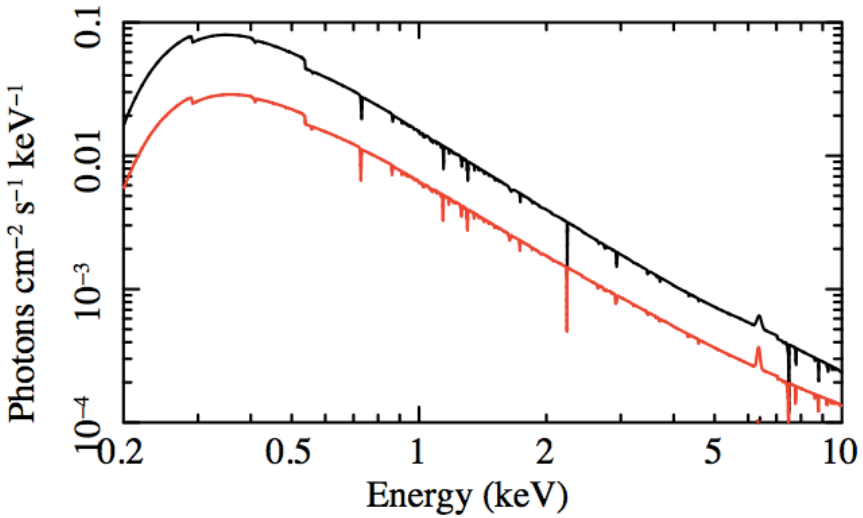
Cold intrinsic absorption

NH~4e19 cm-2

Fe K emission line

E~6.43 keV, width<150 eV, EW~40 eV, EW~50 eV





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Cold intrinsic absorption

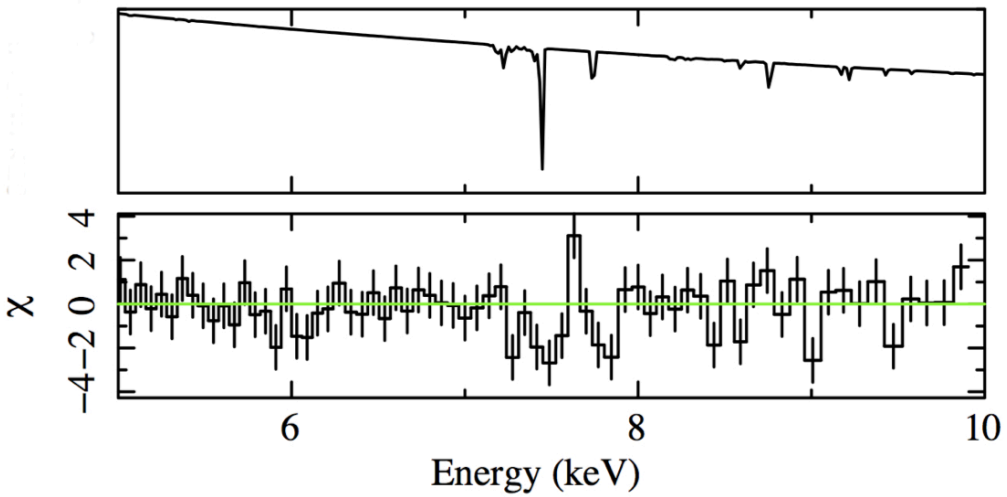
NH~4e19 cm-2

Fe K emission line

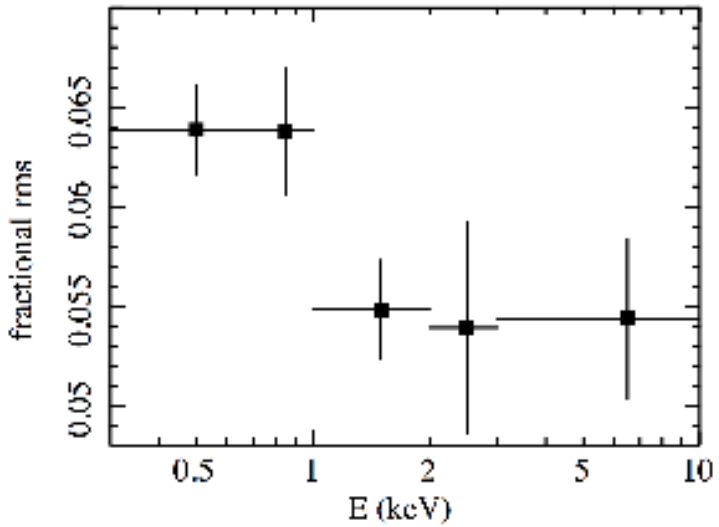
E~6.43 keV, width<150 eV, EW~40 eV, EW~50 eV

Outflowing absorber

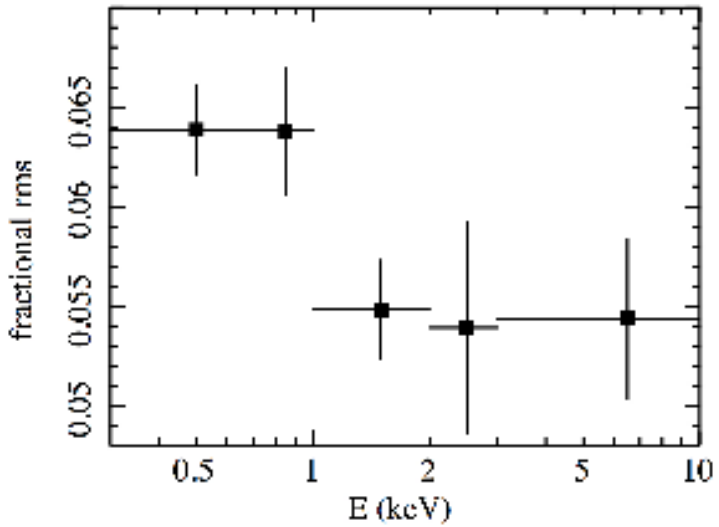
logx~3.5, NH~1.5e22 cm-2, v~0.1c

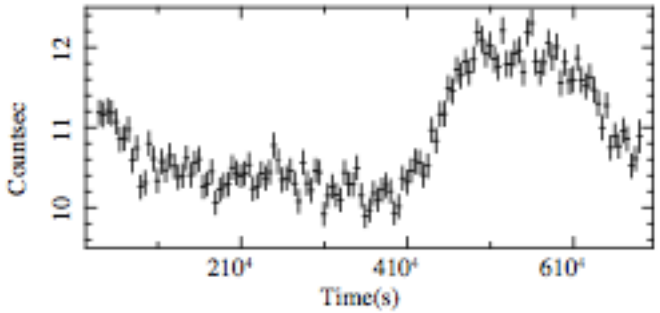


NGC 2617 varies most at E<1 keV.

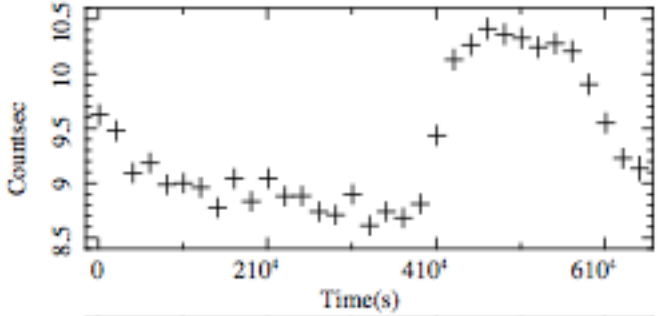


NGC 2617 varies most at E<1 keV.

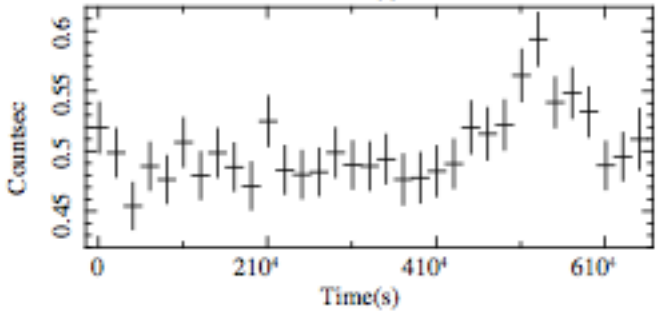




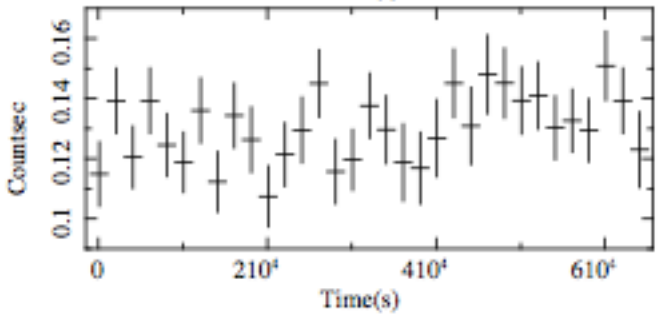
0.2-10 keV



0.2-1 keV



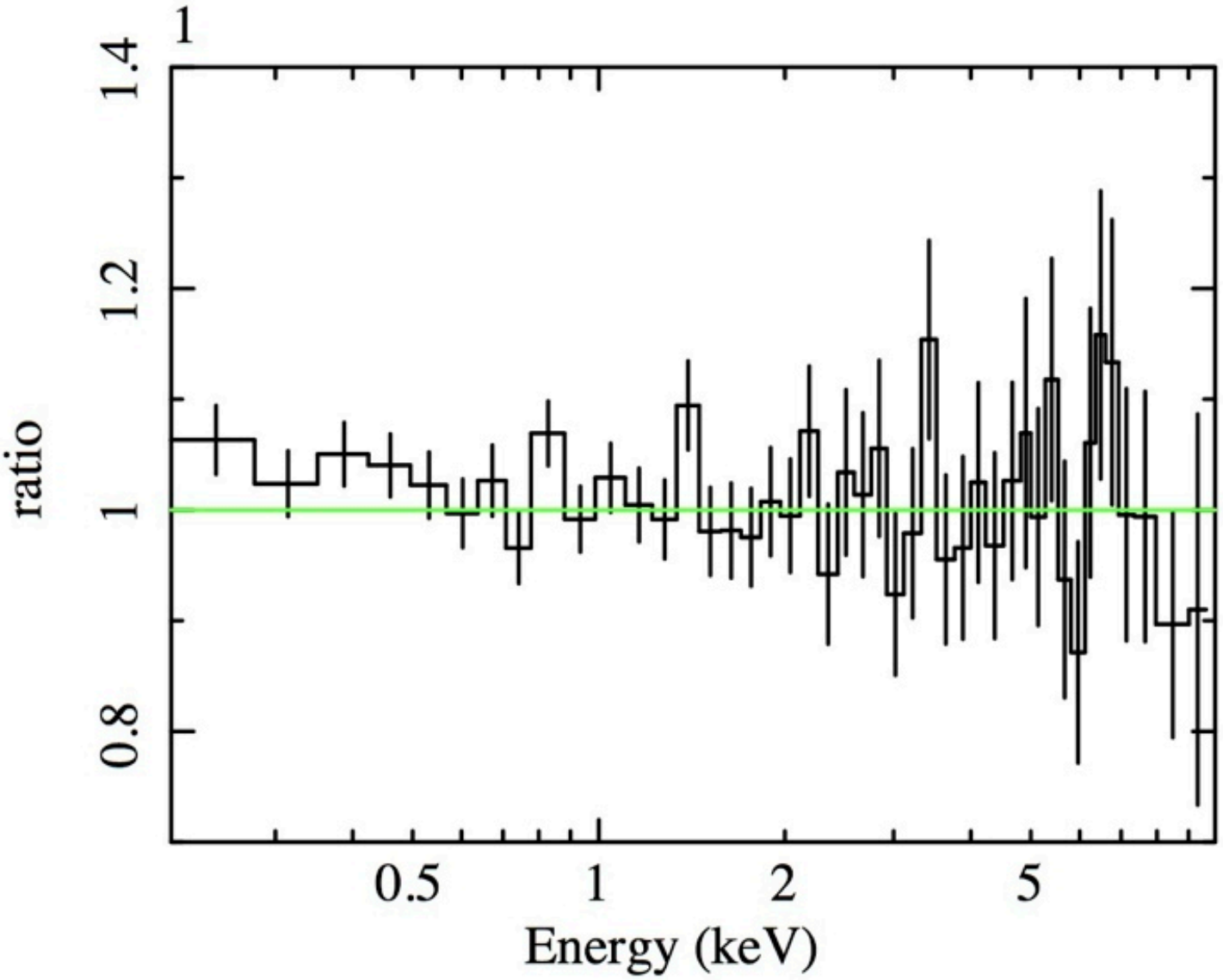
5-7 keV

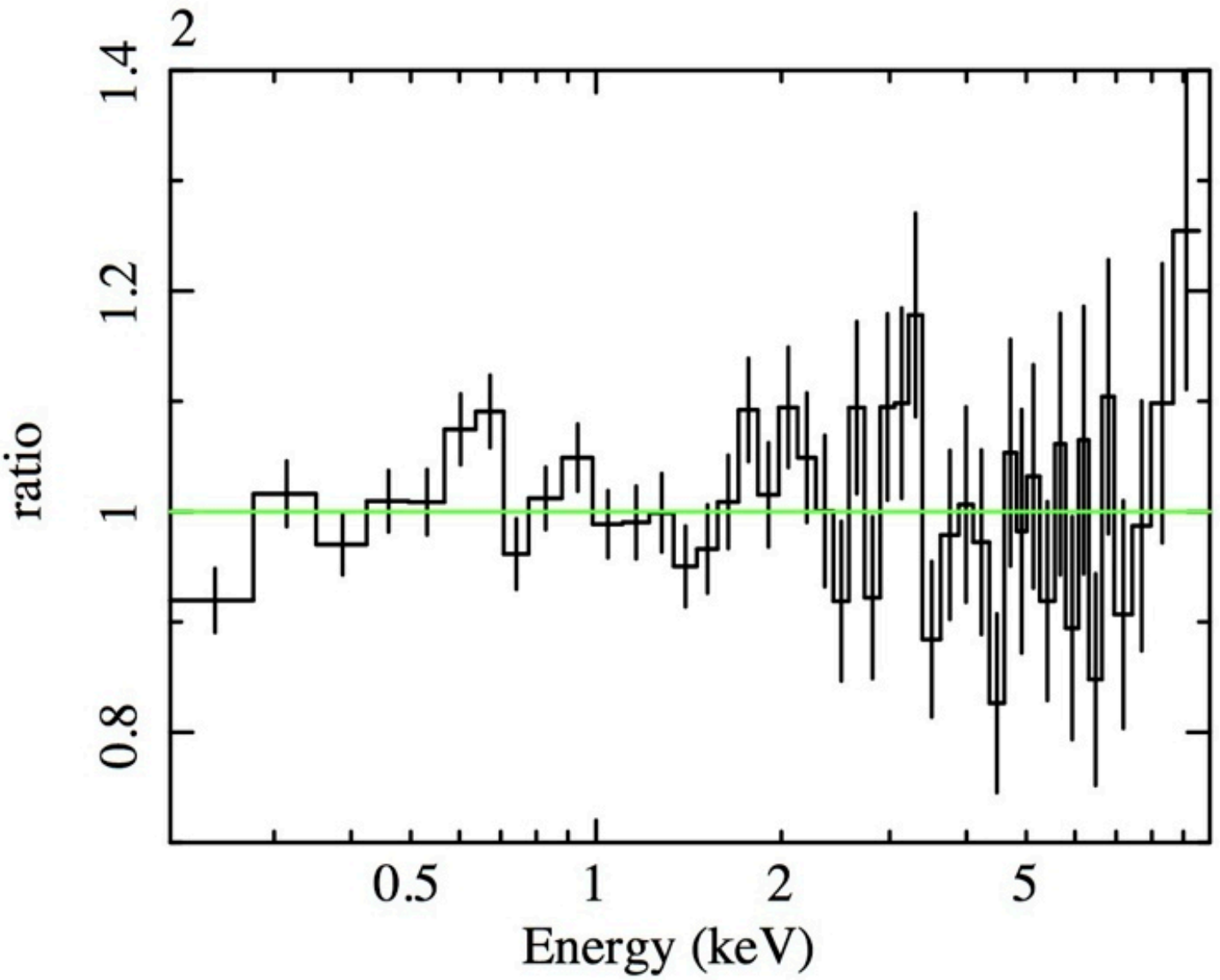


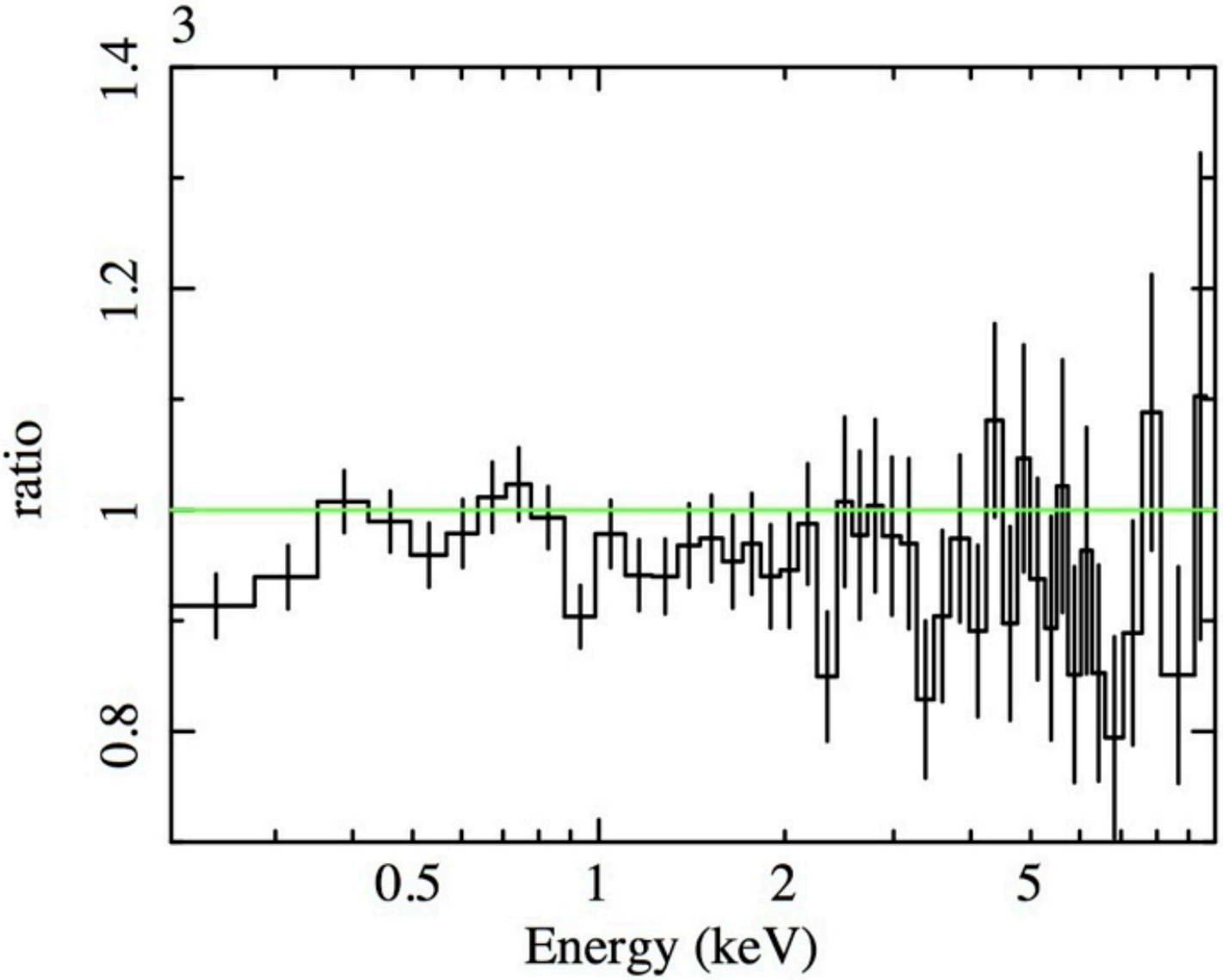
8-10 keV

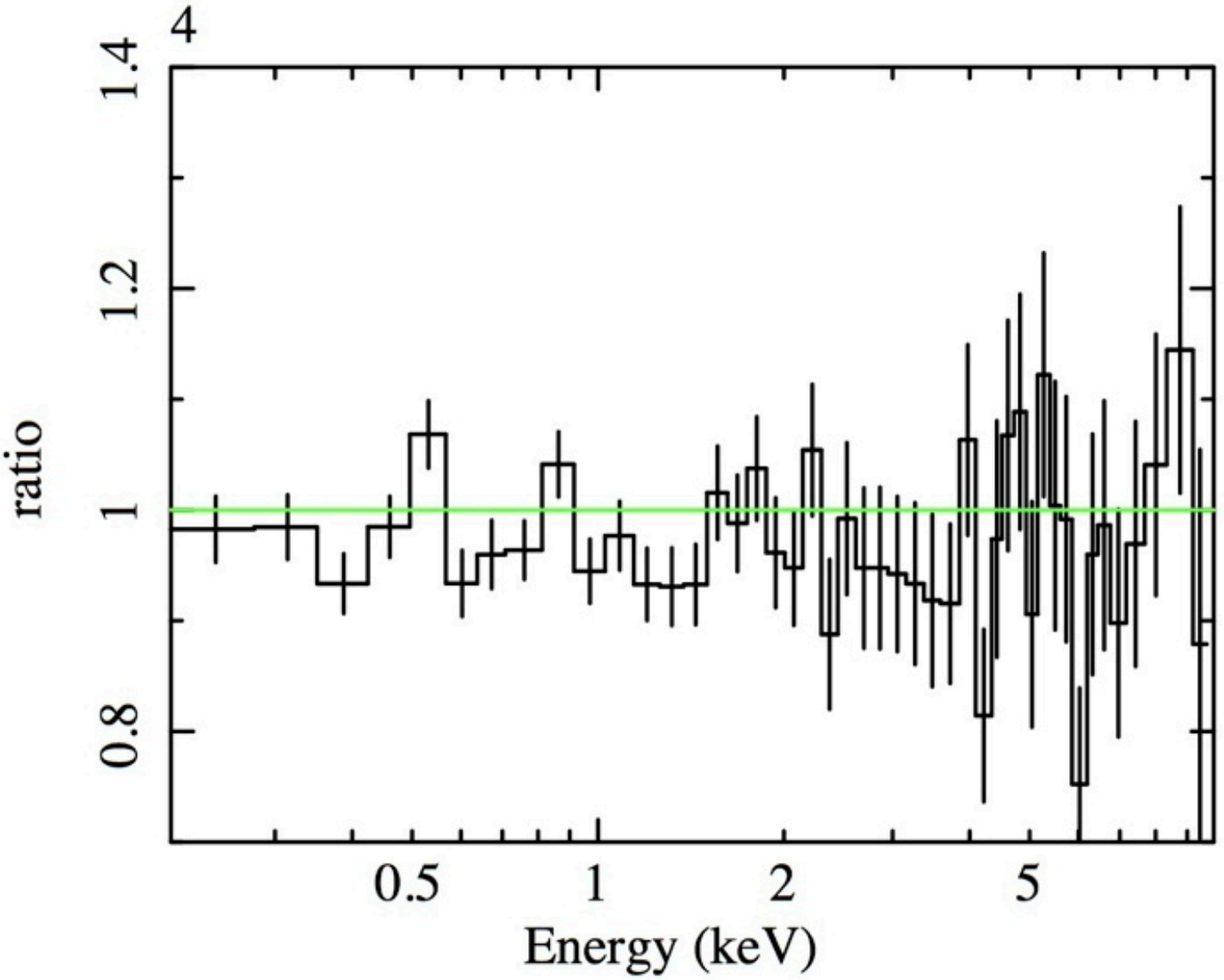
Variability happens FIRST at E<1 keV !

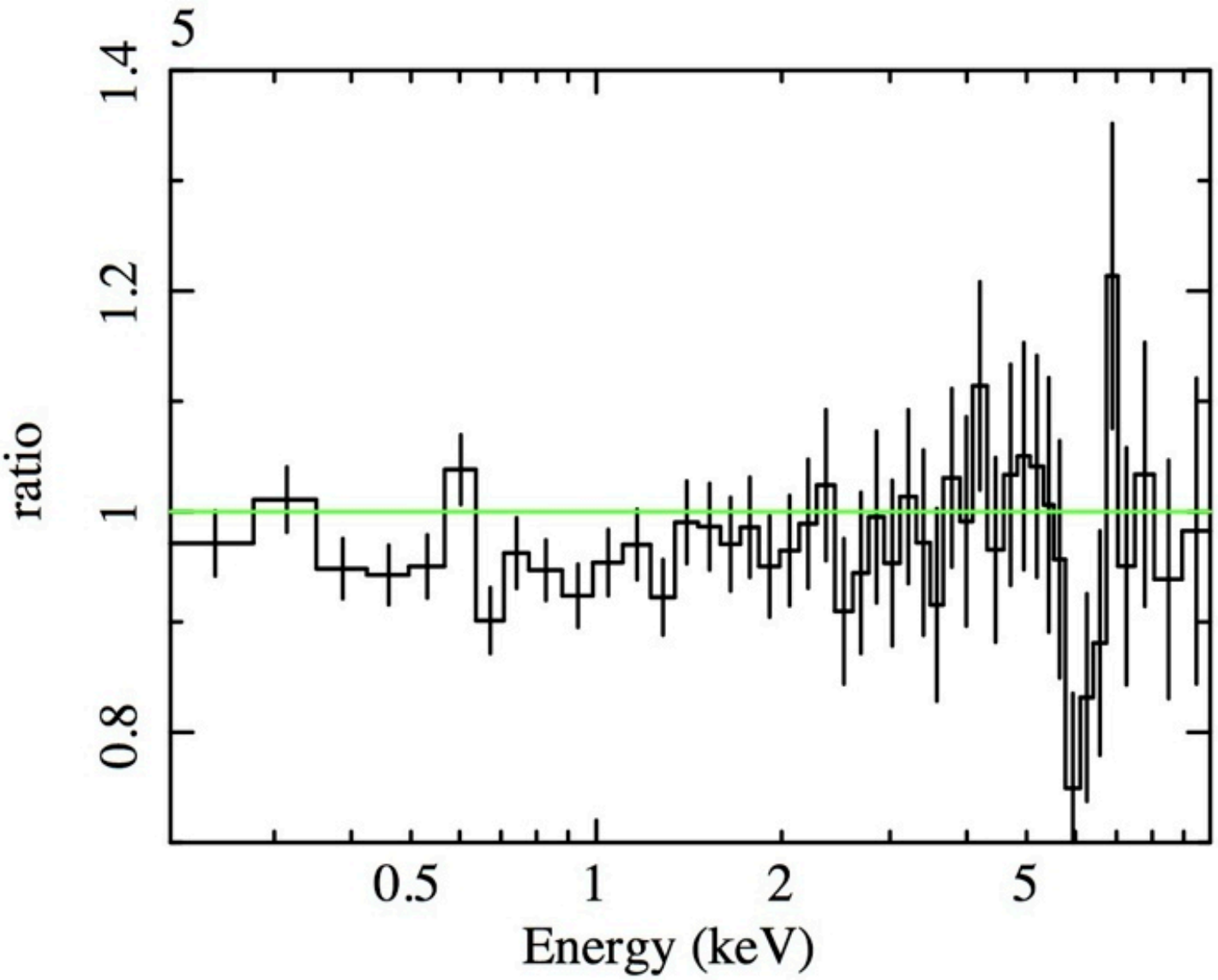
Time resolved spectral analysis

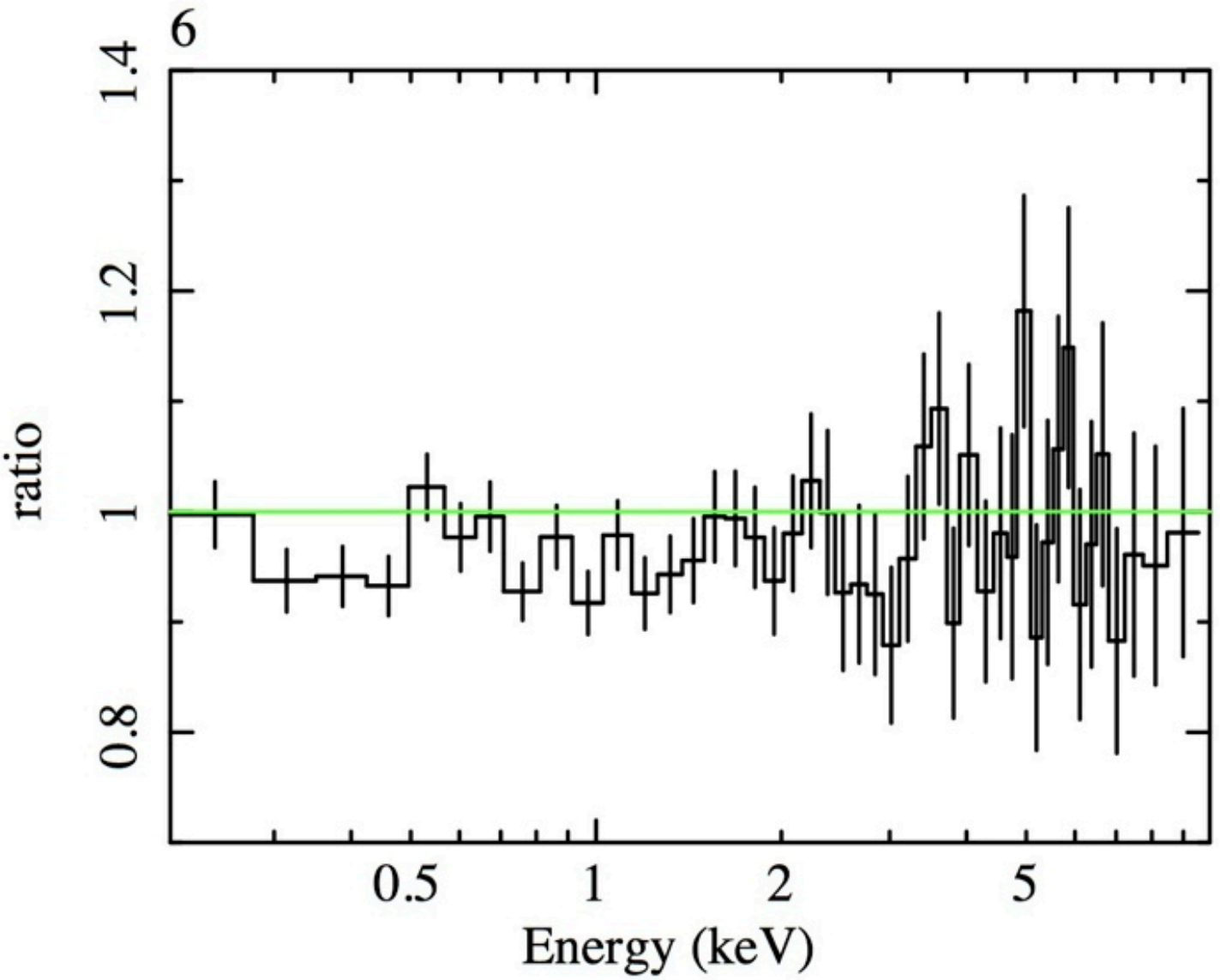

1
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

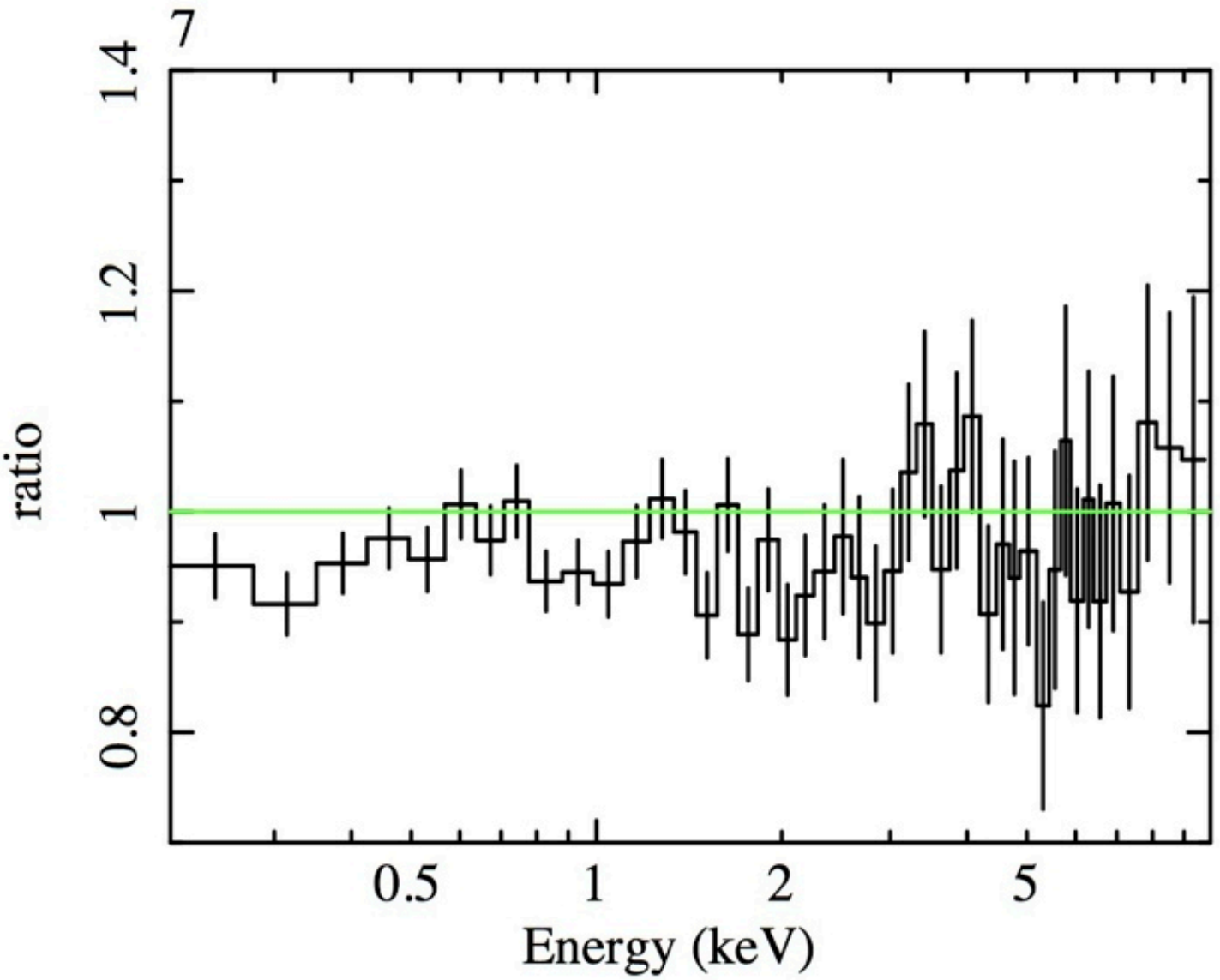

2
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

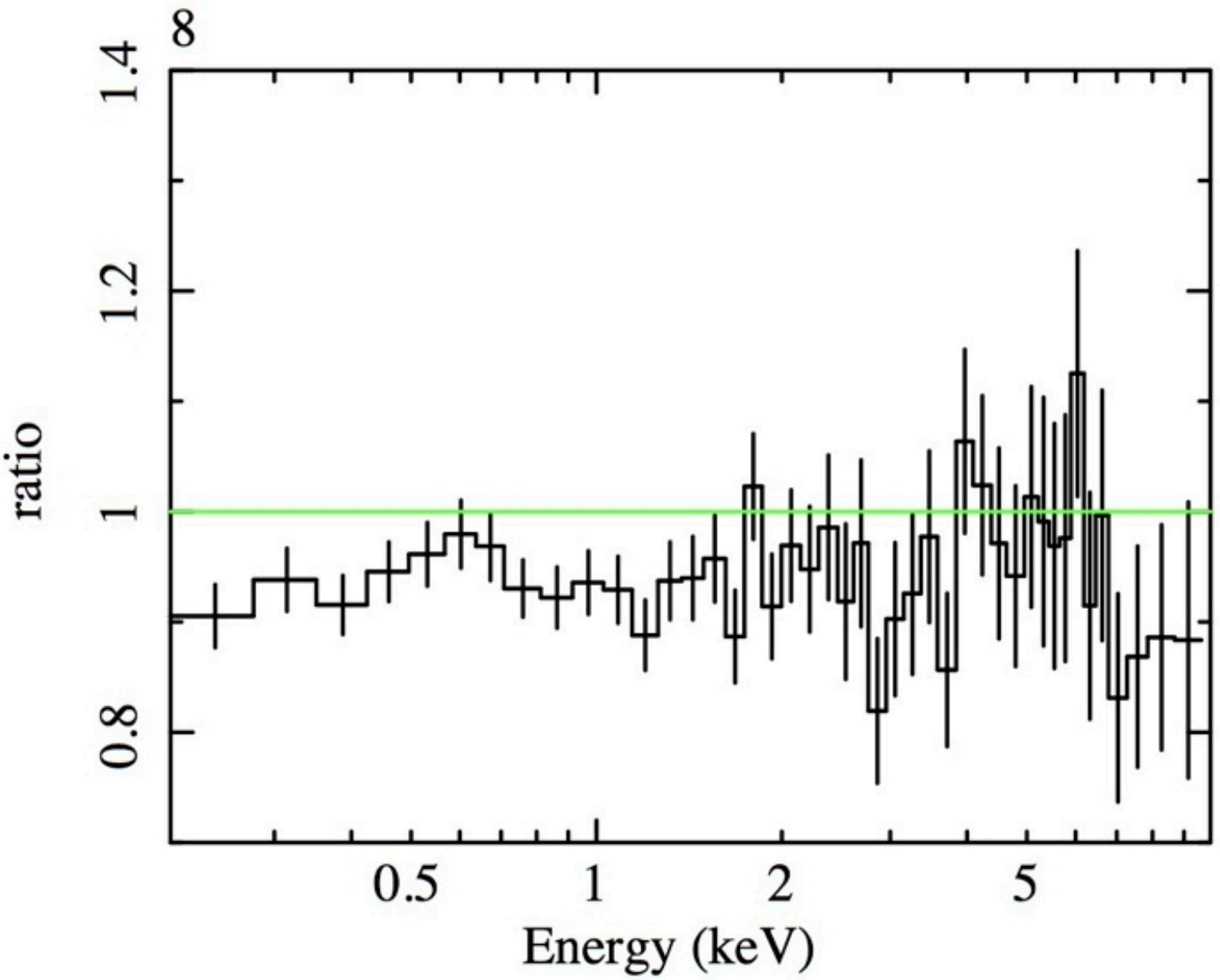

3
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

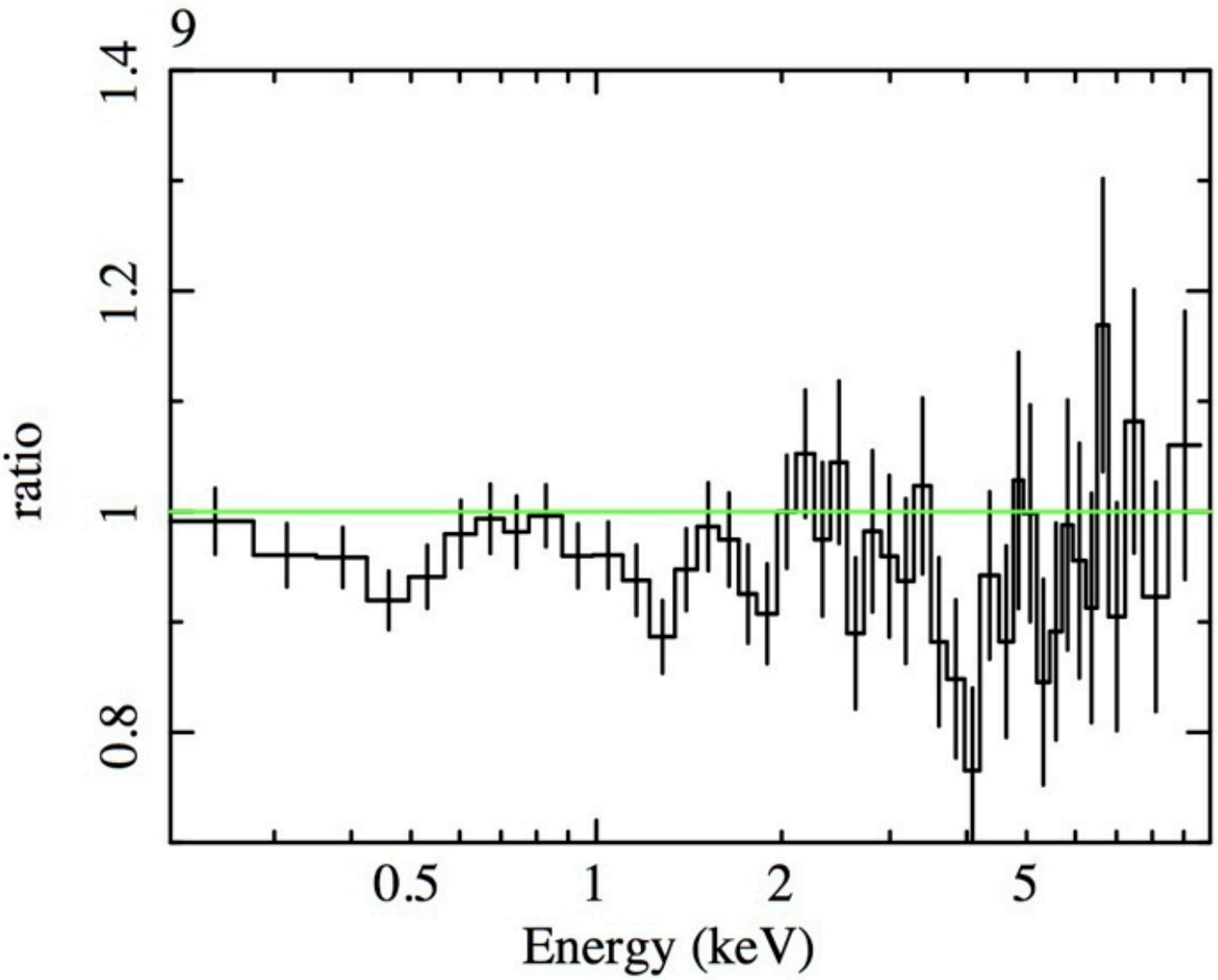

4
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

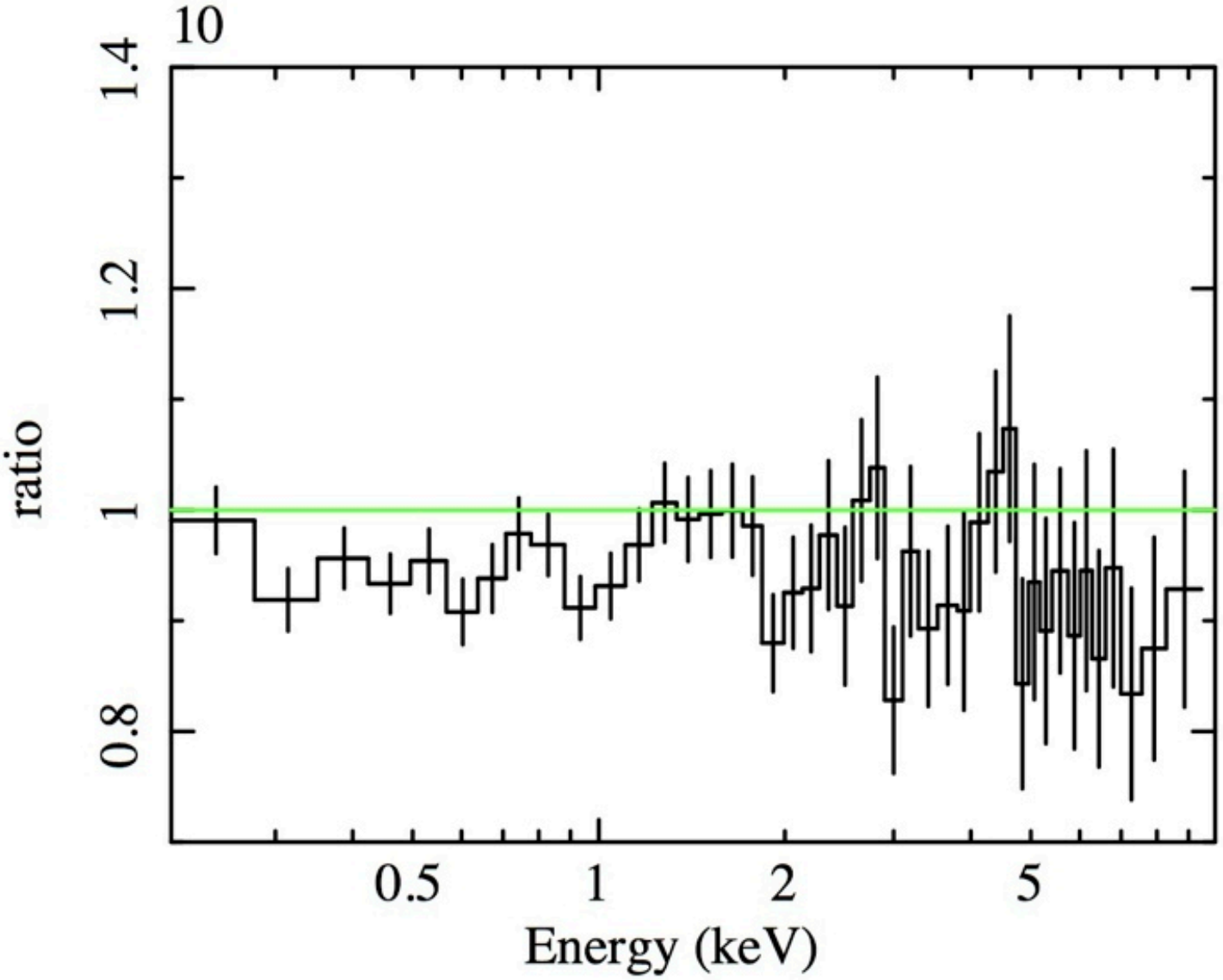

5
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

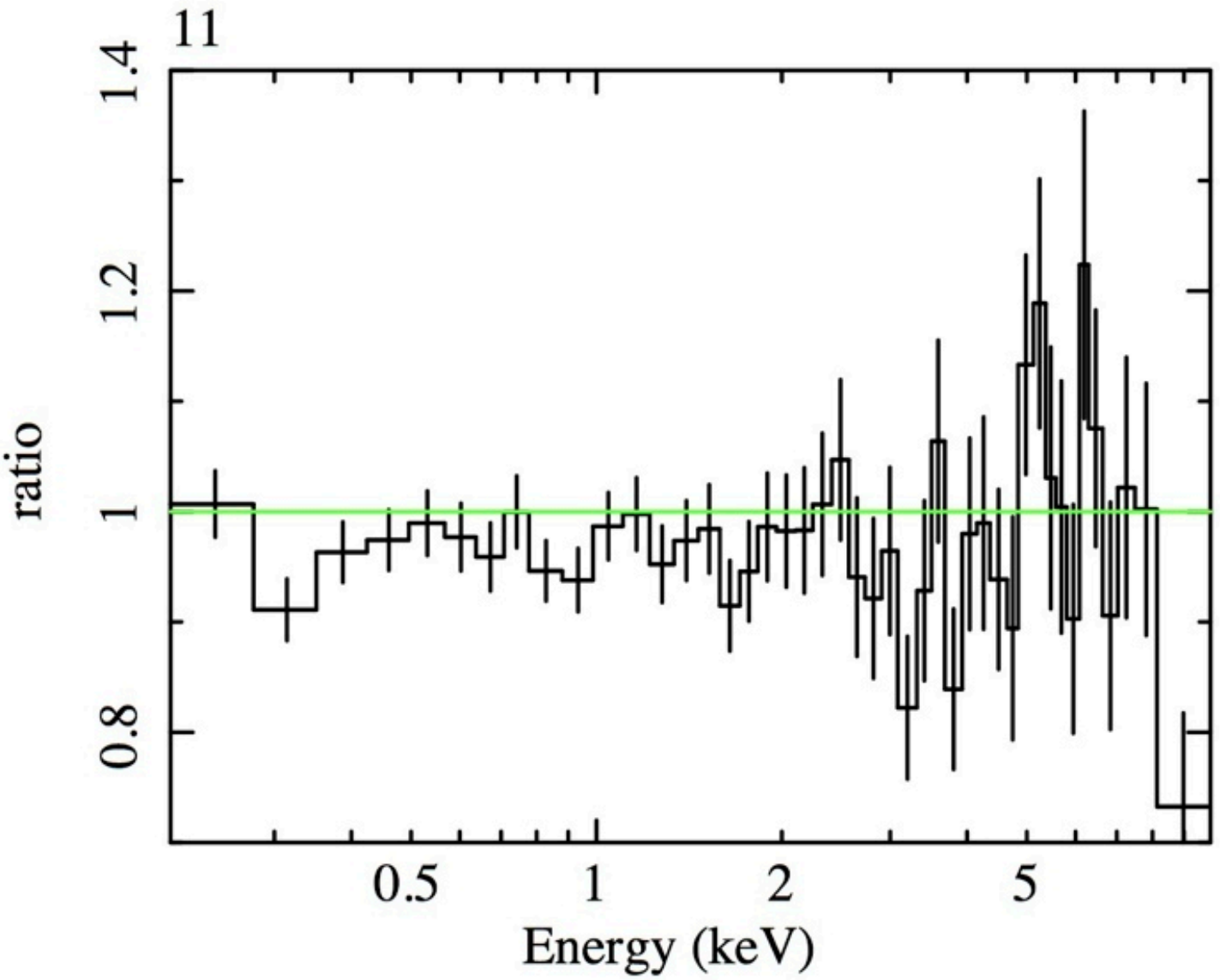

6
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

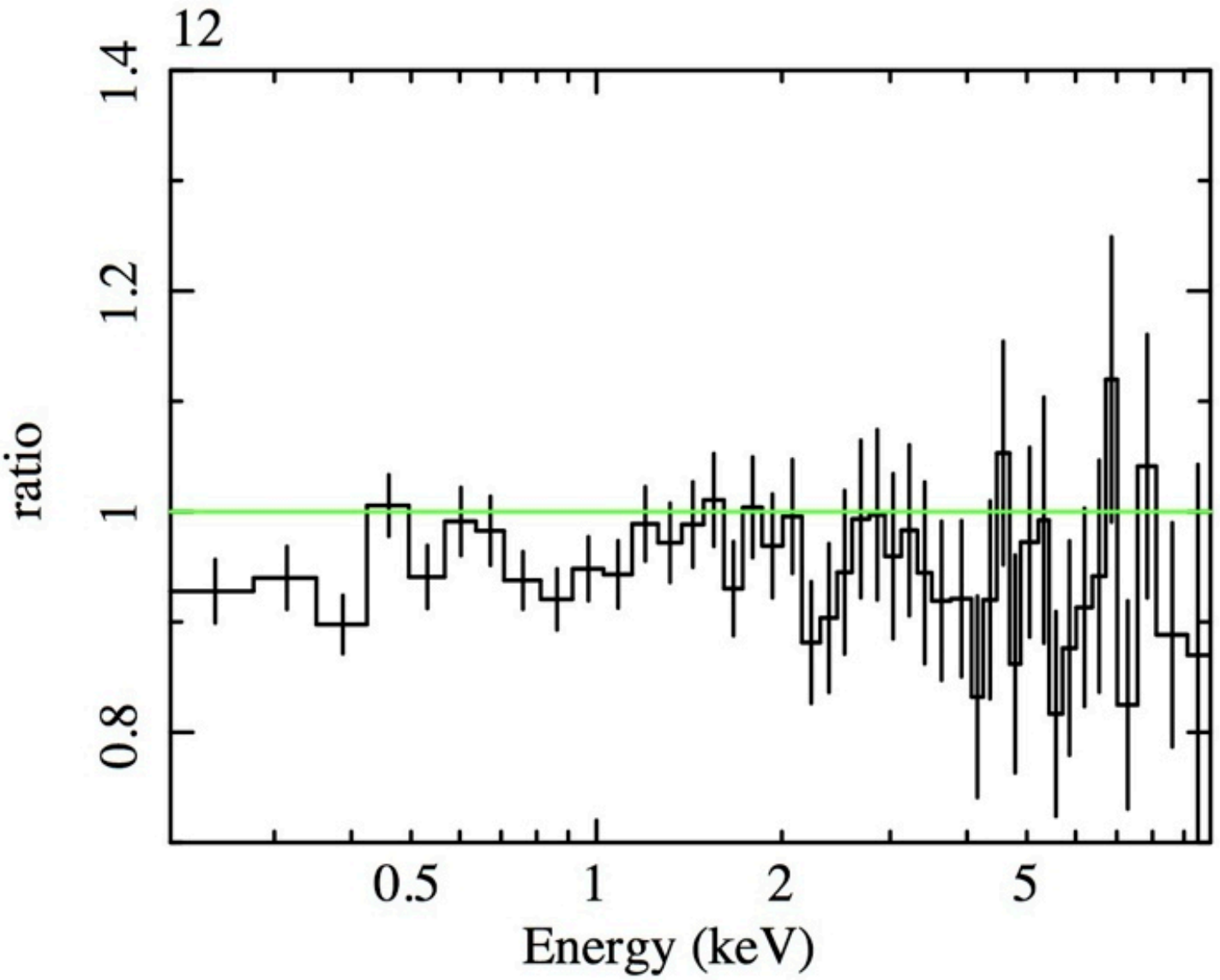

7
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

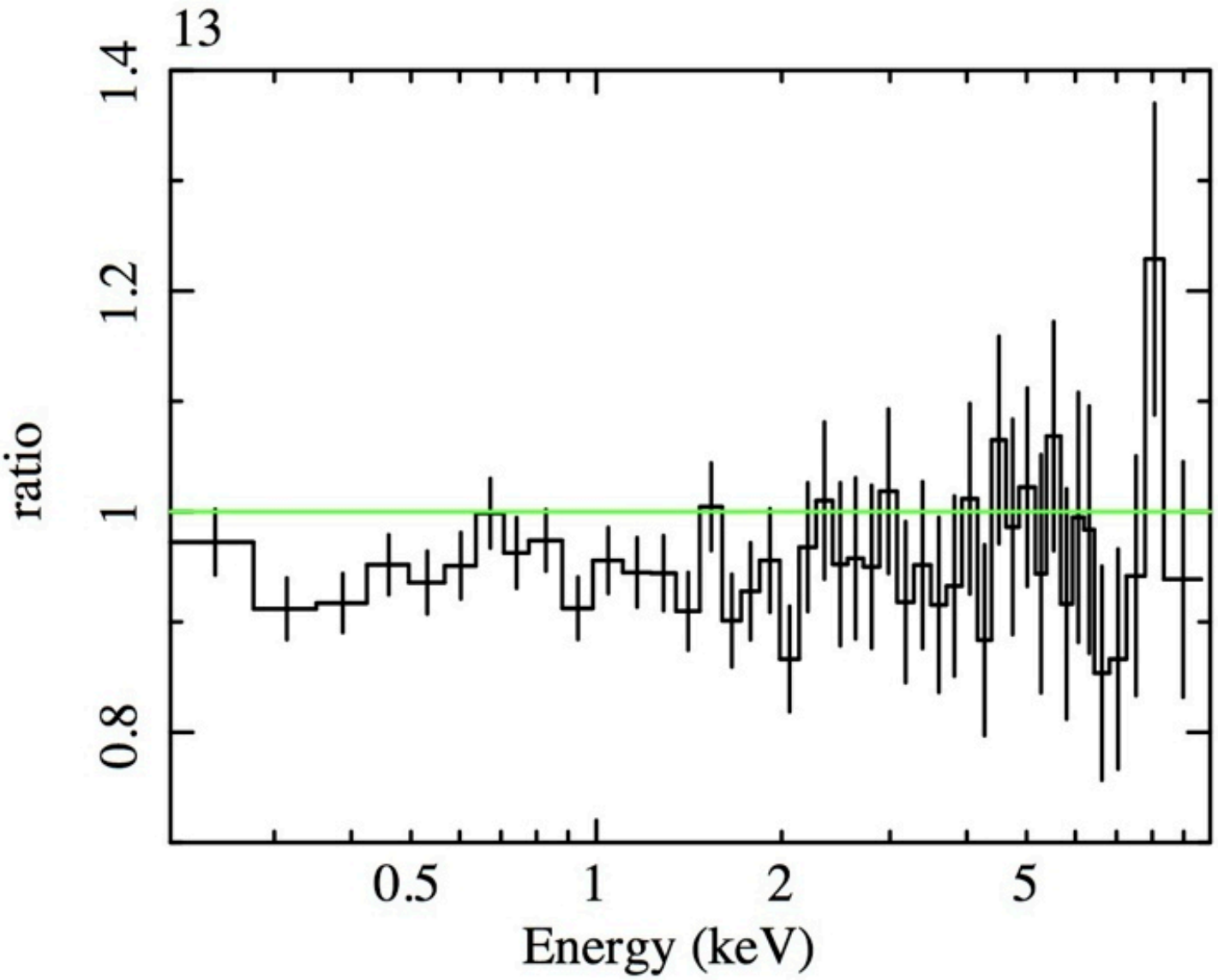

8
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

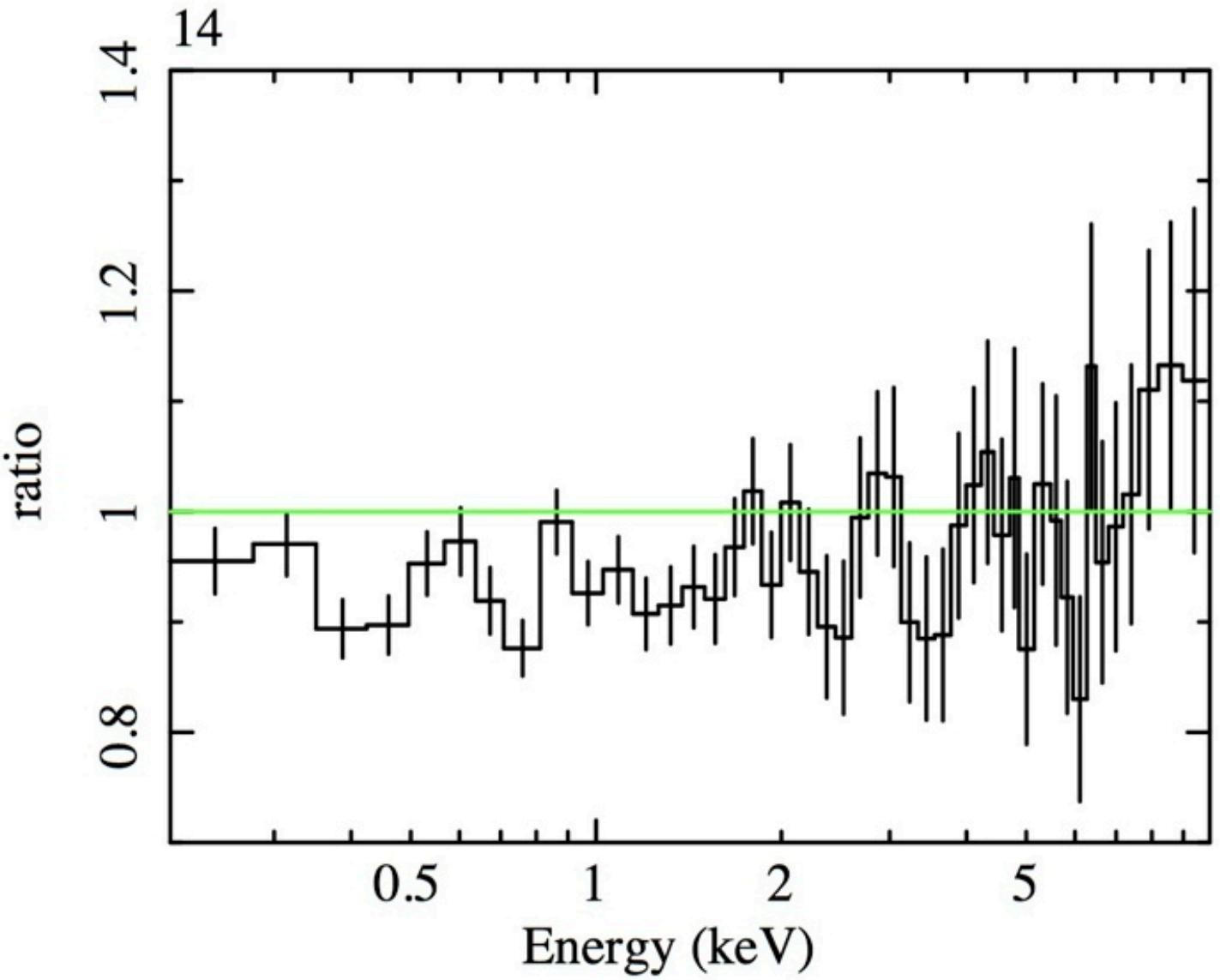

9
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

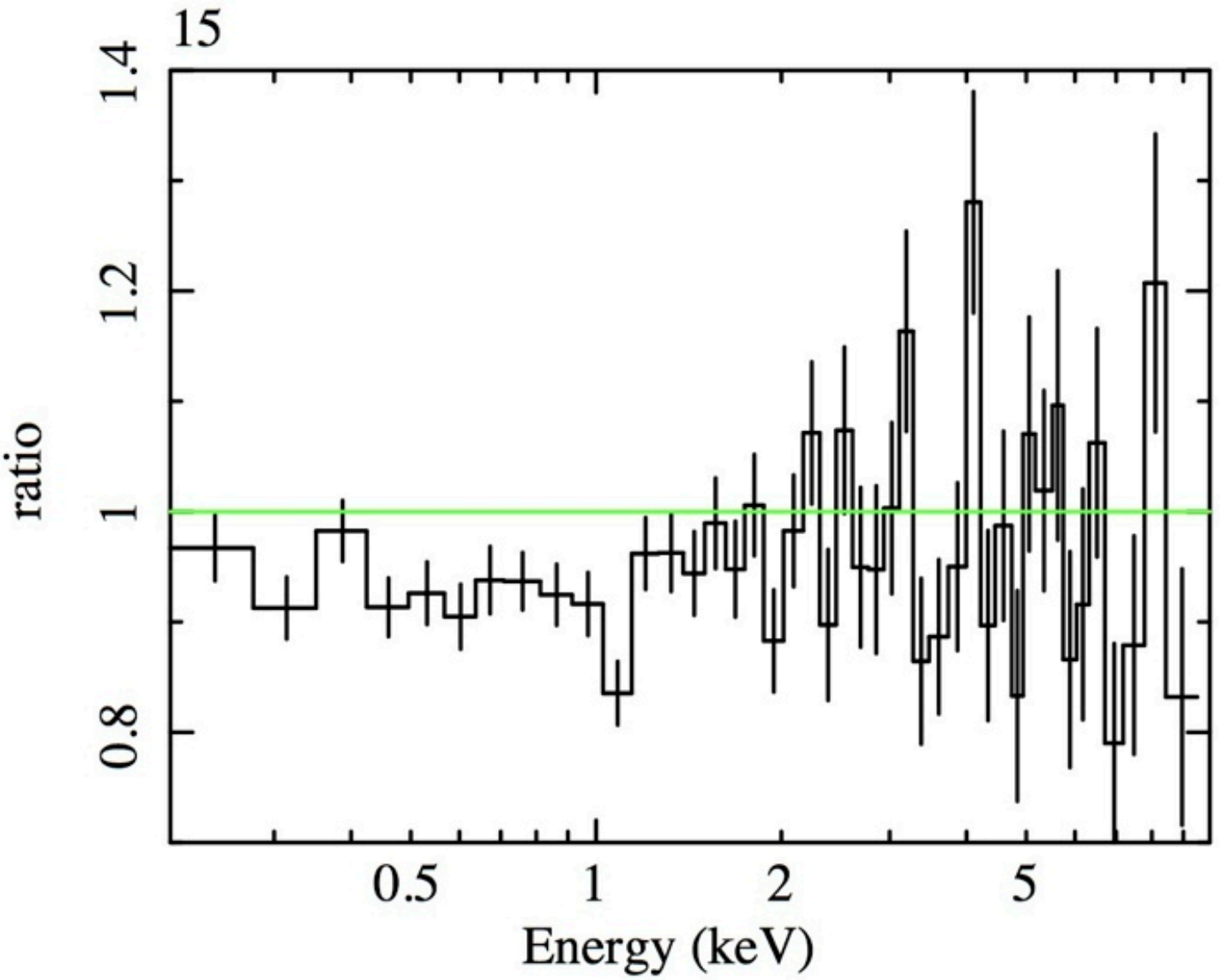

10
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

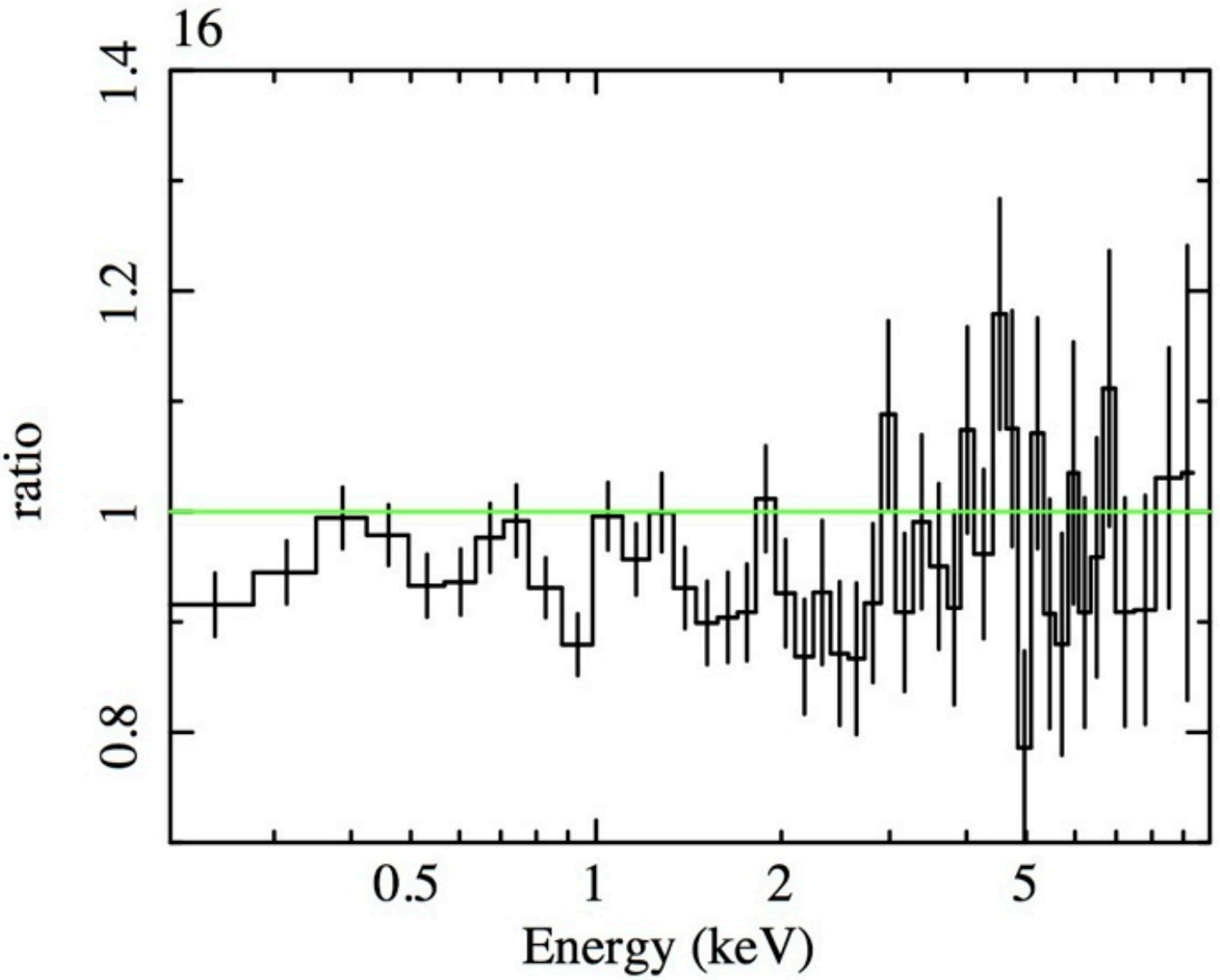

11
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

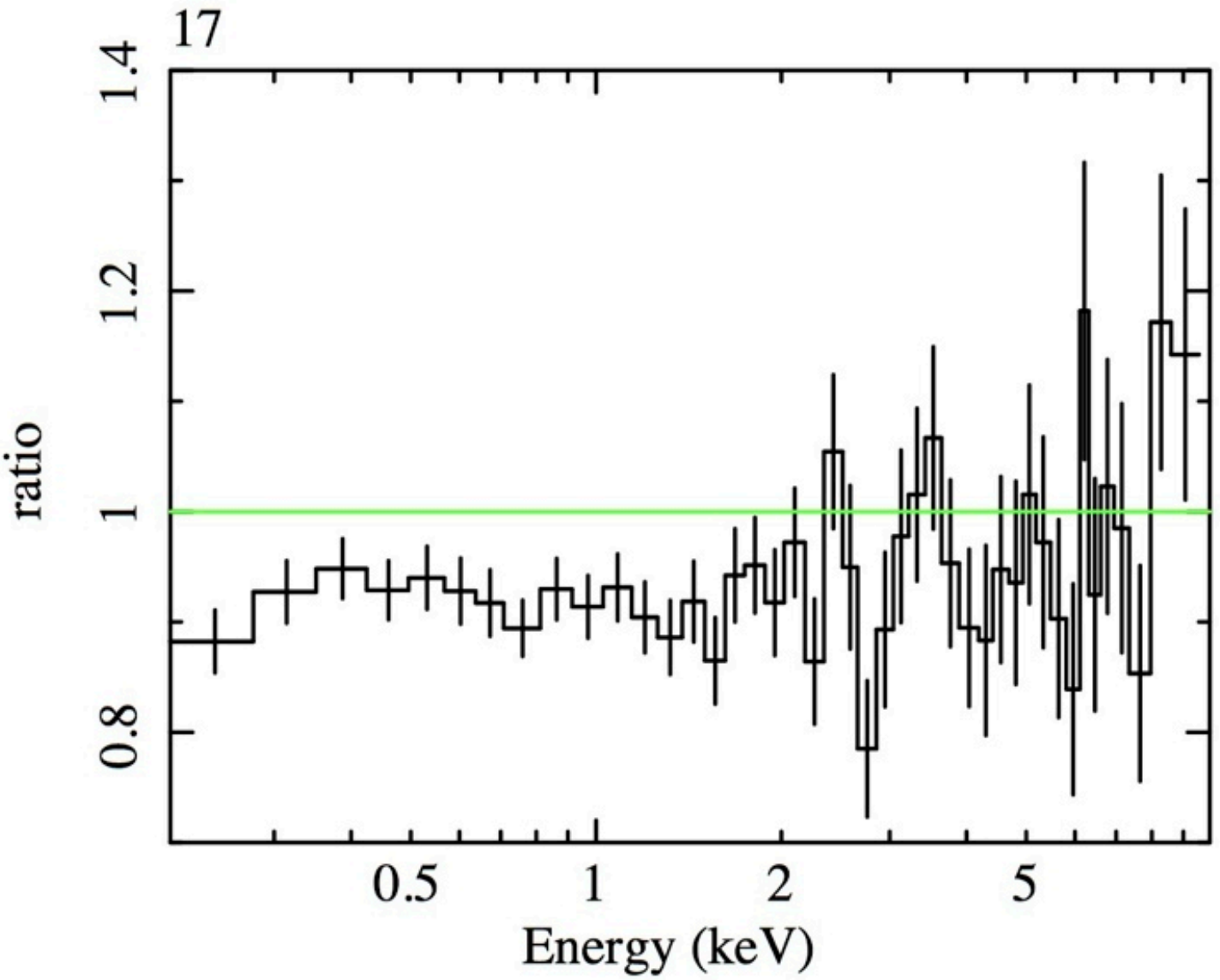

12
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

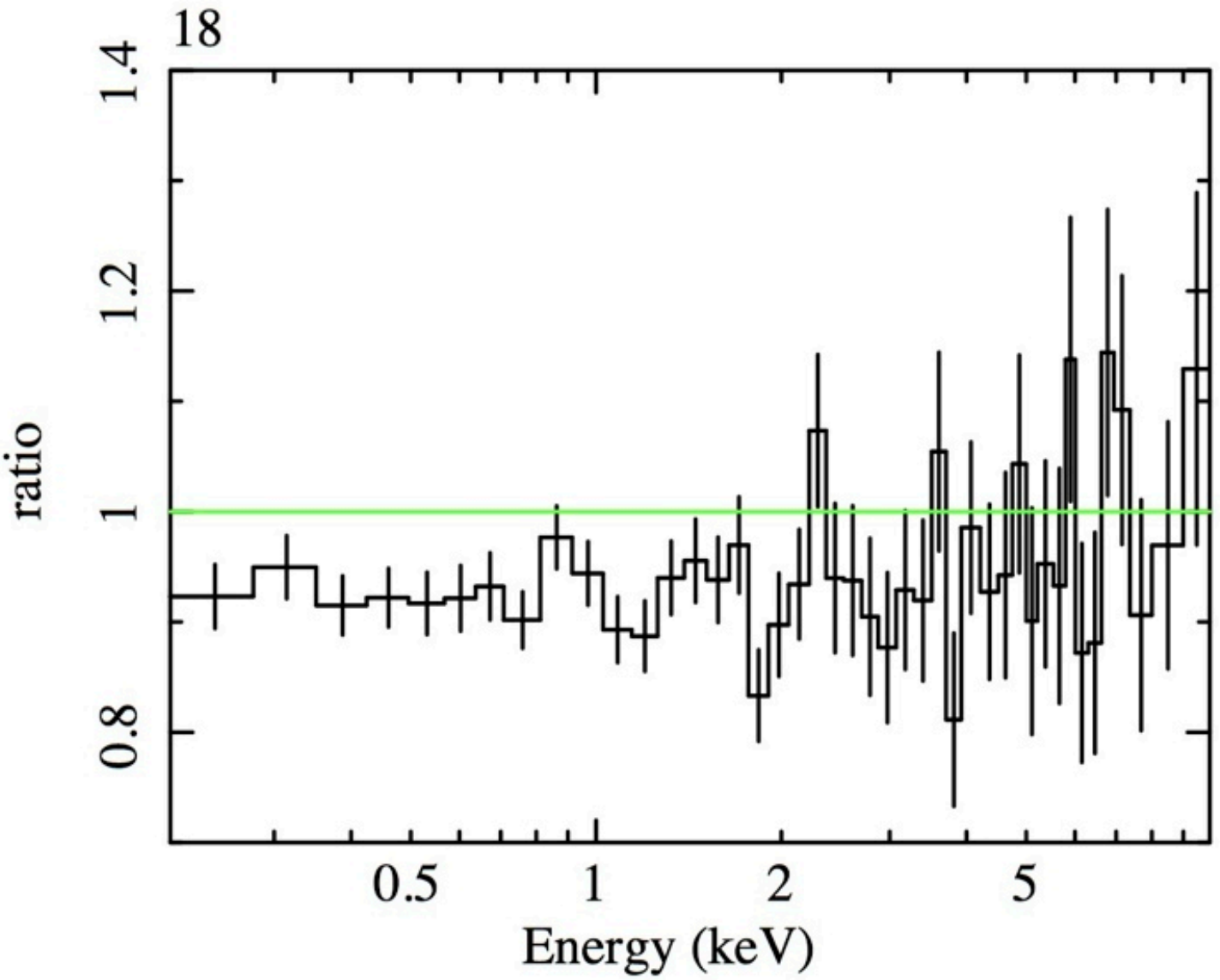

13
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

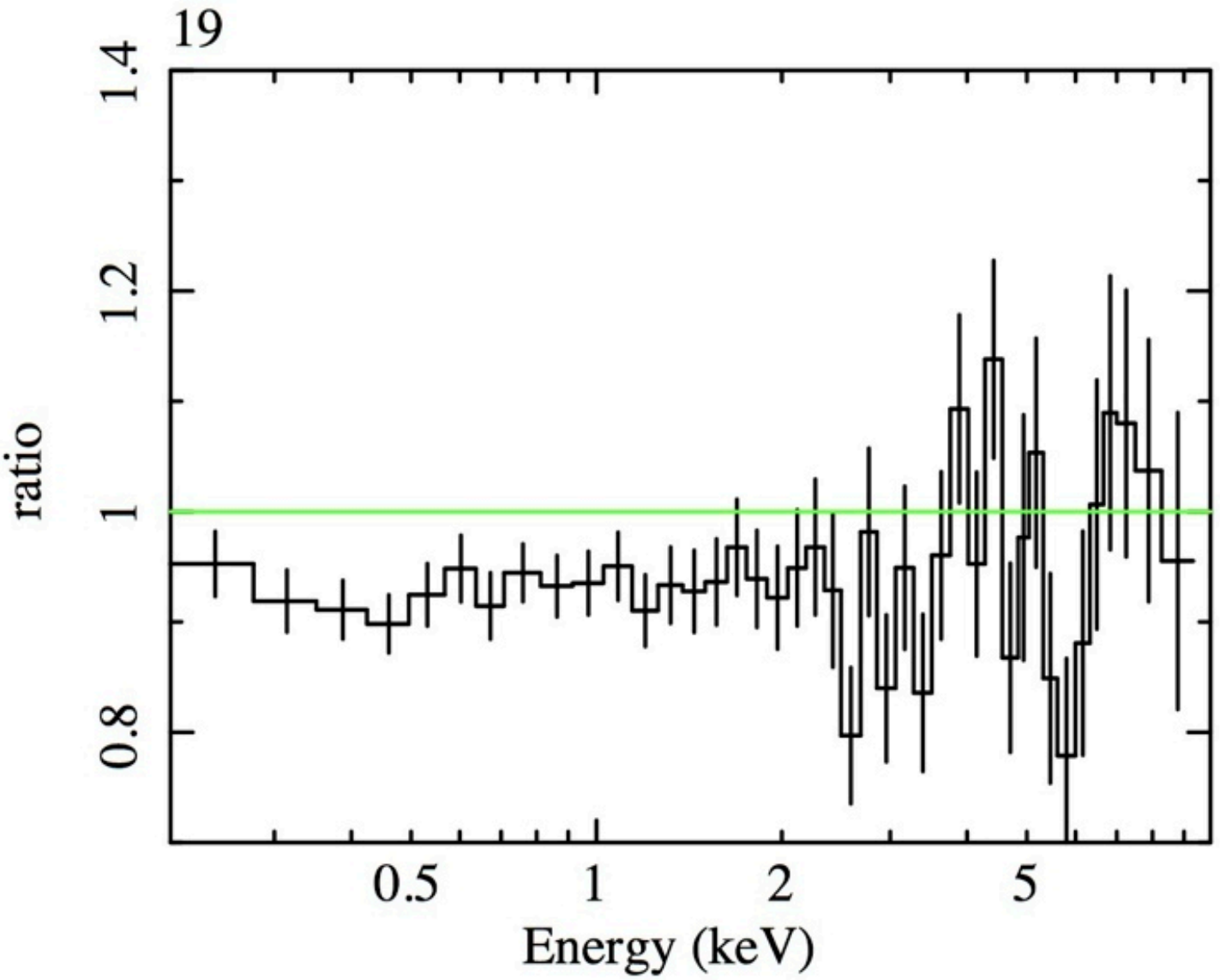

14
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

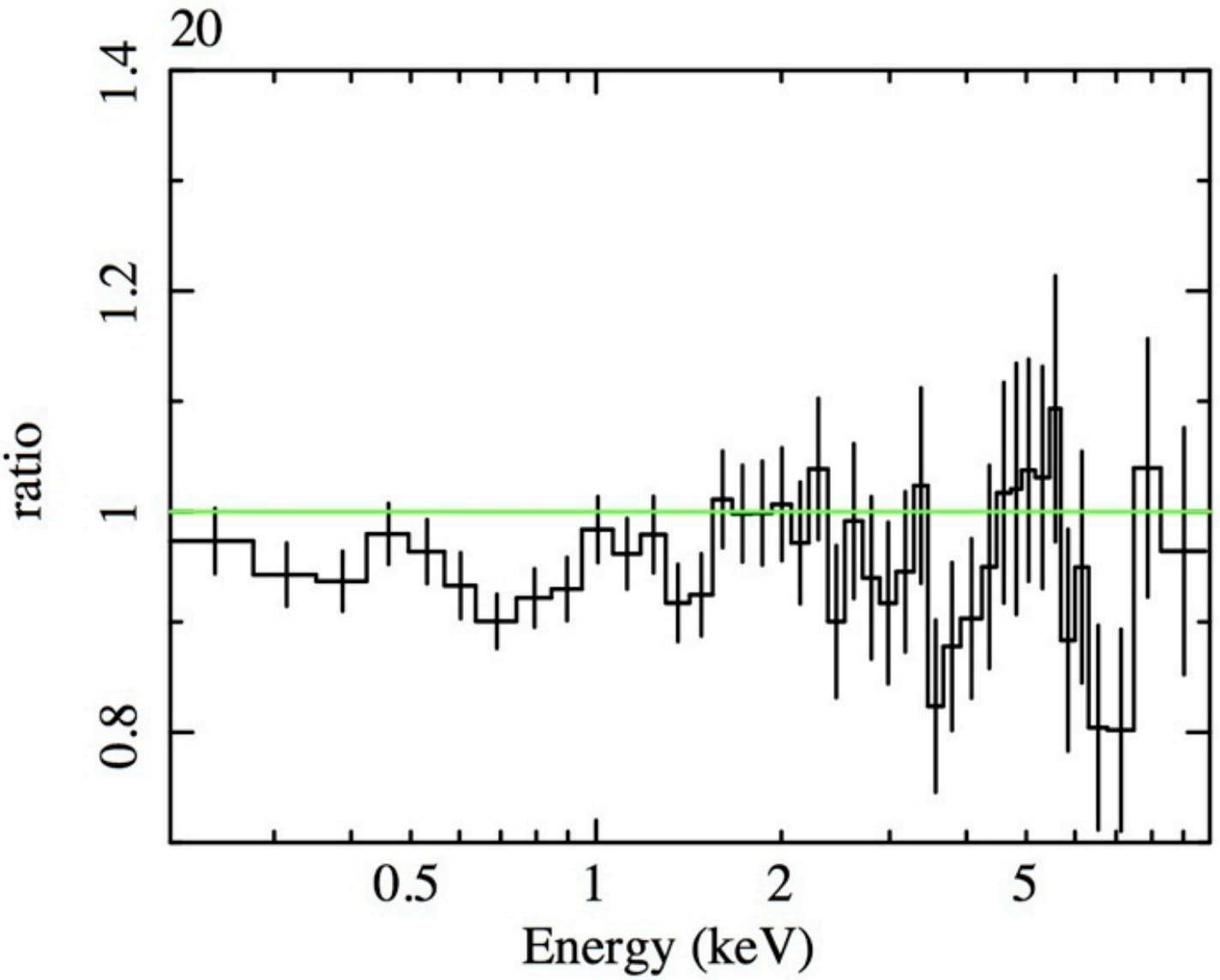

15
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

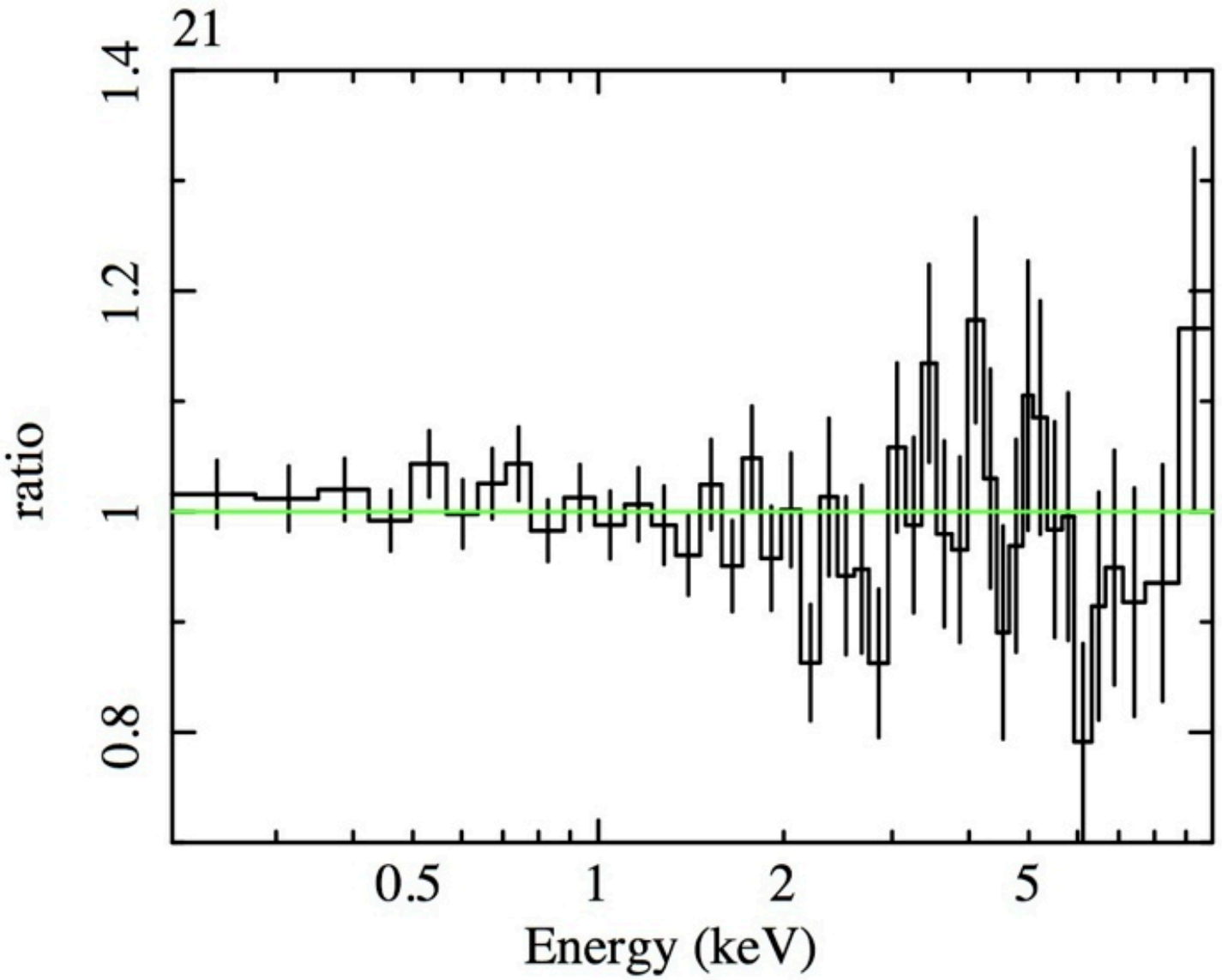

16
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

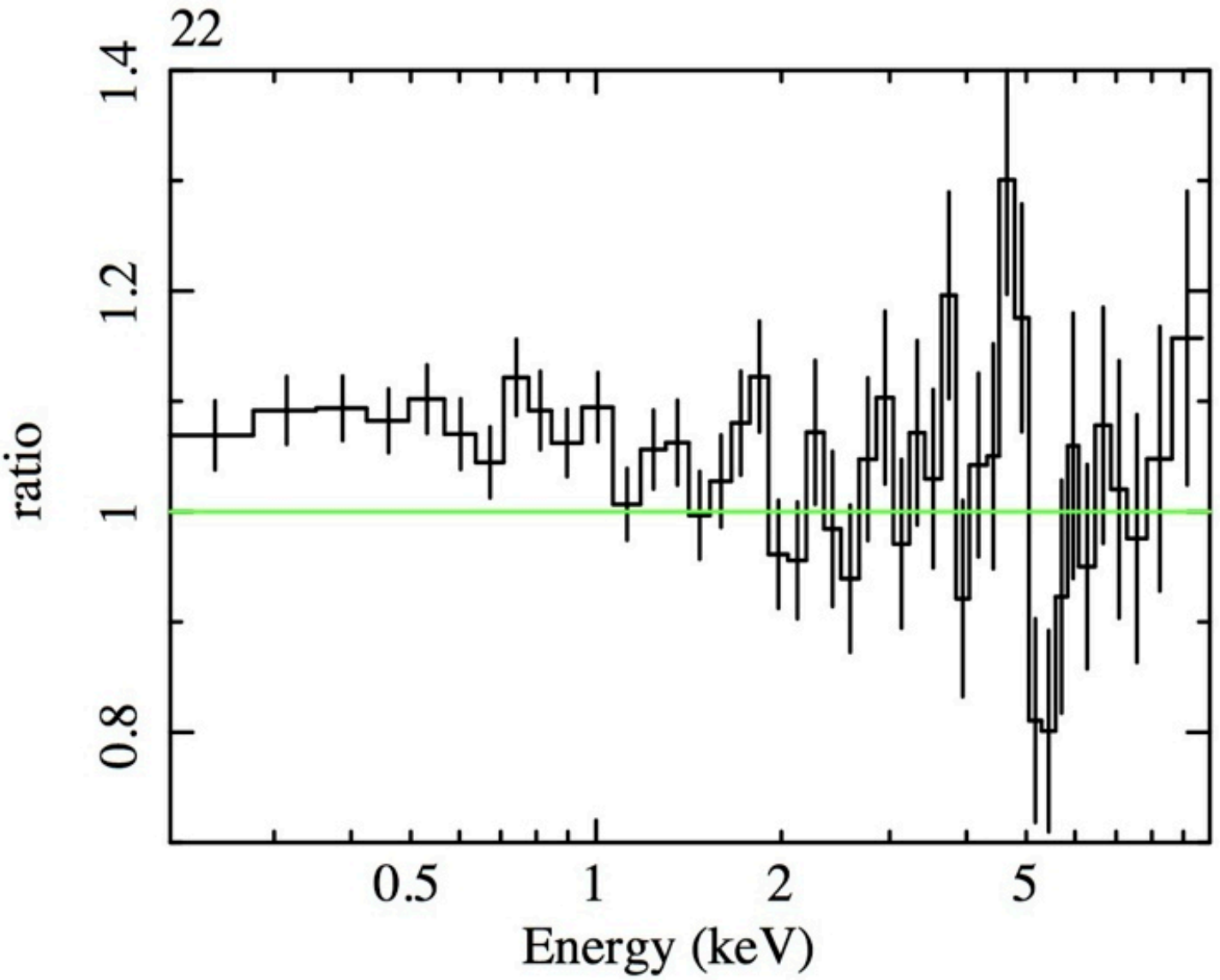

17
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

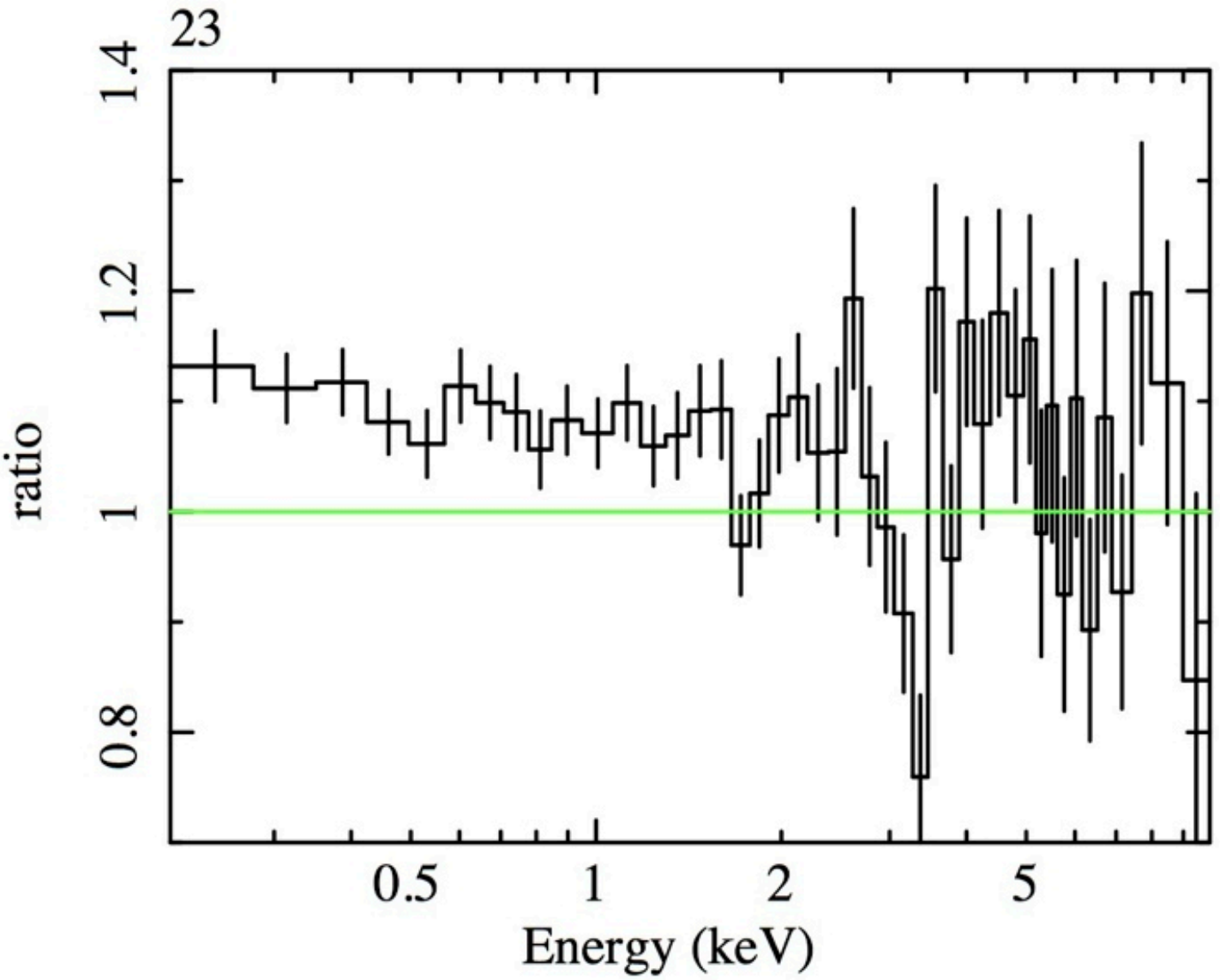

18
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

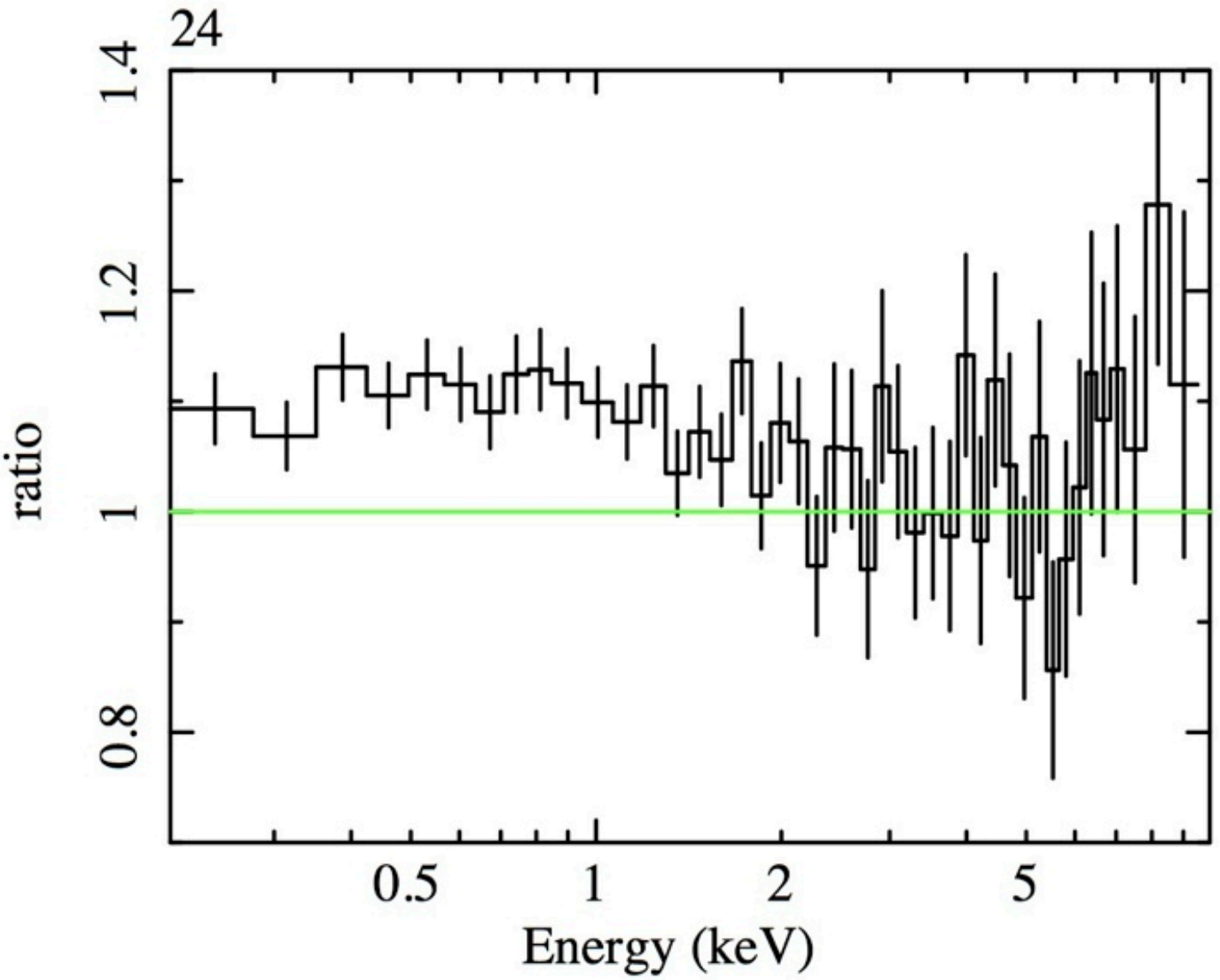

19
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

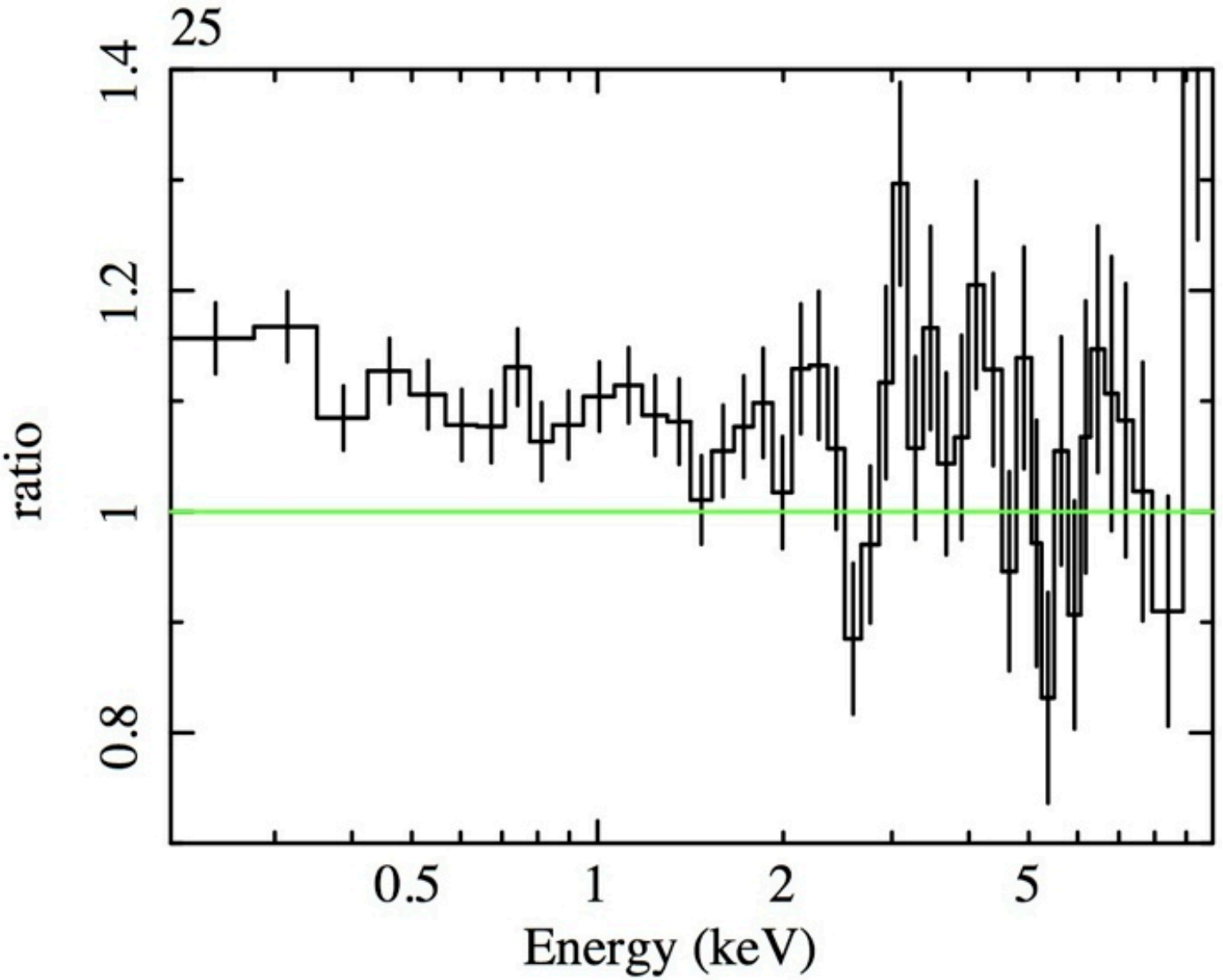

20
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

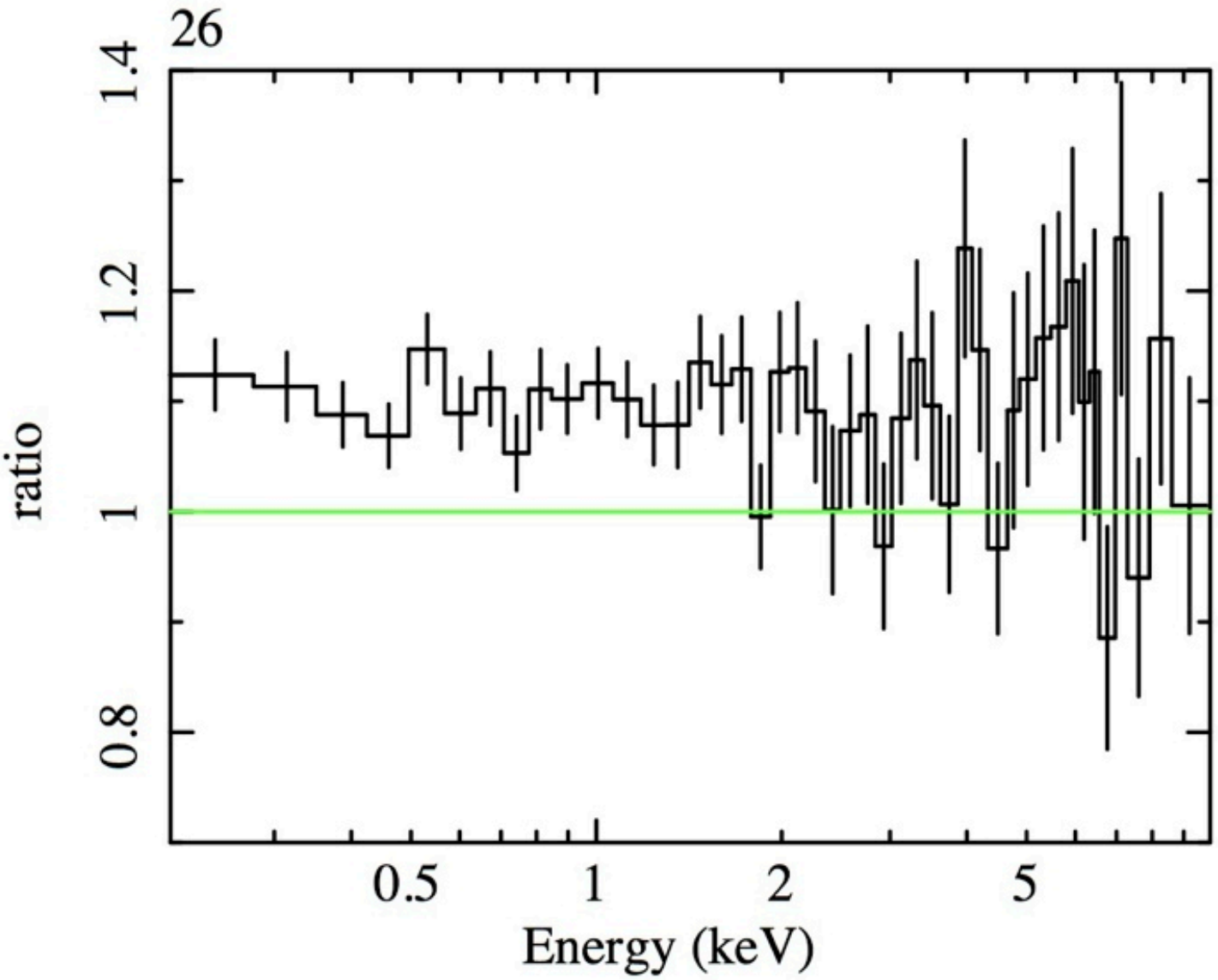

21
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

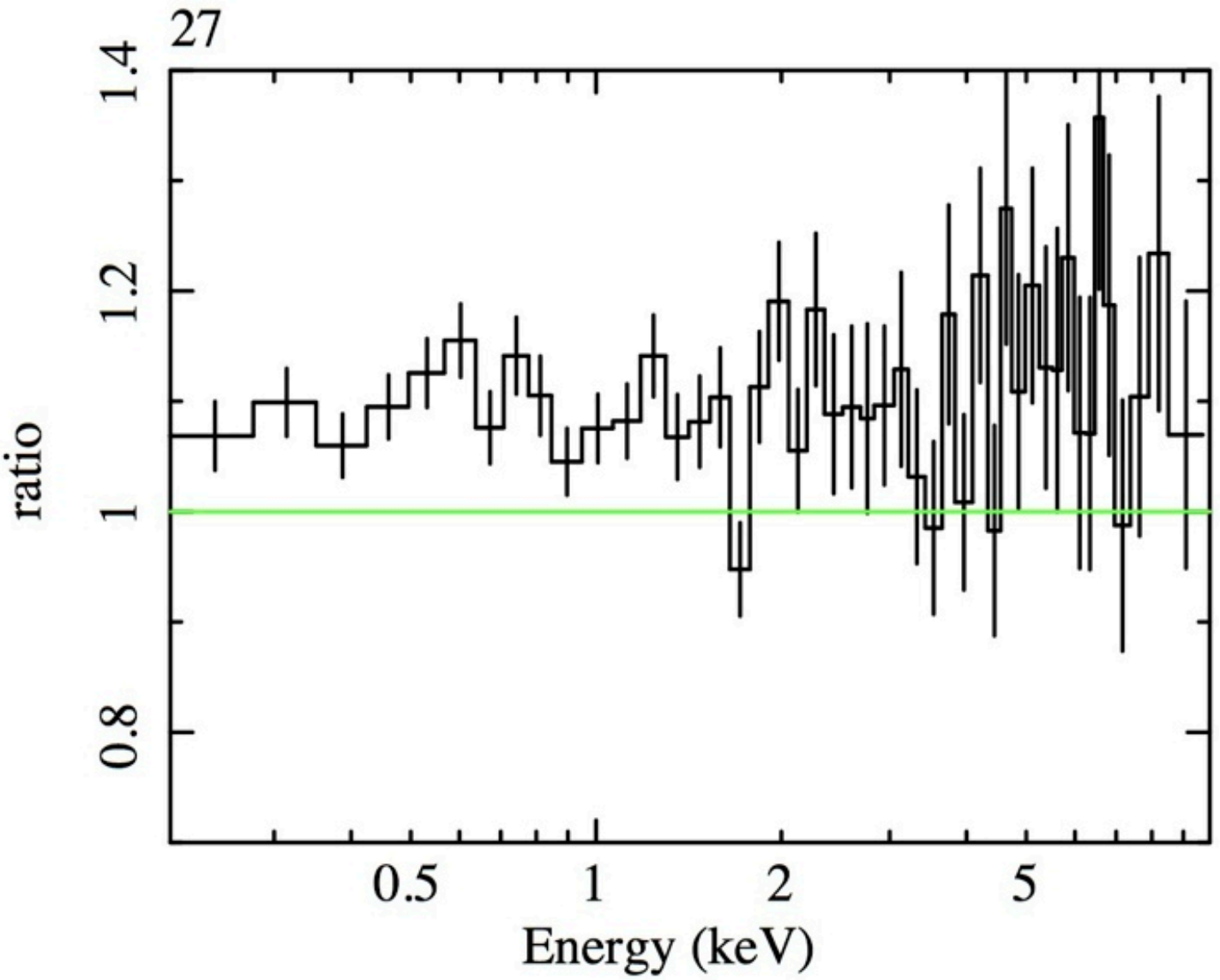

22
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

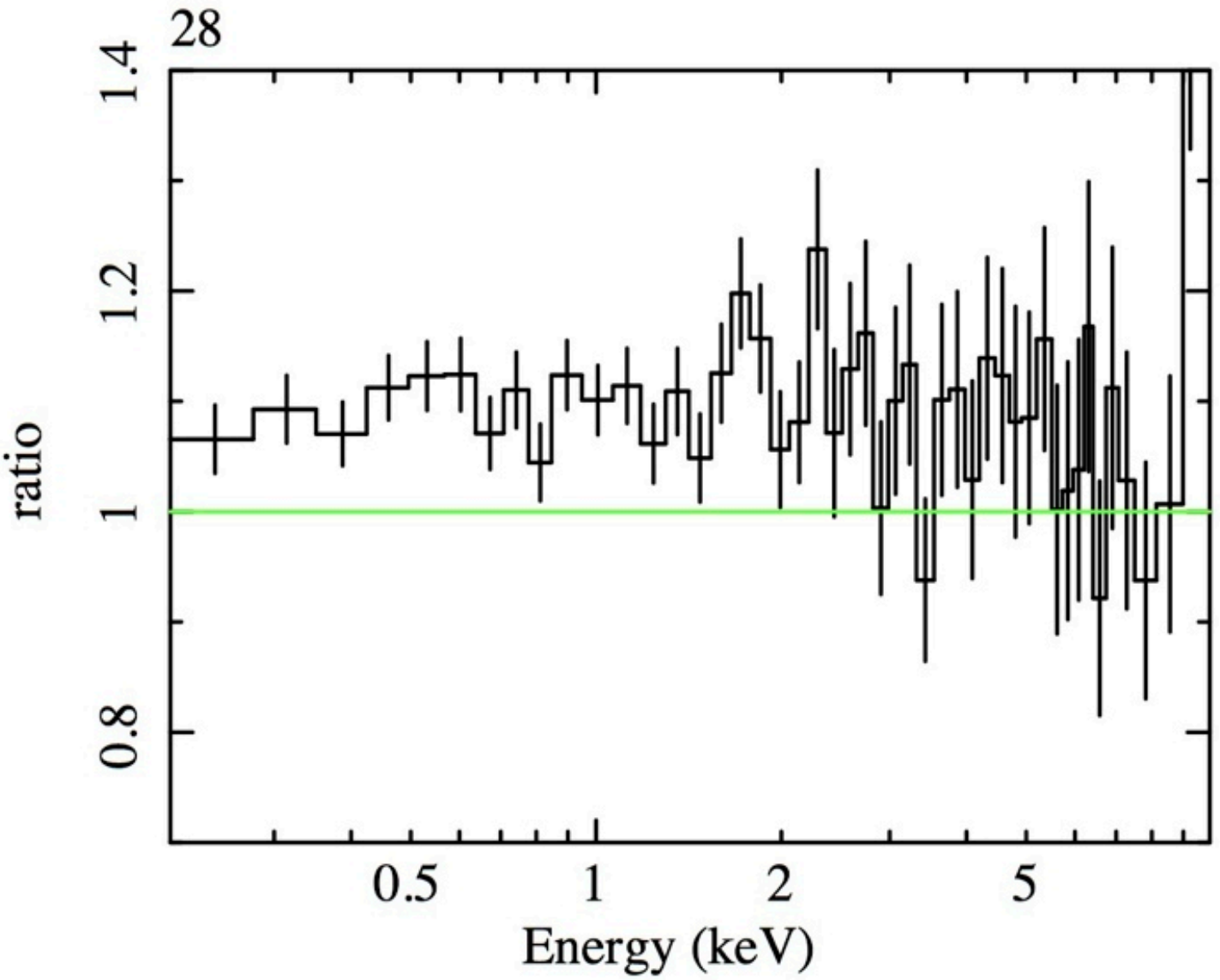

23
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

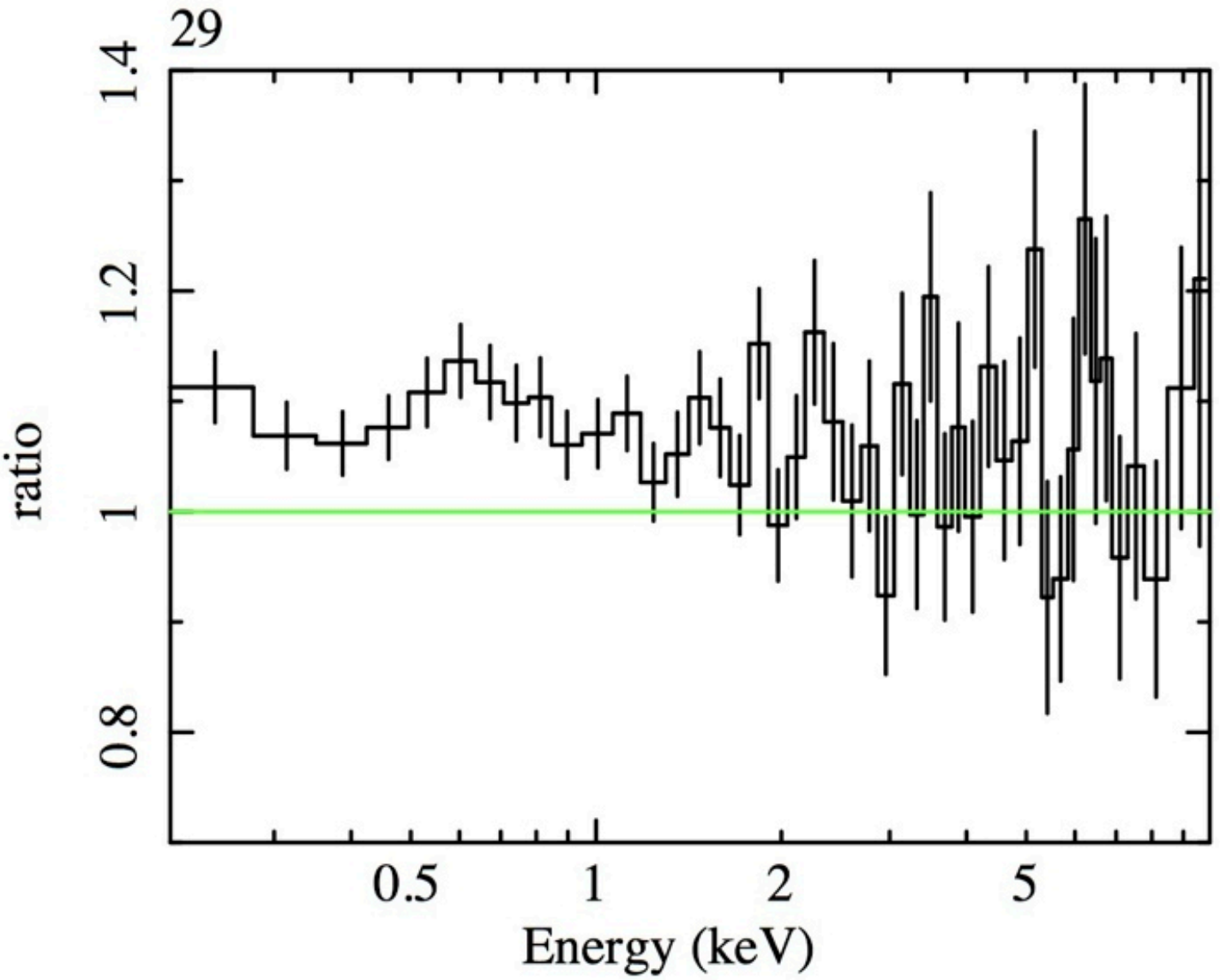

24
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

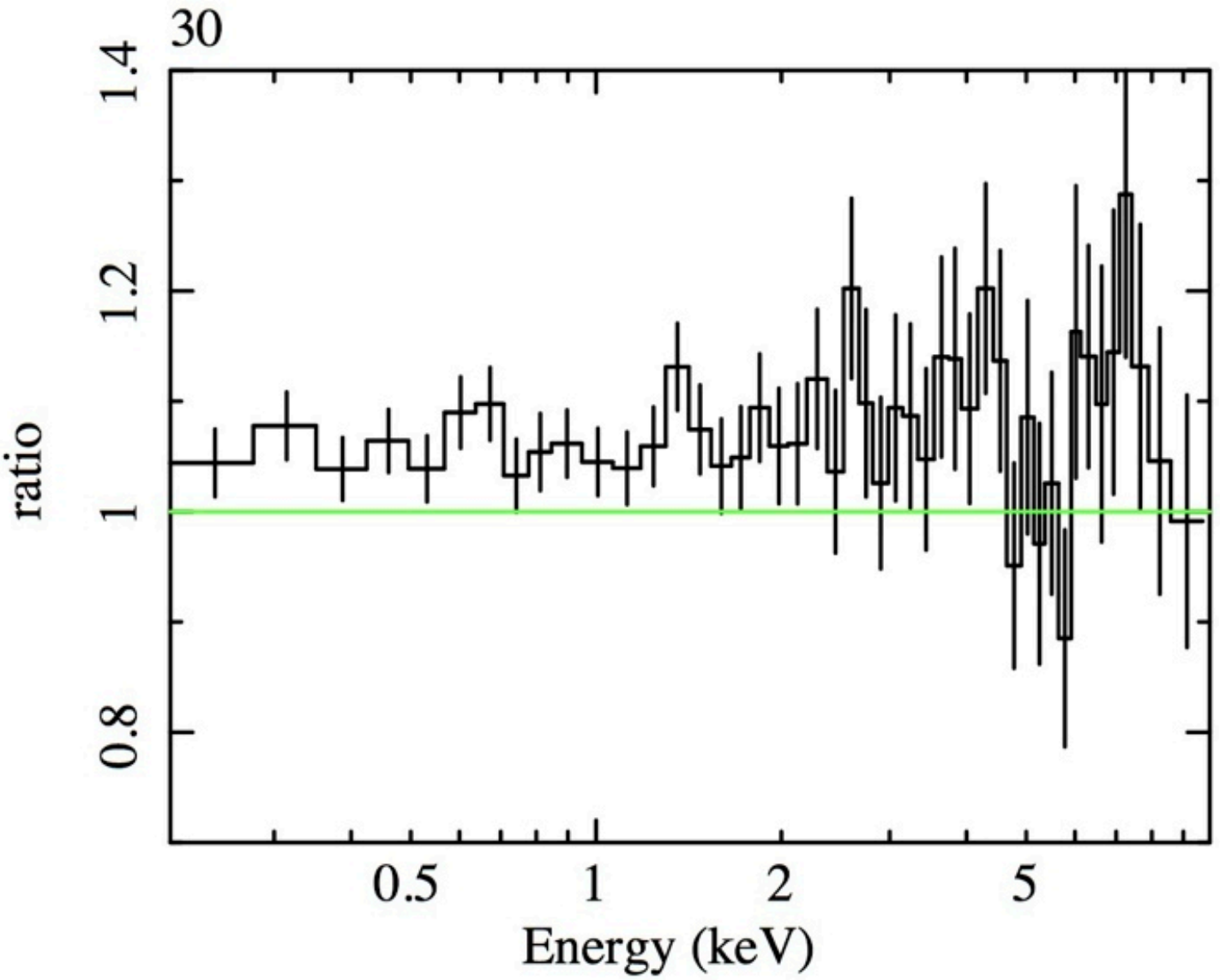

25
1.4
1.2
1
0.8
ratio
0.5
1
2
5
Energy (keV)

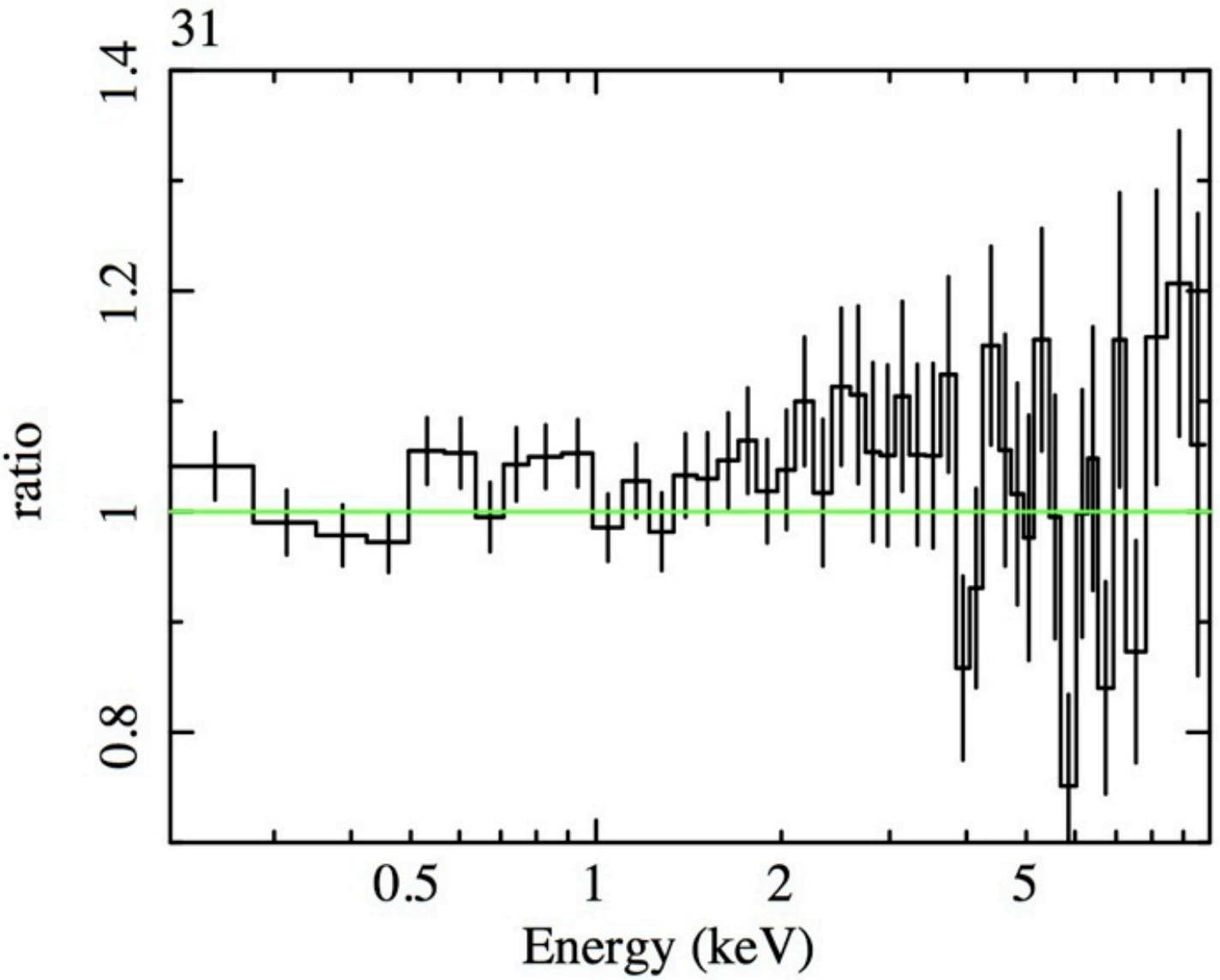

26
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

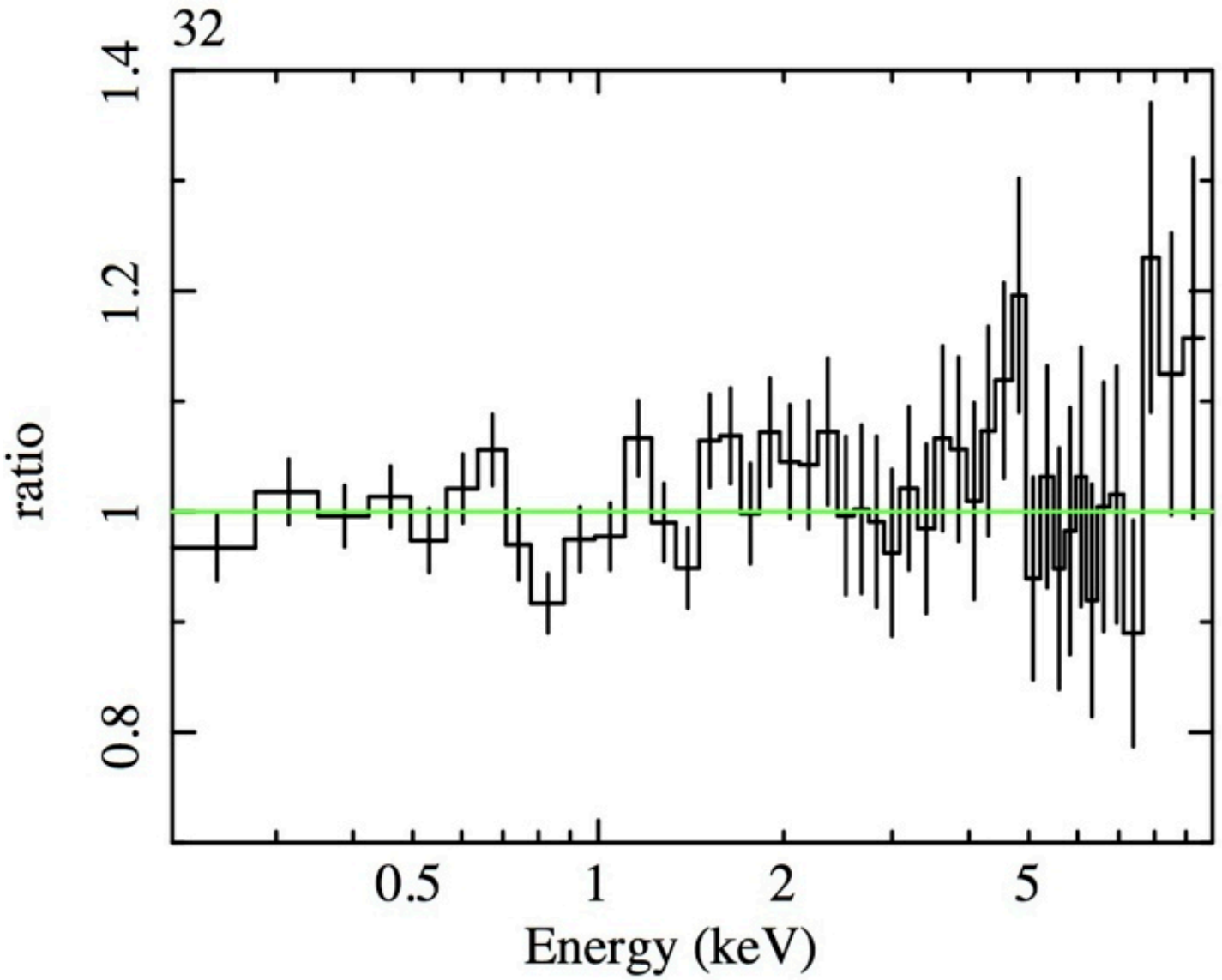

27
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

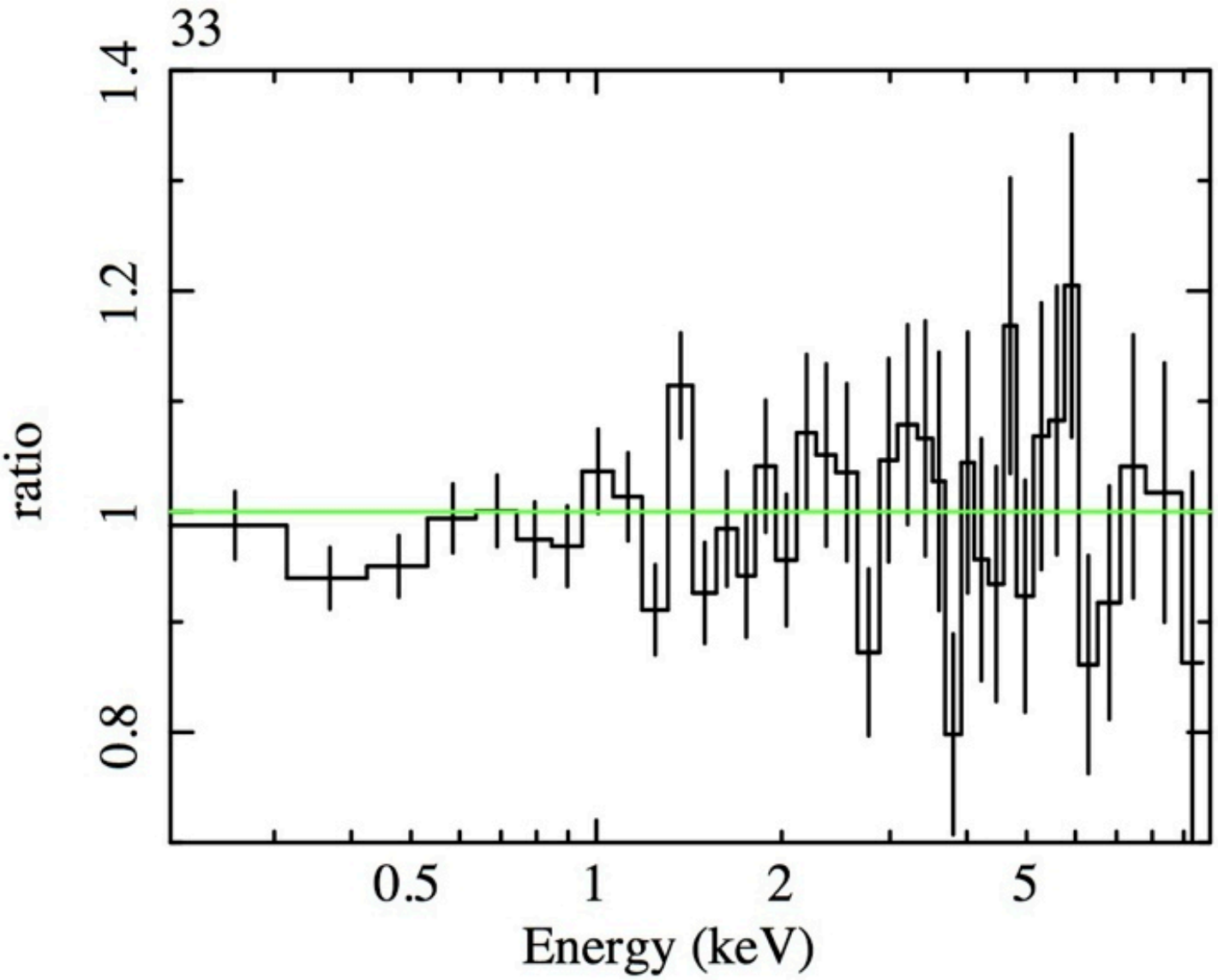

28
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)


29
ratio
0.8
1
1.2
1.4
0.5
1
2
5
Energy (keV)


30
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)


31
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)


32
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)


33
ratio
1.4
1.2
1
0.8
0.5
1
2
5
Energy (keV)

Thanks for your attention!