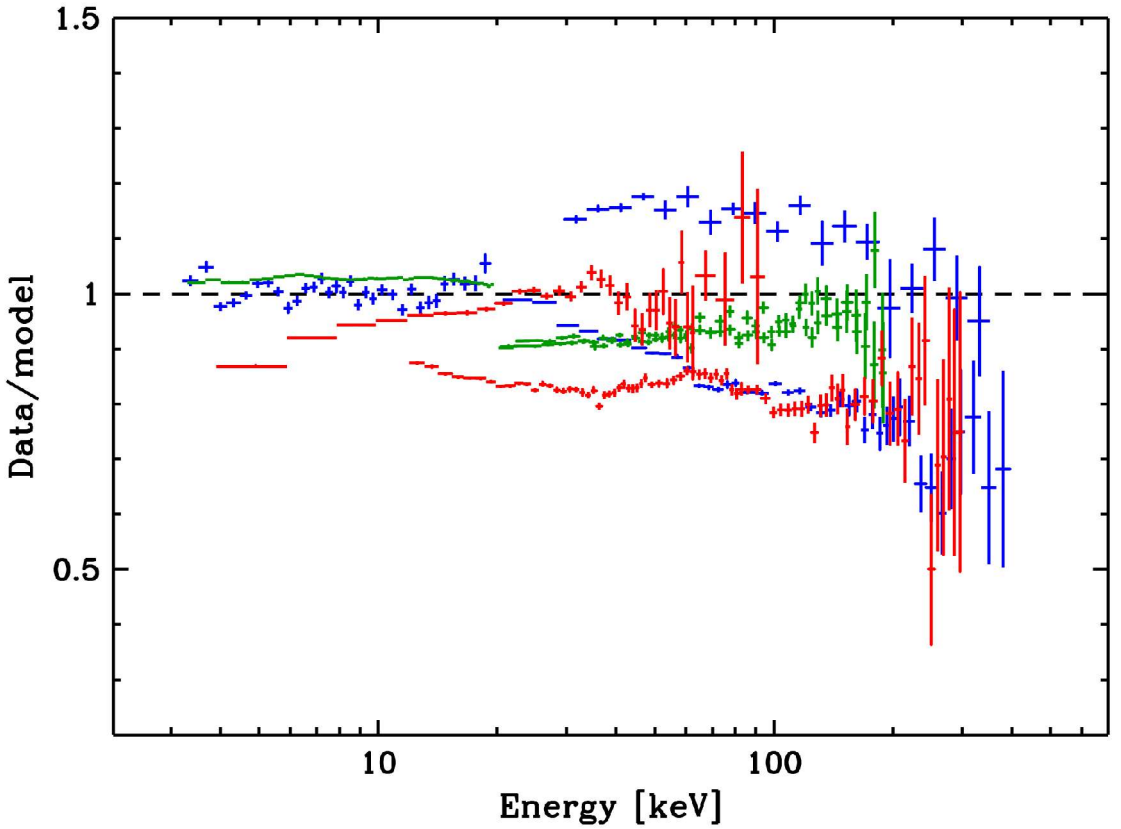
INTEGRAL cross-calibration

Status for OSA 4.2

P. Lubi?ski (CAMK, Warsaw & ISDC), P. Dubath (ISDC),
P. Kretschmar (MPI, Garching & ESAC), I. Kreykenbohm (IAAT, Tuebingen & ISDC),
N. Produit (ISDC), R. Walter (ISDC)



Crab canonical model

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The Crab Nebula as a calibration source for x-ray astronomy

A. Toor and F. D. Seward

Lawrence Livermore Laboratory, University of California, Livermore, California 94550

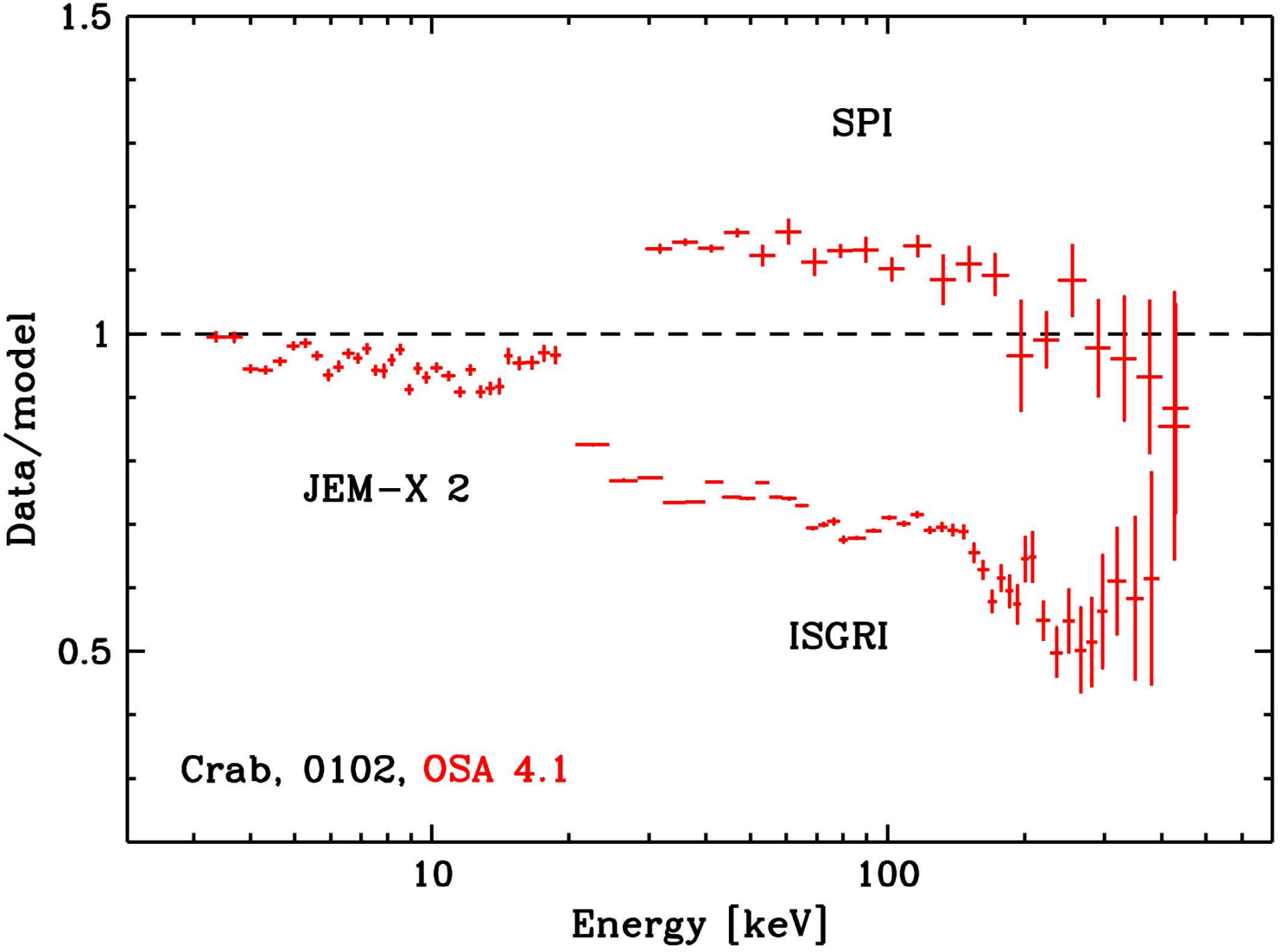
(Received 10 June 1974)

A new high-quality observation of the 2- to 60-keV spectrum of the Crab Nebula is presented. Previous x-ray spectral measurements are critically reviewed and compared with this new measurement. Within the accuracy of the observations, which span a period of eight years, the Crab can be considered a steady x-ray source, producing a constant spectrum suitable for checking the response of x-ray instruments.

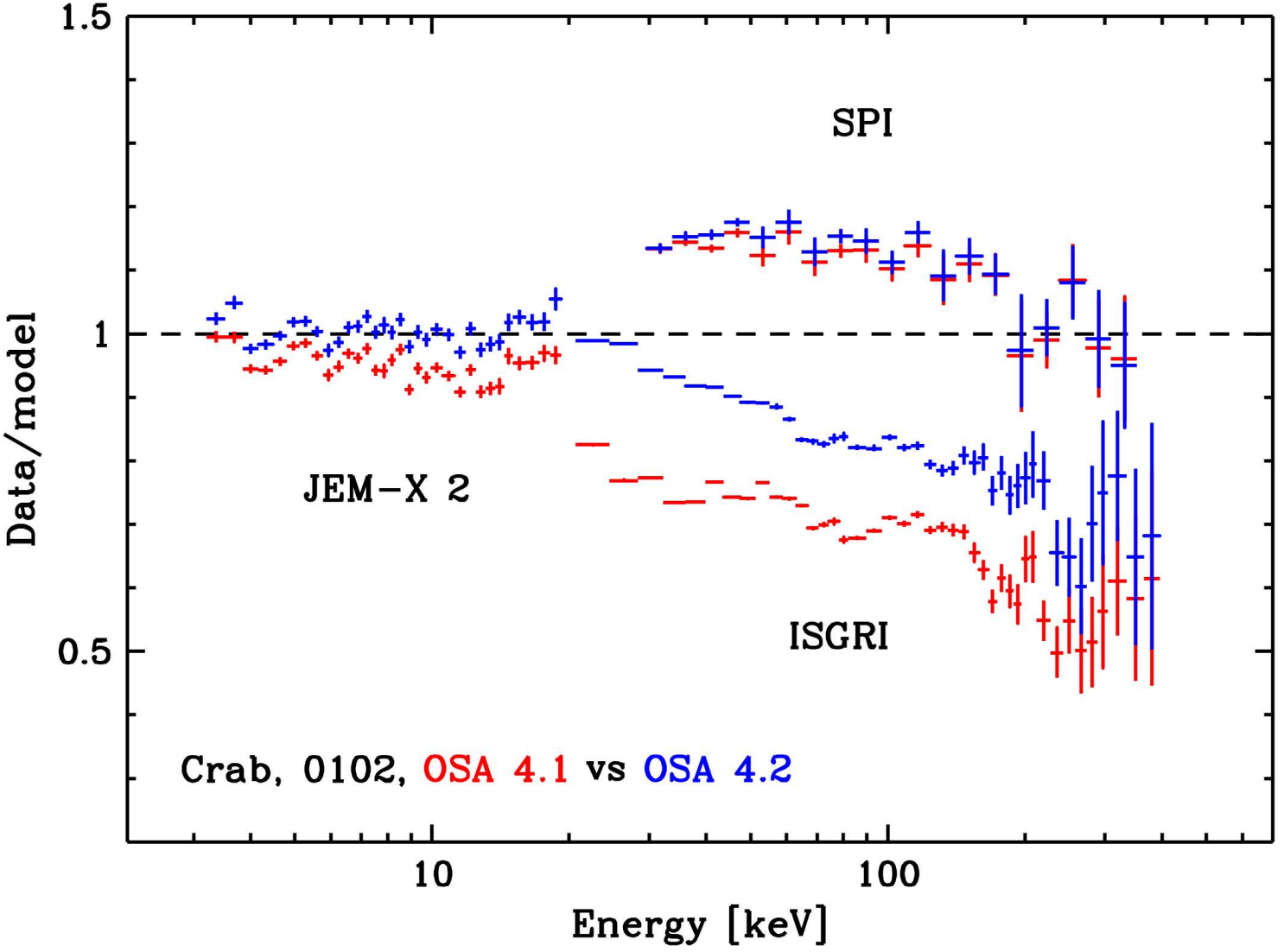
2-60 keV, spectral index: 2.1, normalization at 1 keV: 9.7

N_H: 0.285×10^{22}

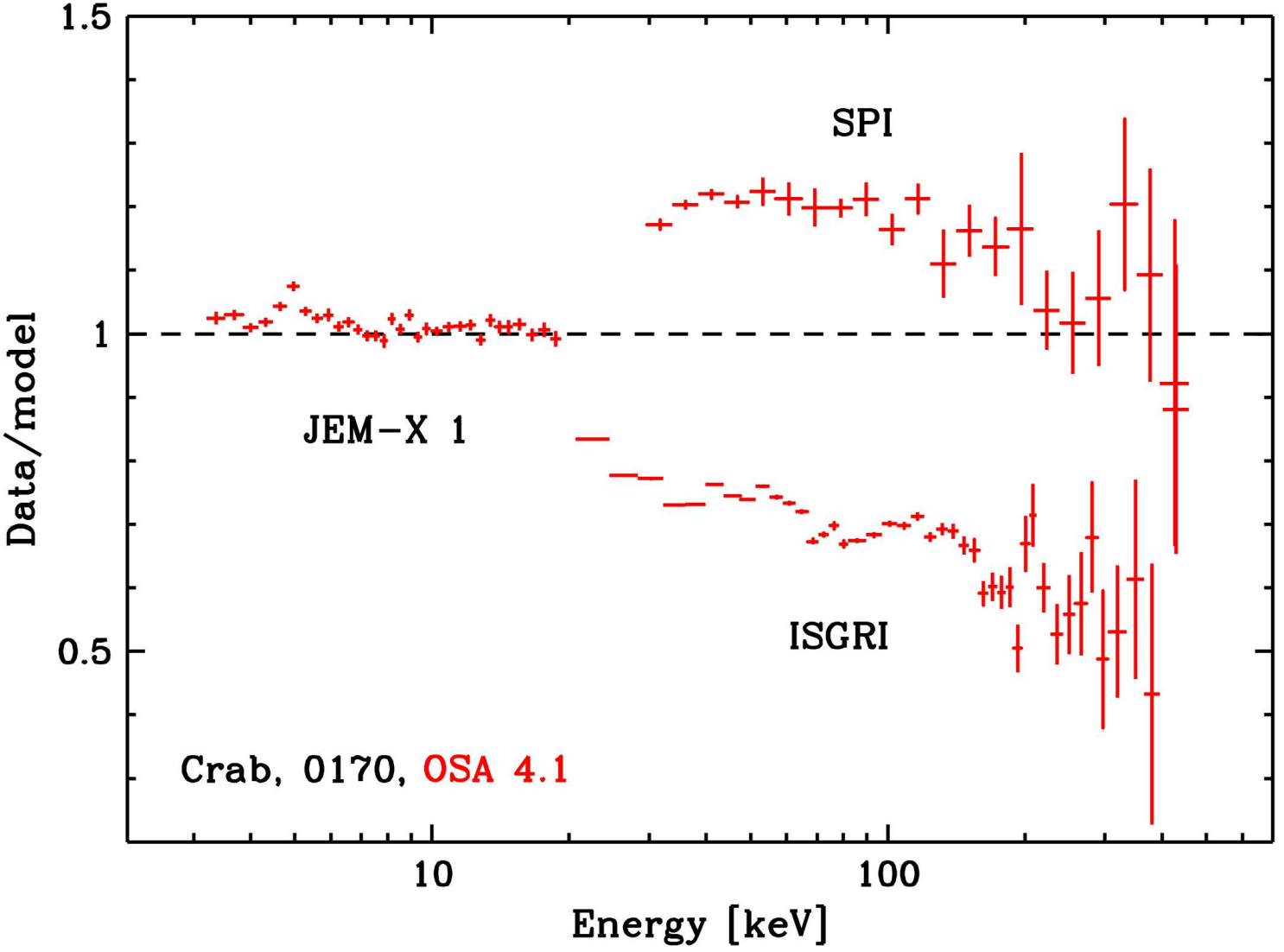
OSA 4.1


1.5
1
0.5
Data/model
SPI
JEM−X 2
ISGRI
Crab, 0102, OSA 4.1
10
100
Energy [keV]

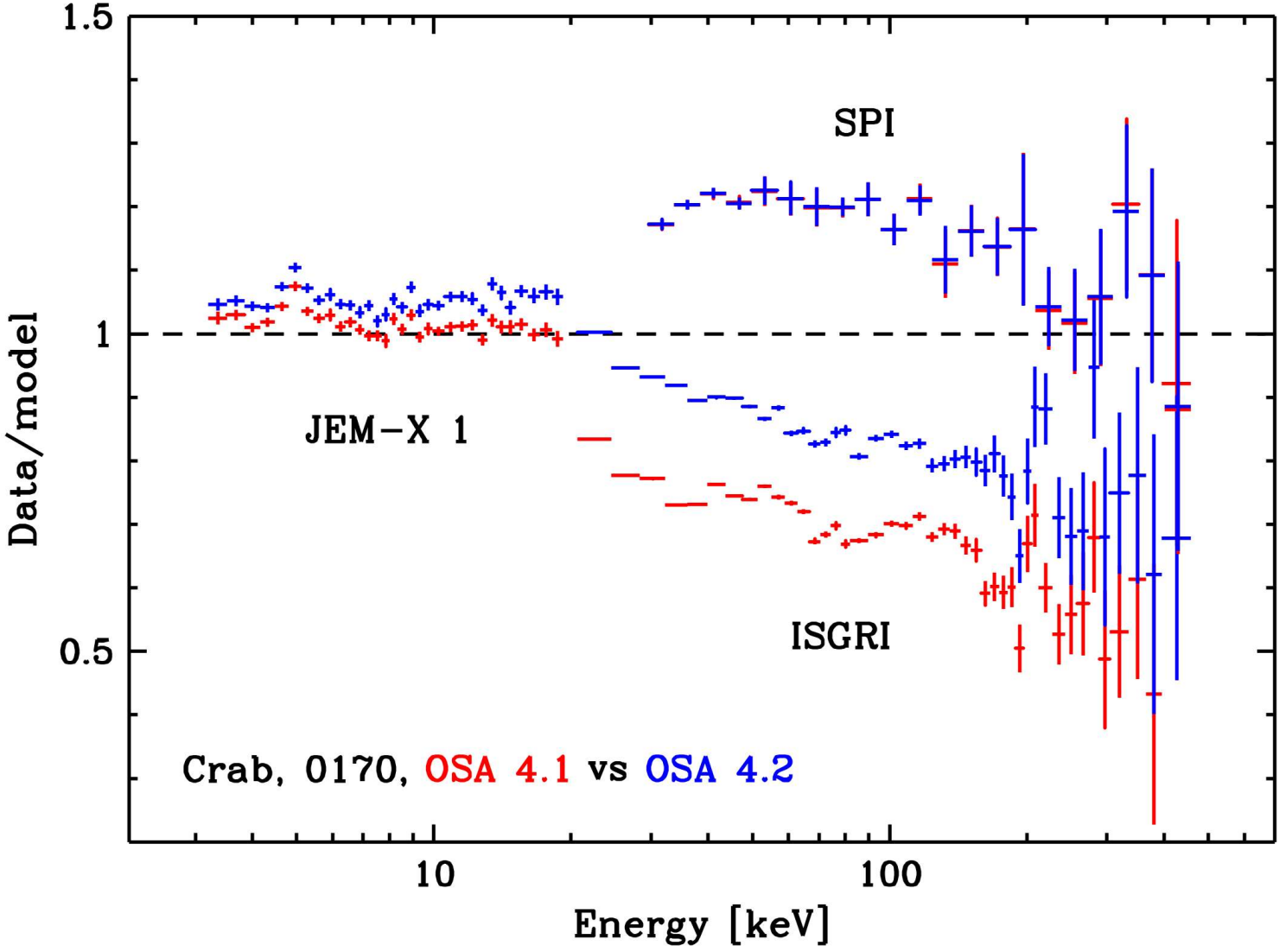
OSA 4.1 and OSA 4.2



OSA 4.1


1.5
1
0.5
Data/model
SPI
JEM−X 1
ISGRI
Crab, 0170, OSA 4.1
10
100
Energy [keV]

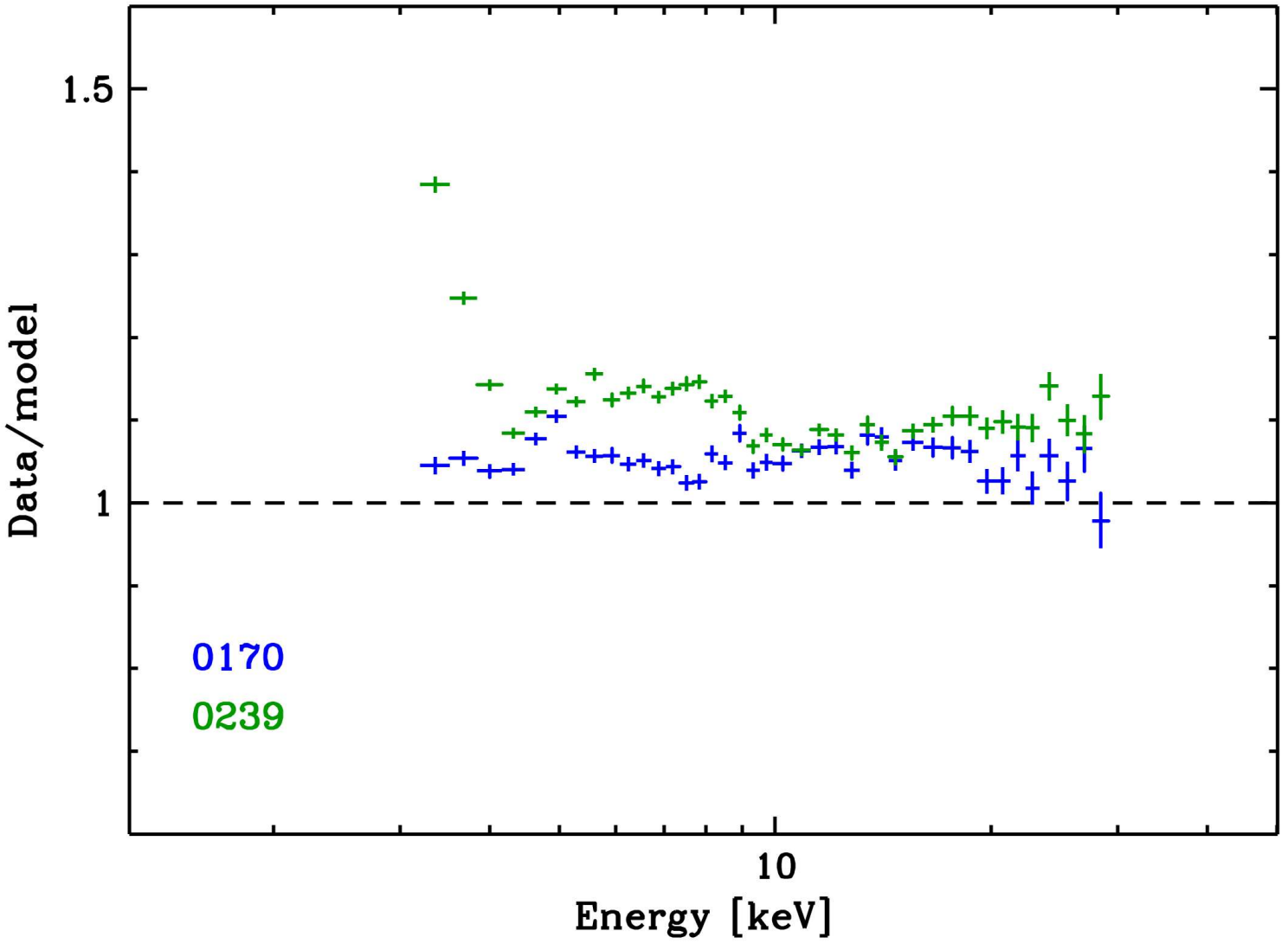
OSA 4.1 and OSA 4.2



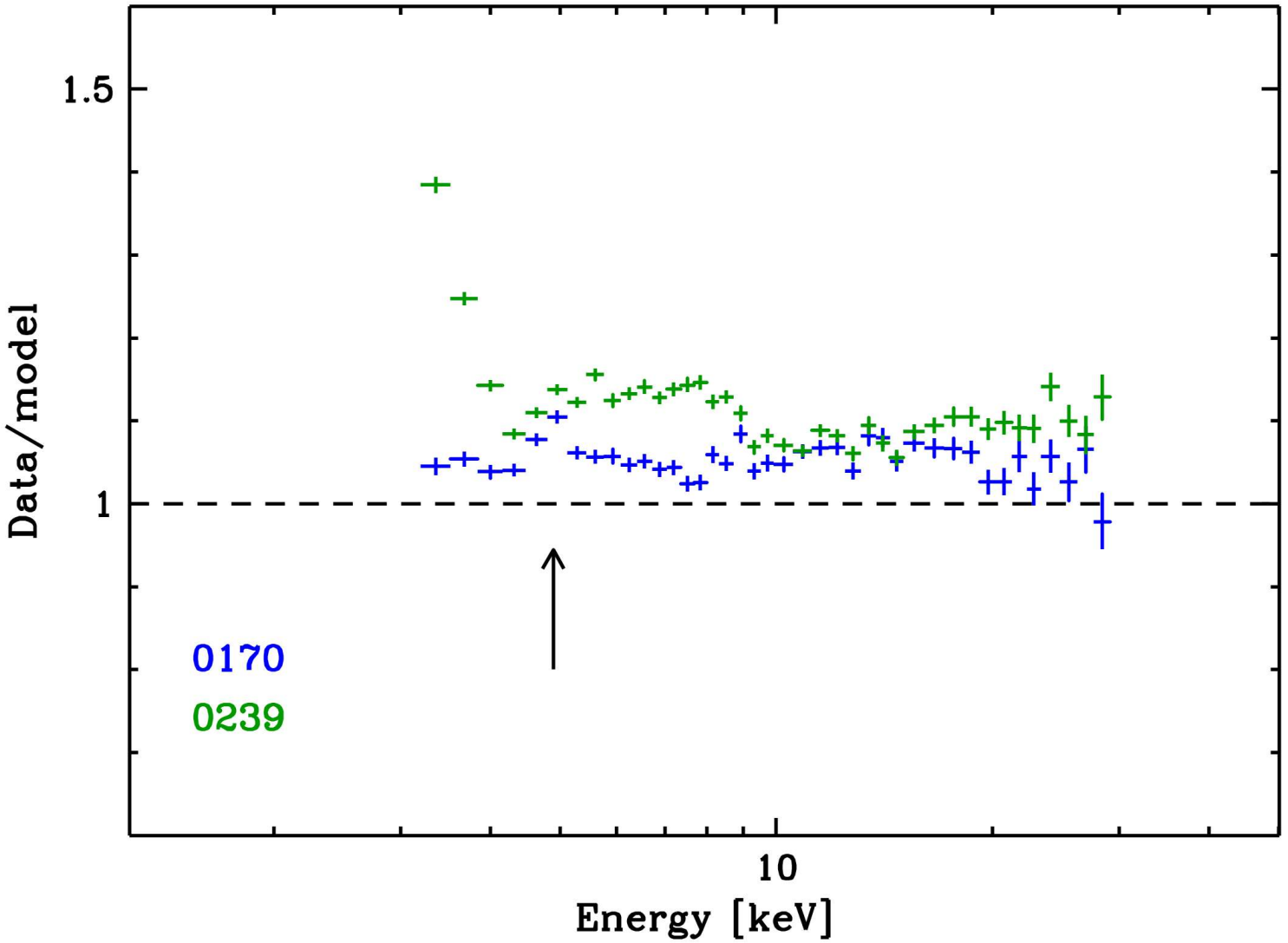
OSA 4.1 and OSA 4.2 in numbers (power law fit)

Fitted parameters	0102			0170		
	Norm	Index	χ2/NDF	Norm	Index	χ2/NDF
JEM-X1	-	-	-	1	2.12	3.7
JEM-X1	-	-	-	0.99	2.09	-
JEM-X2	1	2.13	4.9	-	-	-
JEM-X2	1.0	2.10	-	-	-	-
ISGRI	1	2.20	36.6	1	2.22	35.1
ISGRI	1.40	2.24	-	1.28	2.23	-
SPI	1	2.12	2.2	1	2.11	2.5
SPI	0.98	2.12	-	1.0	2.11	-

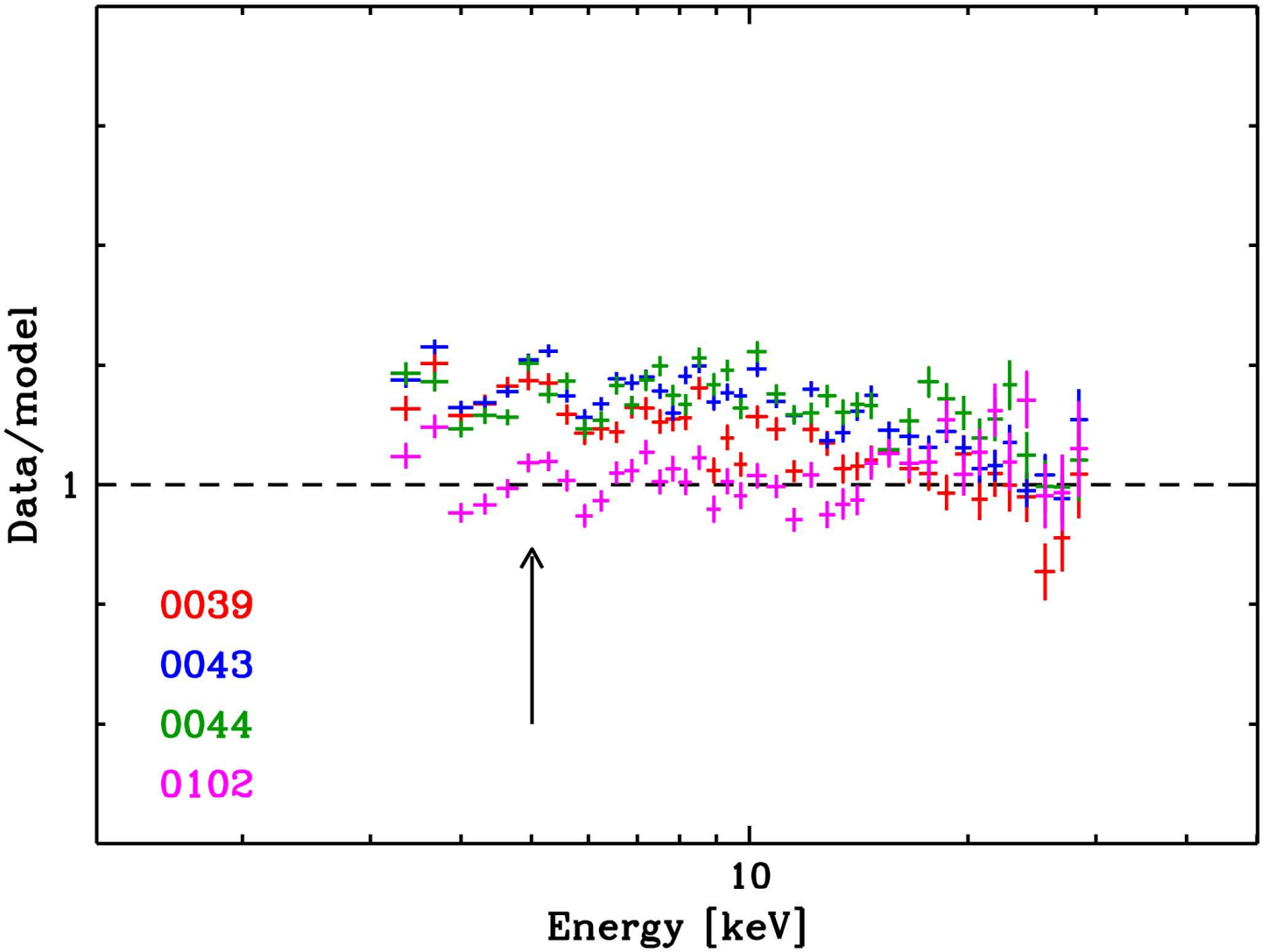
JEM-X 1 Crab spectra



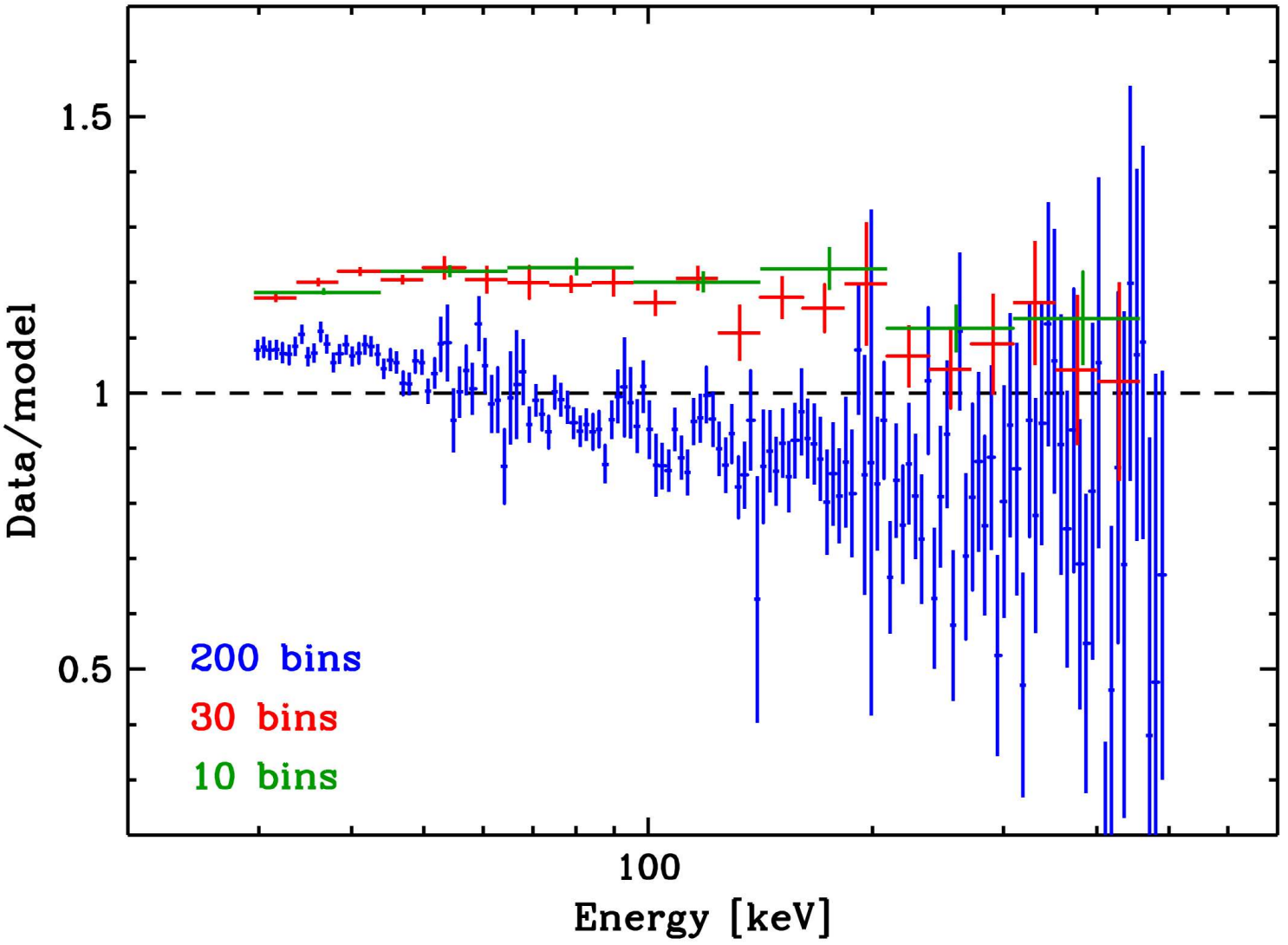
JEM-X 1 Crab spectra



JEM-X 2 Crab spectra



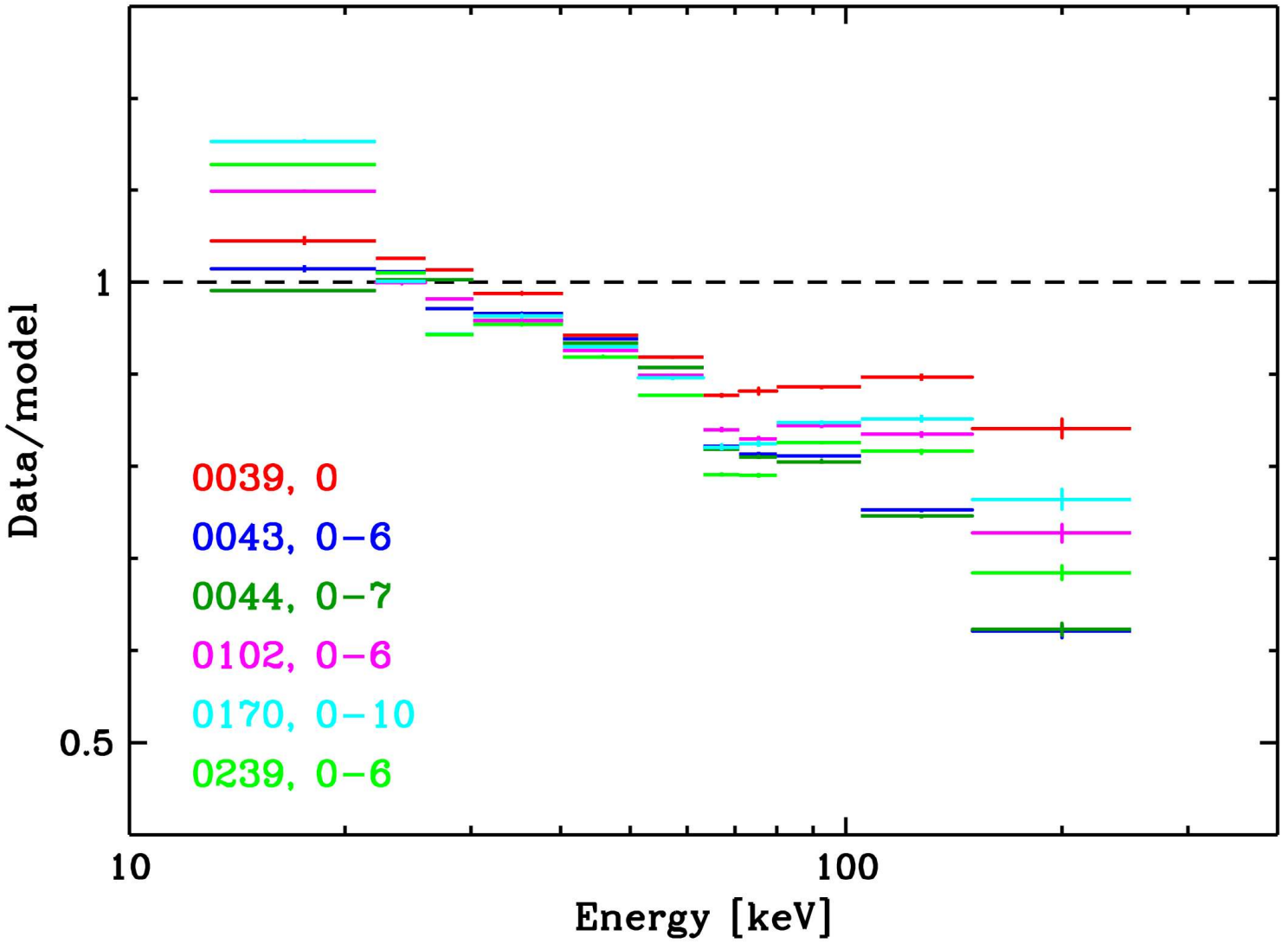
SPI energy binning



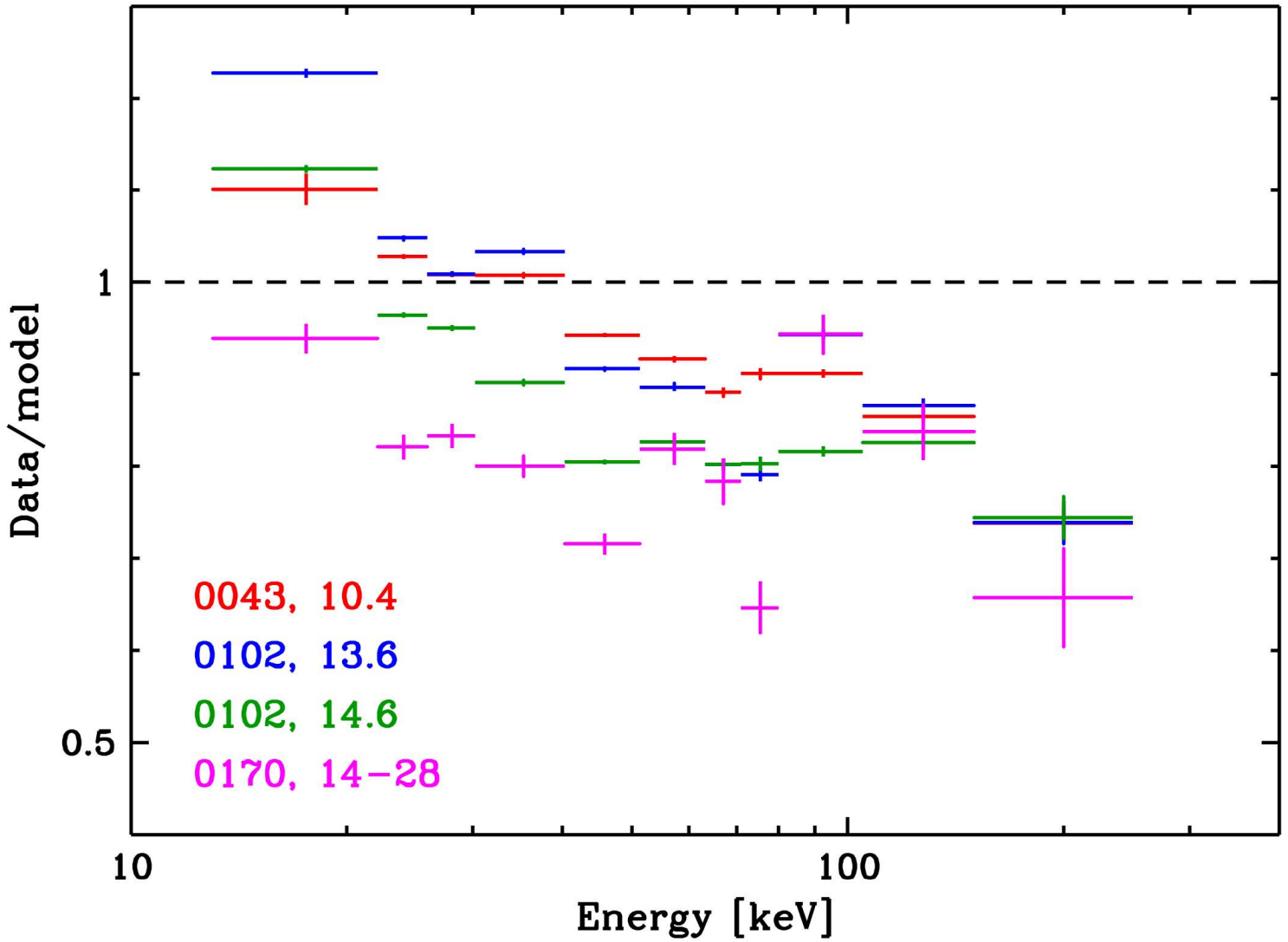
Spectral index	2.25	2.14	2.13
40-400 keV flux (photons)	0.135	0.150	0.152

ISGRI, Crab spectra

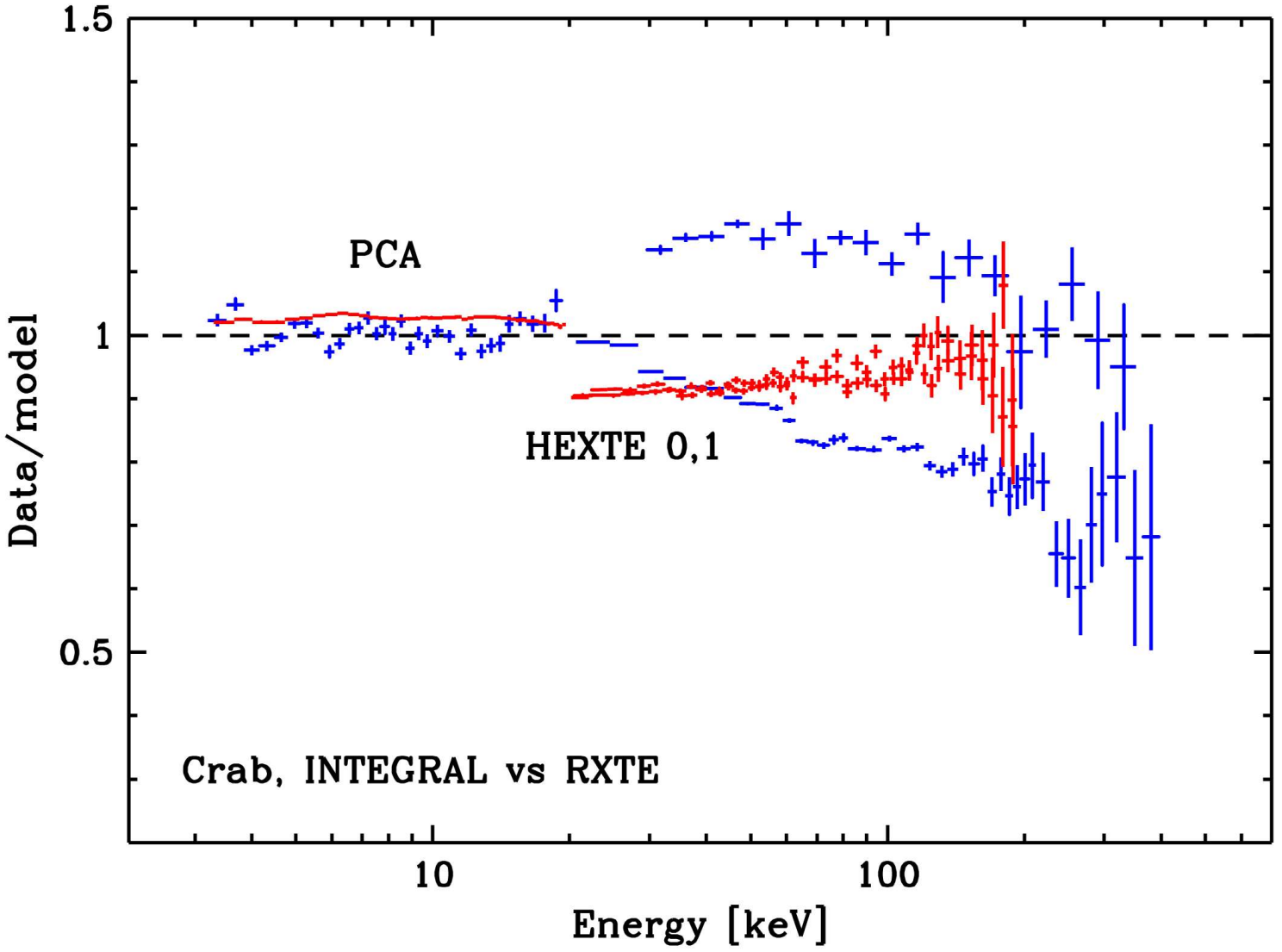
Spread of systematic effects



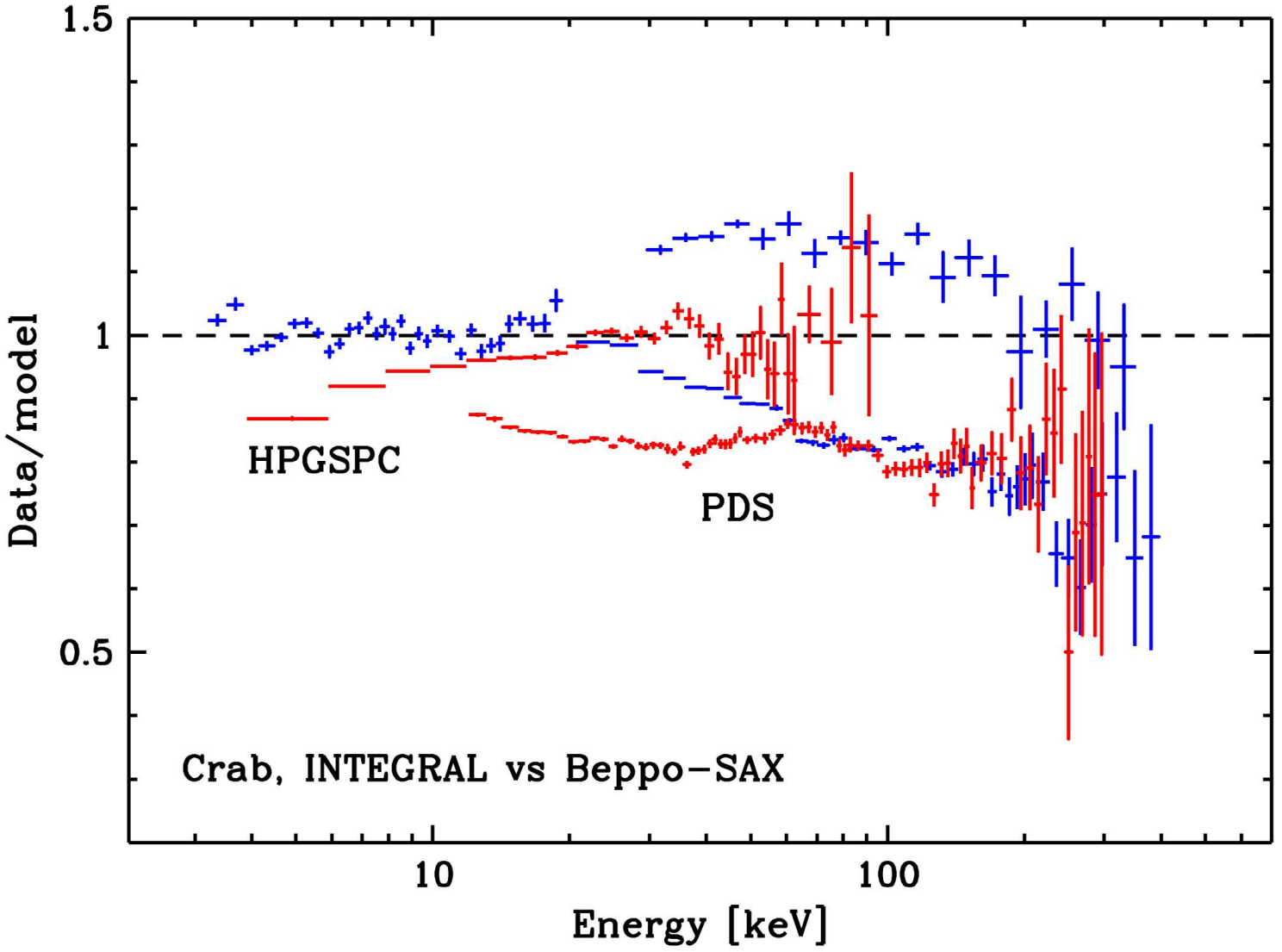
ISGRI, large offset angles spectra



Comparison with RXTE



Comparison with Beppo-SAX



CONCLUSIONS

JEM-X

- absolute normalization differences
- some systematic features

SPI

- binning dependence

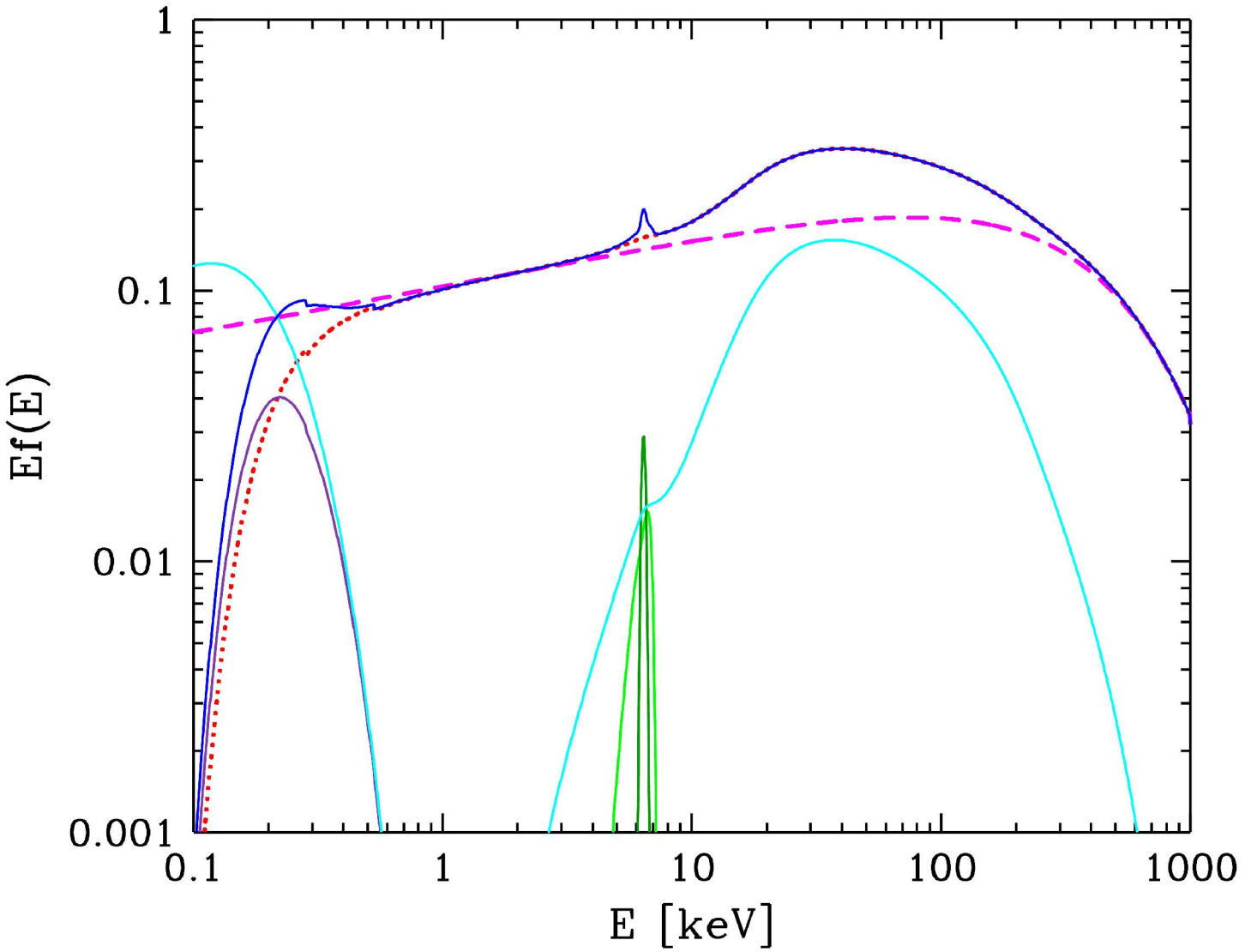
ISGRI

- absolute normalization
- spectral slope
- snake-like features

Systematic effects in spectra must be corrected before high precision calibration

INTEGRAL for AGN's

smooth spectra at lower energies, < 100 keV
sensitivity at higher energies, 0.1-1 MeV



ISGRI, possible improvements

- better event selection (noisy pixels)

- revision of rise time correction

- well established, time dependent background maps

- detector non-uniformity map
- Nomex absorption mapping
- absorption in mask nails

- revision of PIF determination

- low statistics Poisson data (C statistic)