High-energy monitoring of NGC 4593 with XMM-Newton and NuSTAR

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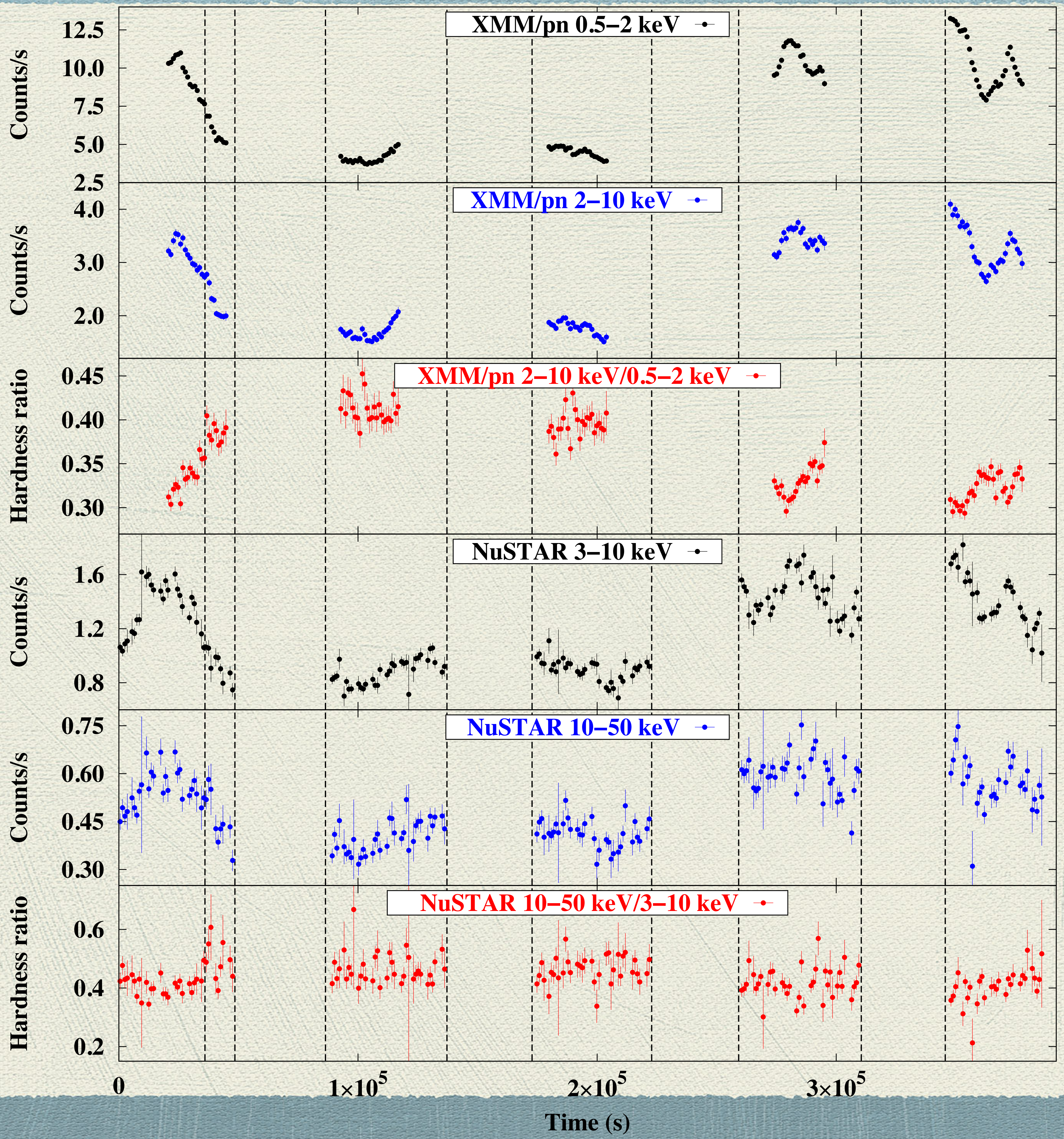
AGN 12

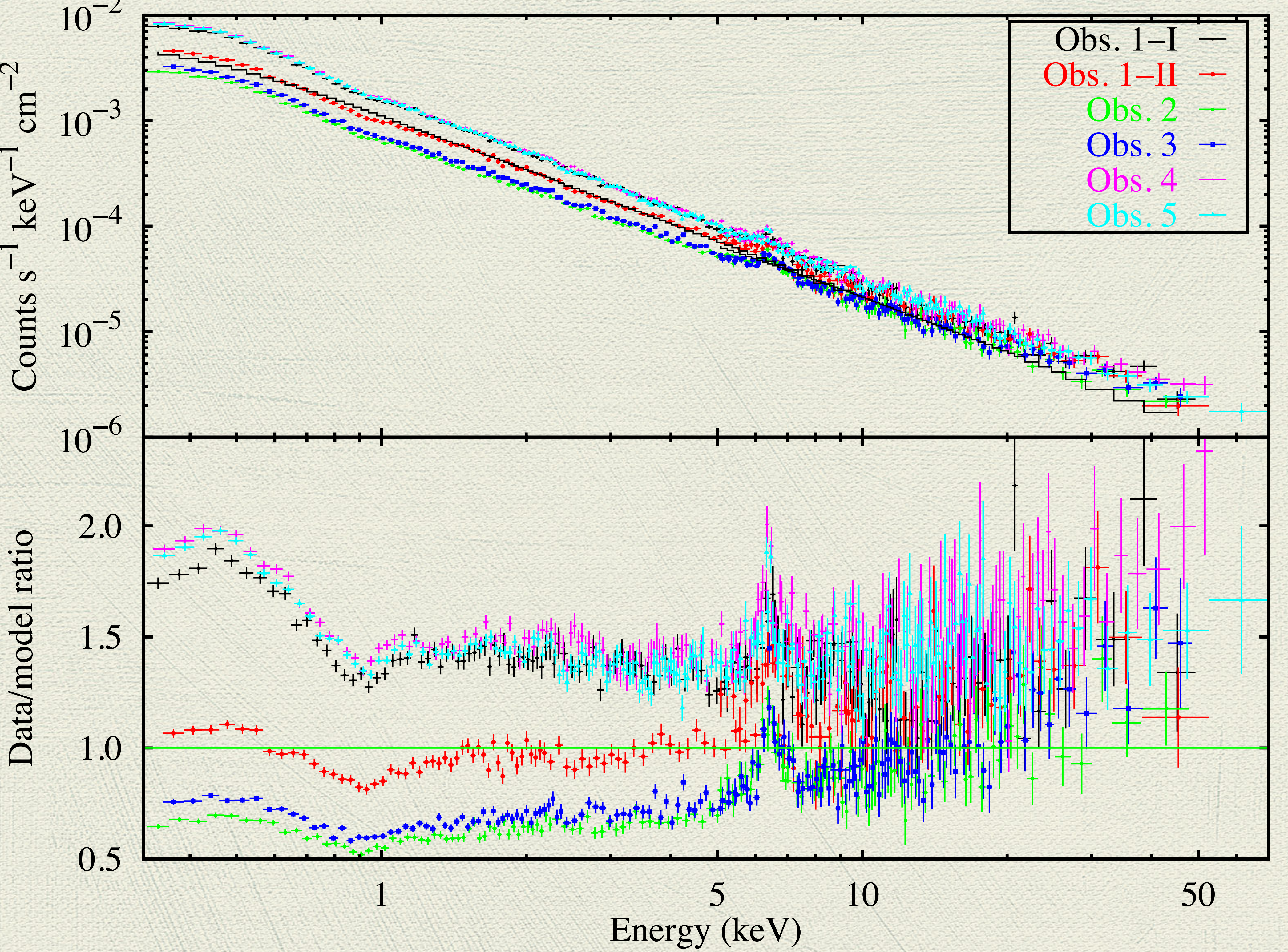
A joint XMM+NuSTAR monitoring

Obs.	Satellites	Obs. Id.	Start time (UTC) yyyy-mm-dd	Net exp. (ks)
1	*XMM–Newton*	0740920201	2014-12-29	16
	NuSTAR	60001149002		22
2	*XMM–Newton*	0740920301	2014-12-31	17
	NuSTAR	60001149004		22
3	*XMM–Newton*	0740920401	2015-01-02	17
	NuSTAR	60001149006		21
4	*XMM–Newton*	0740920501	2015-01-04	15
	NuSTAR	60001149008		23
5	*XMM–Newton*	0740920601	2015-01-06	21
	NuSTAR	60001149010		21

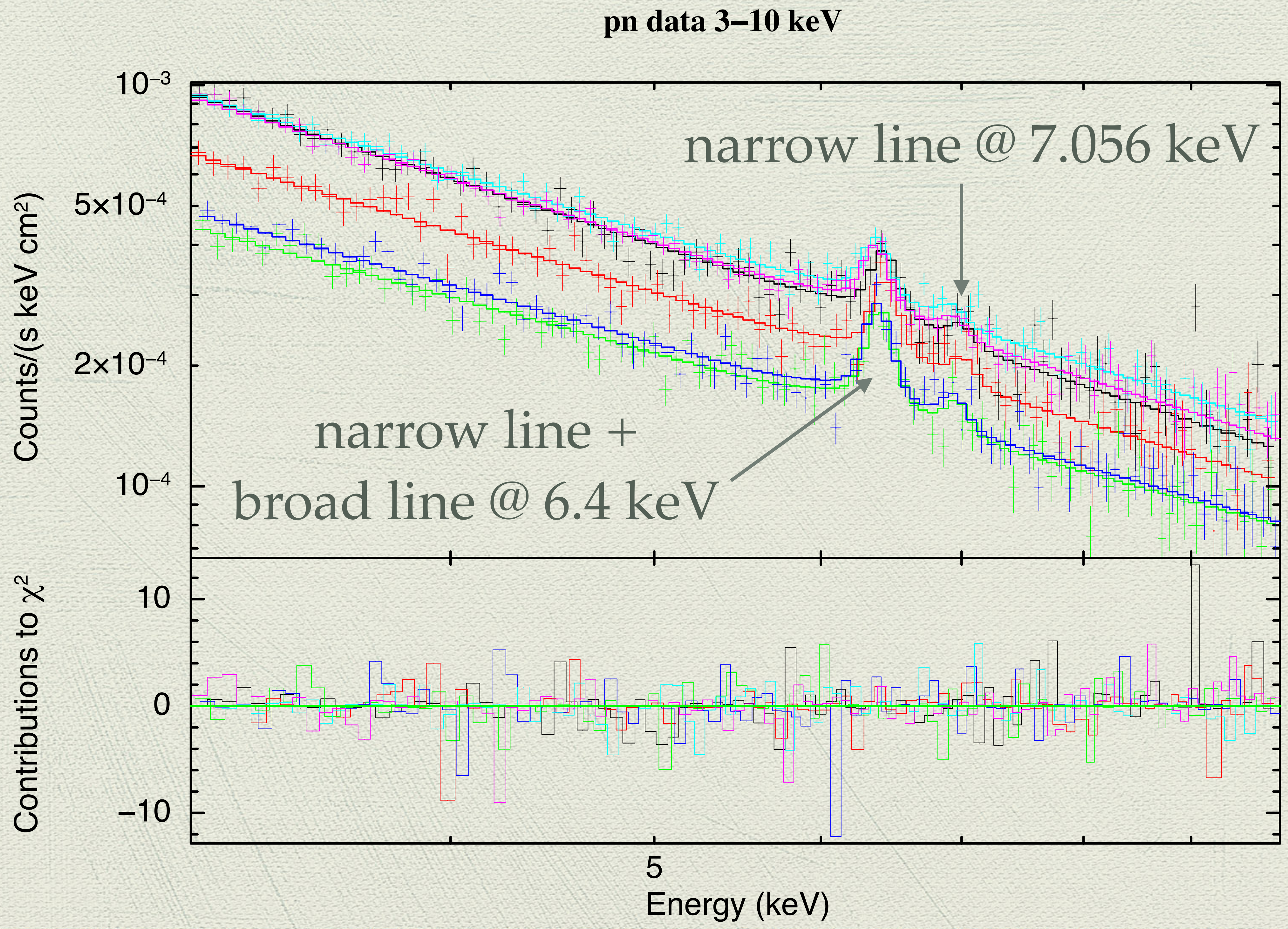
XMM/pn and NuSTAR/FPMA+FPMB light curves and hardness ratios



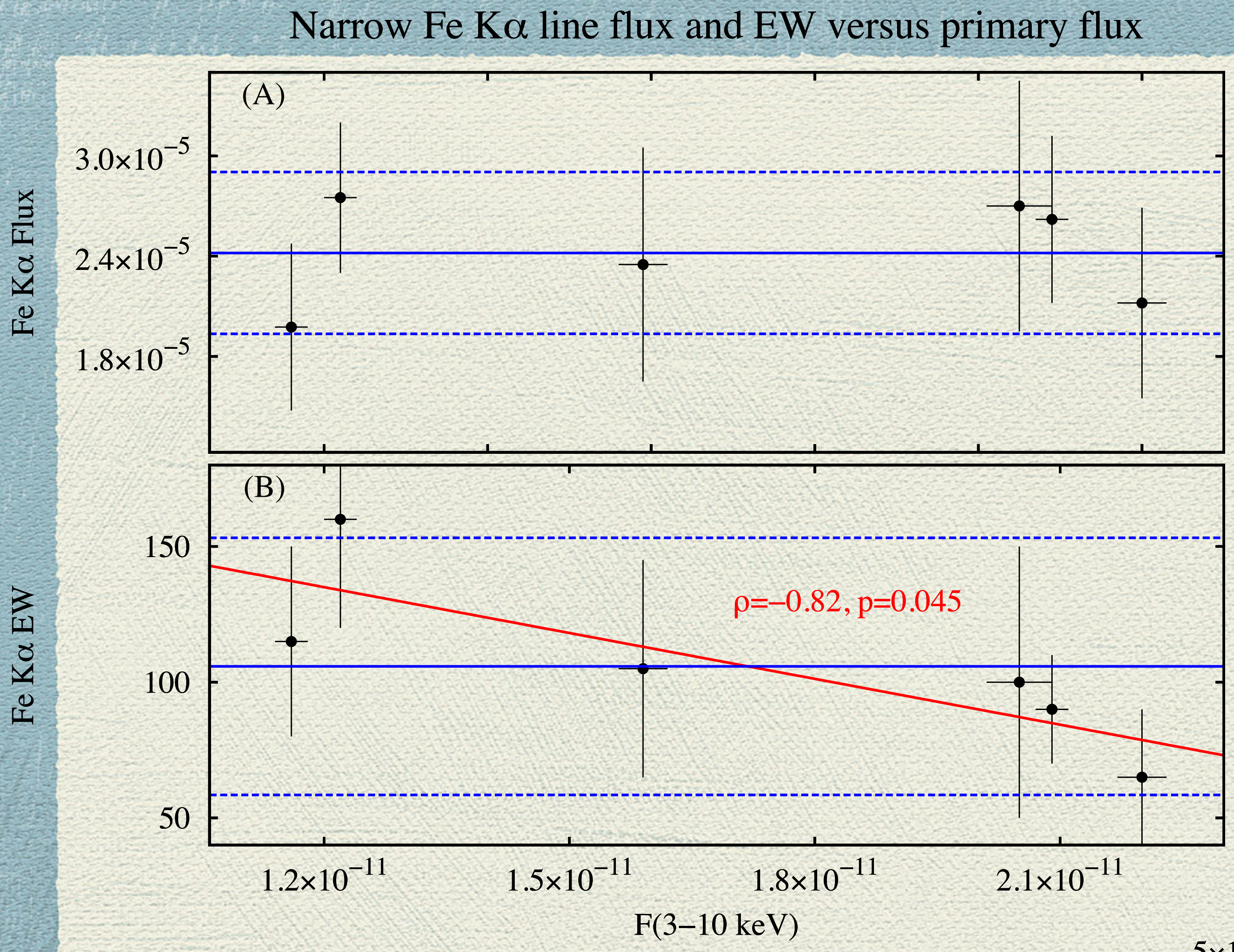
XMM/pn and NuSTAR/FPMA data fitted with a power law



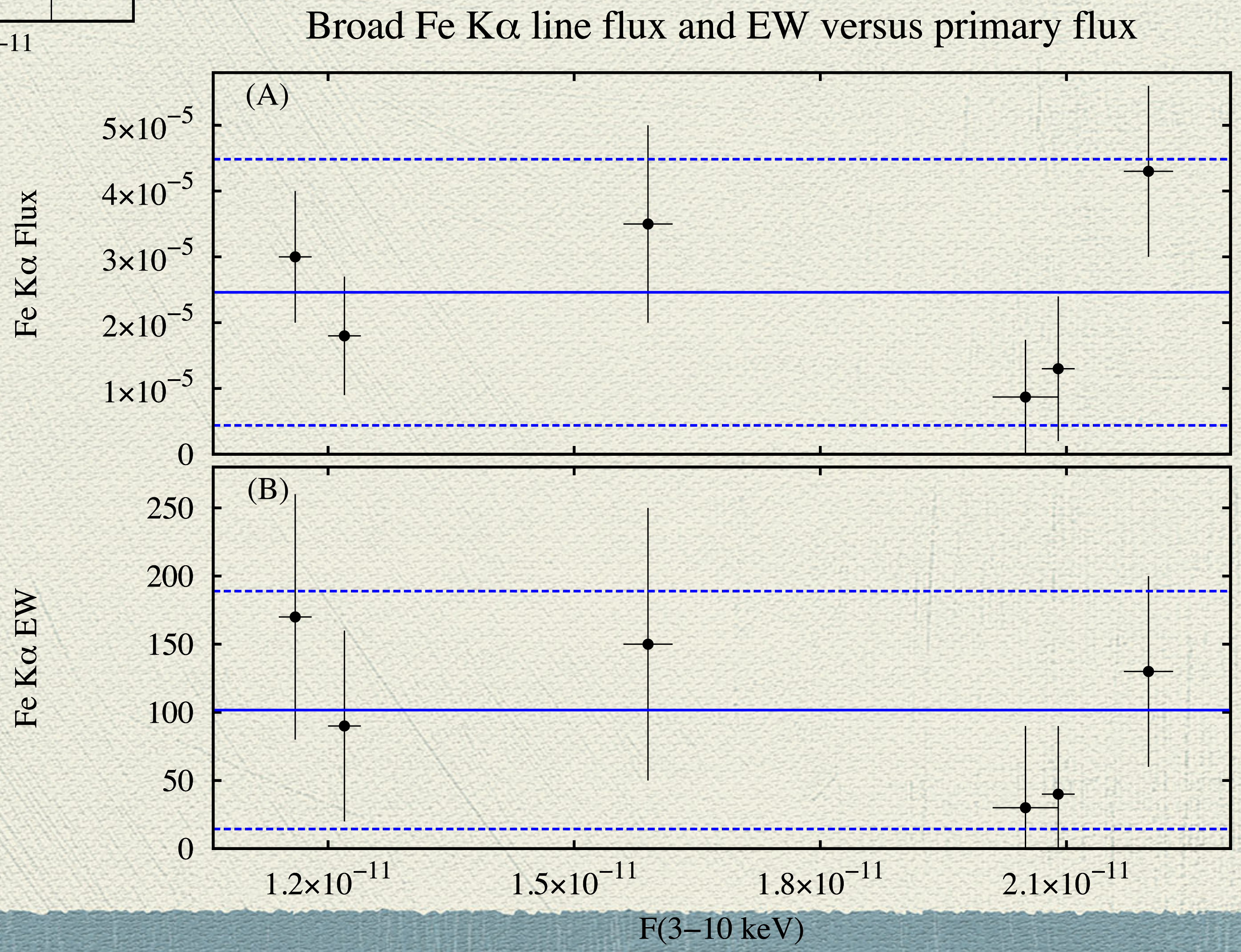
The iron line(s)

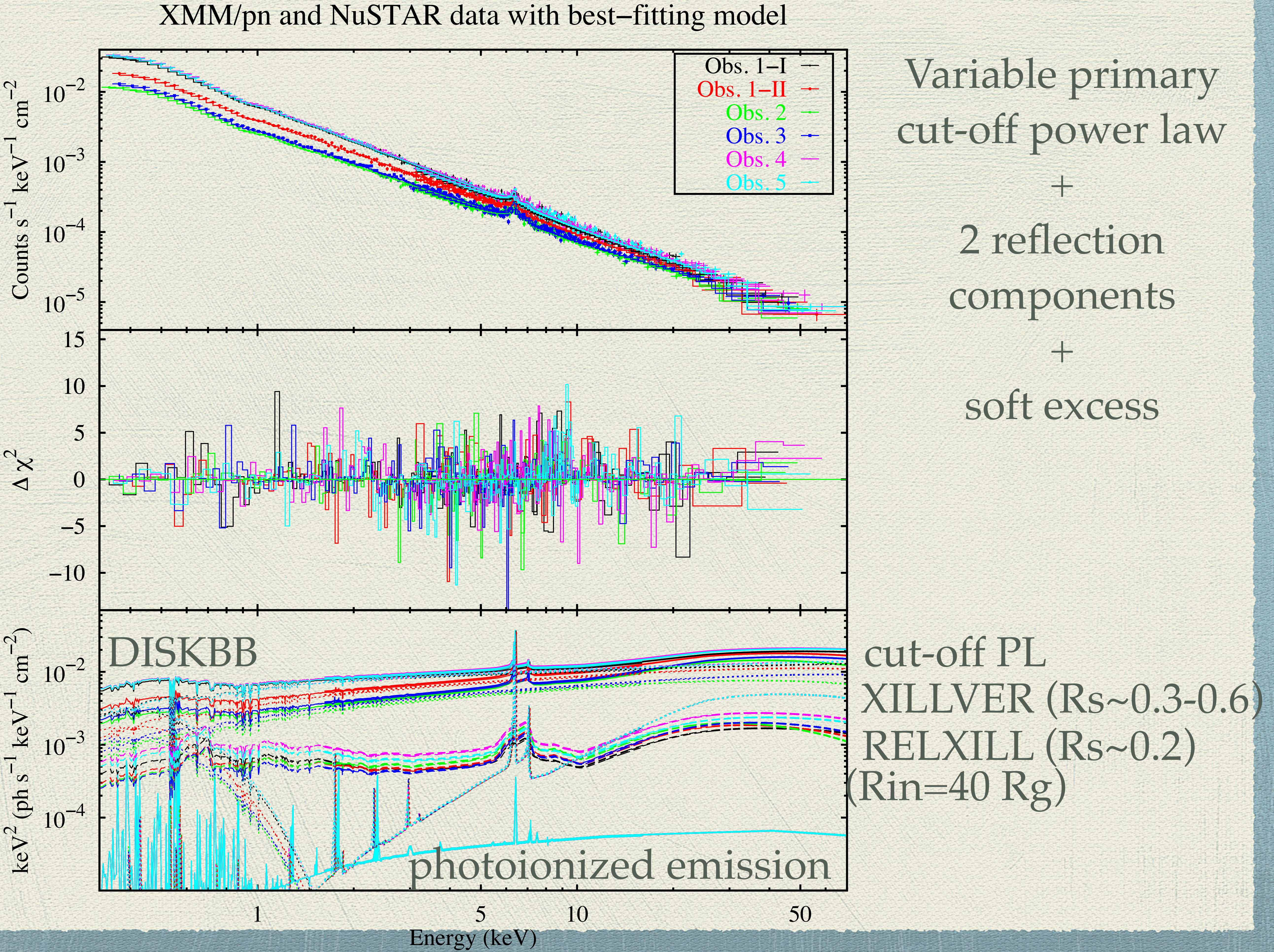


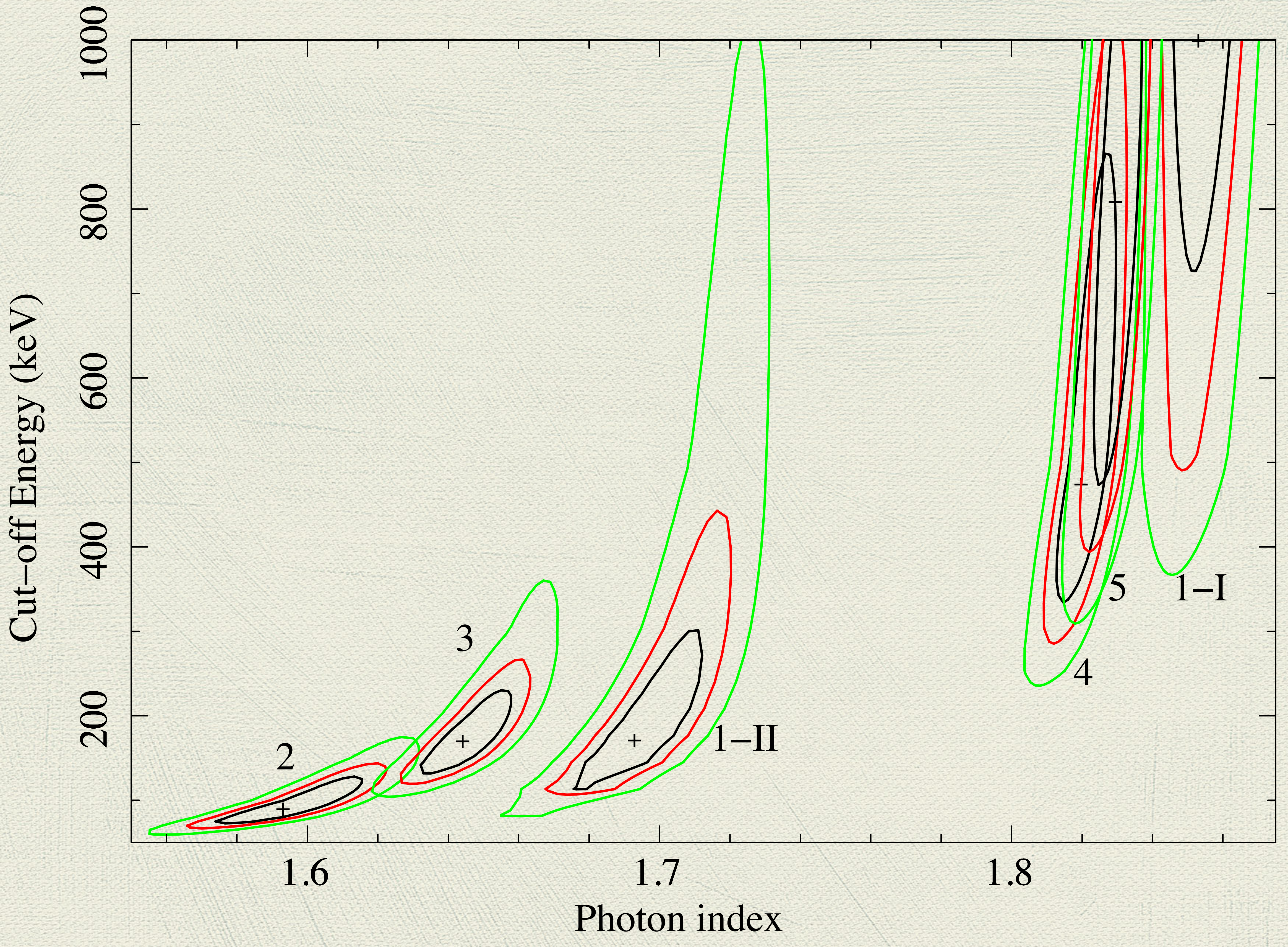
Constant narrow Fe K alpha line



E (keV)	σ (eV)	average flux	average EW (eV)
6.4 (narrow)	*0*	2.42	106
6.4 (broad)	300^{+130}_{-70}	2.36	102
7.056	*0*	0.6	30

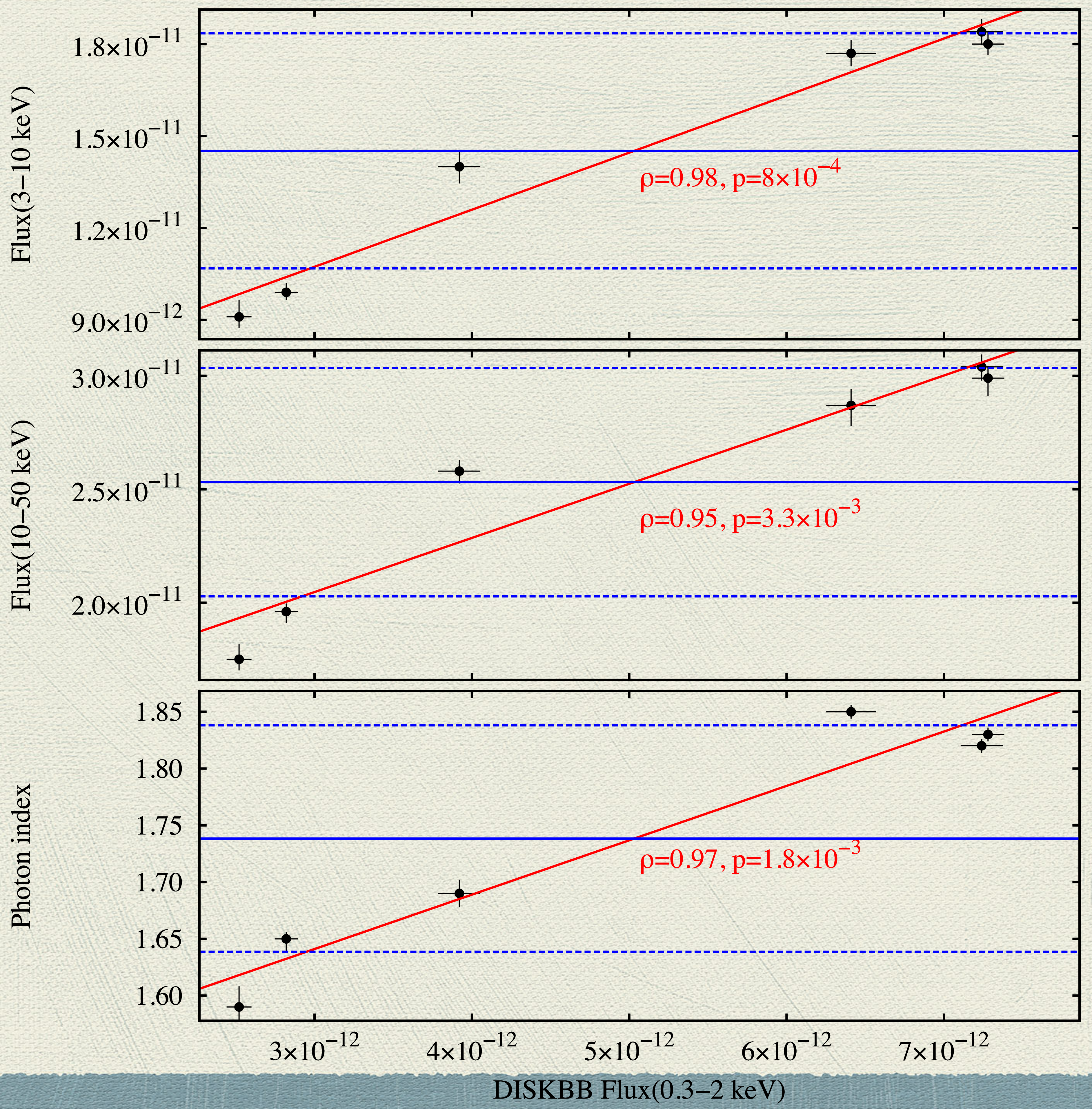



XMM/pn and NuSTAR data with best−fitting model
Obs. 1−I
Obs. 1−II
Obs. 2
Obs. 3
Obs. 4
Obs. 5
Counts s^{-1} keV^{-1} cm^{-2}
$\Delta\chi^2$
keV^2 (ph s^{-1} keV^{-1} cm^{-2})
Energy (keV)
DISKBB
photoionized emission
Variable primary
cut-off power law
+
2 reflection
components
+
soft excess
cut-off PL
XILLVER (Rs~0.3-0.6)
RELXILL (Rs~0.2)
(Rin=40 Rg)

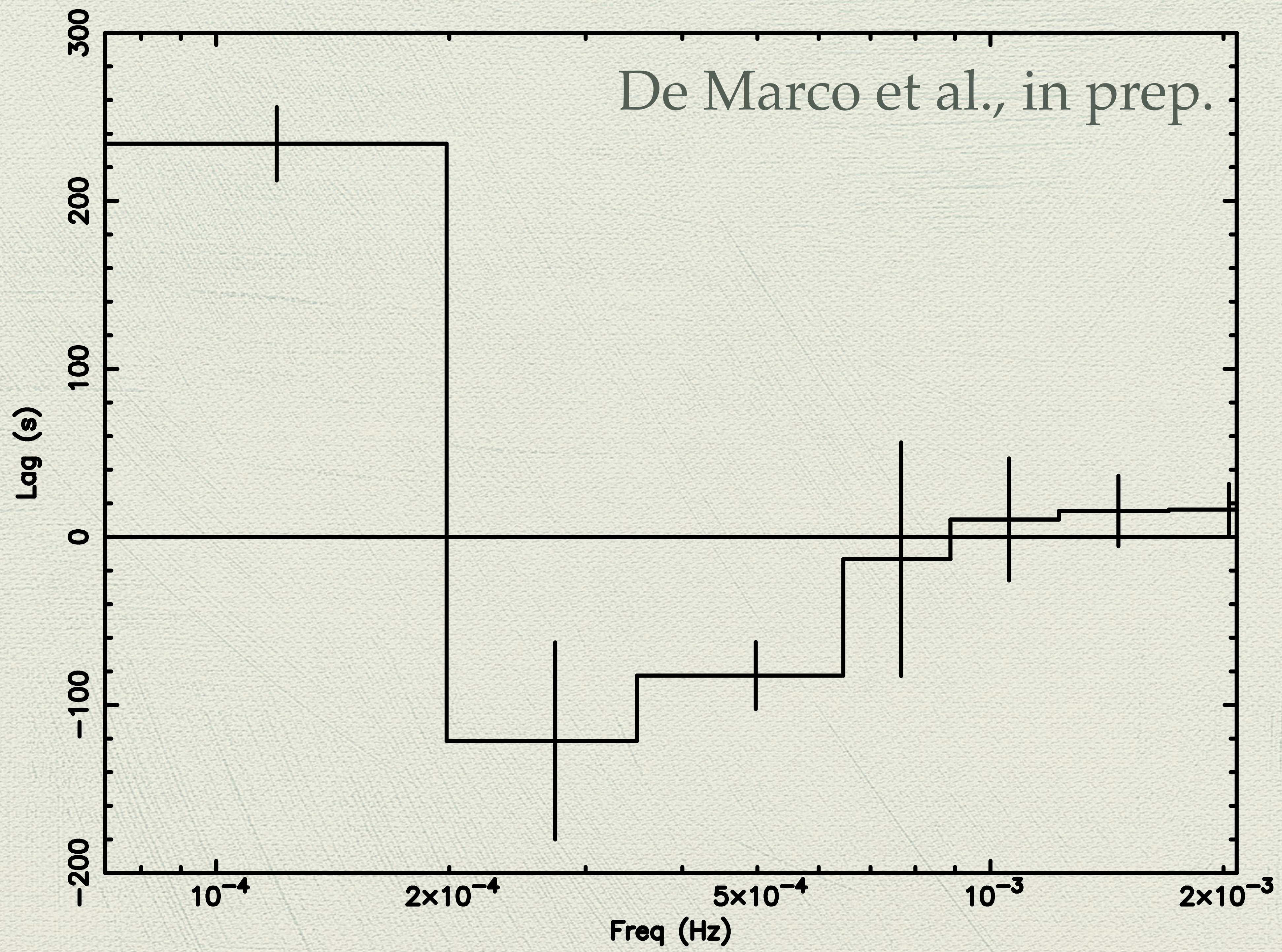


Cut−off Energy (keV)
1000
800
600
400
200
1.6
1.7
1.8
Photon index
2
3
1−II
4
5
1−I

Correlation between soft excess and primary emission



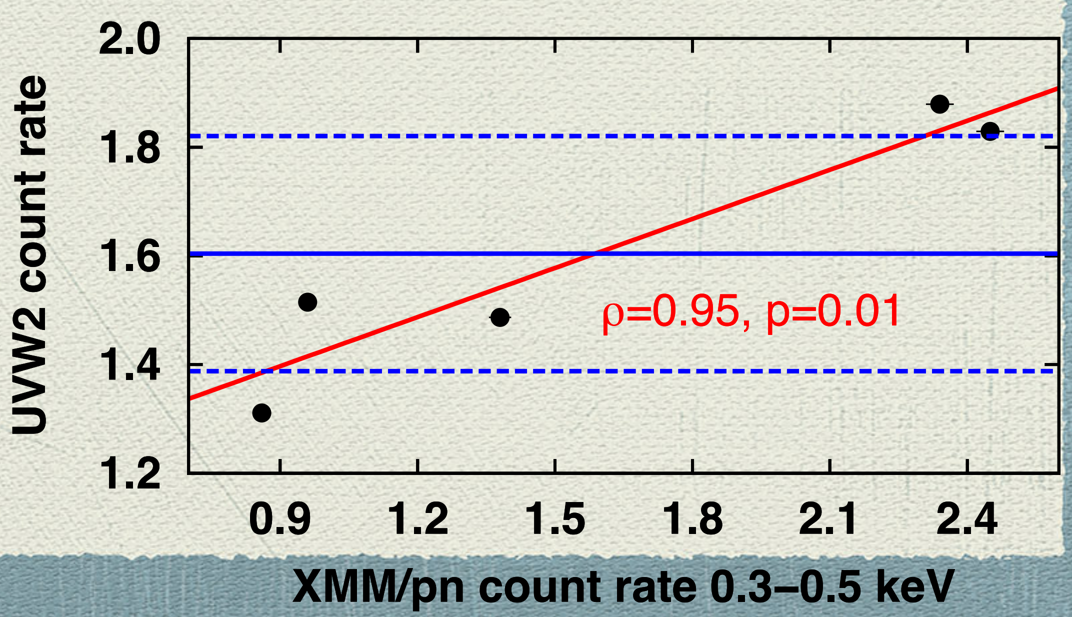
Timing



De Marco et al., in prep.
Lag (s)
300
200
100
0
−100
−200
10^{-4}
2×10^{-4}
5×10^{-4}
10^{-3}
2×10^{-3}
Freq (Hz)

Main results

- Remarkable variability, both in flux and spectral shape over ~days and down to ~ks
- Significant variations of Gamma (1.6-1.8) and cut-off (~100 keV up to >500 keV): temperature/optical depth variations?
- 2 reflection components, giving rise to a narrow and a broad Fe K alpha lines. One (XILLVER) is from neutral and distant matter, one (RELXILL) from an ionized disc with Rin~40 Rg
- Soft excess correlated with primary emission: warm Comptonization? Link with the UV? (in progress) →



- See Ursini et al. 2016, MNRAS, 463, 382