Thermal SNR Working Group: Report from this IACHEC

Paul Plucinsky on behalf of the IACHEC Thermal SNR Working Group

Thermal SNR Working Group

One of the "Standard candle" working groups.

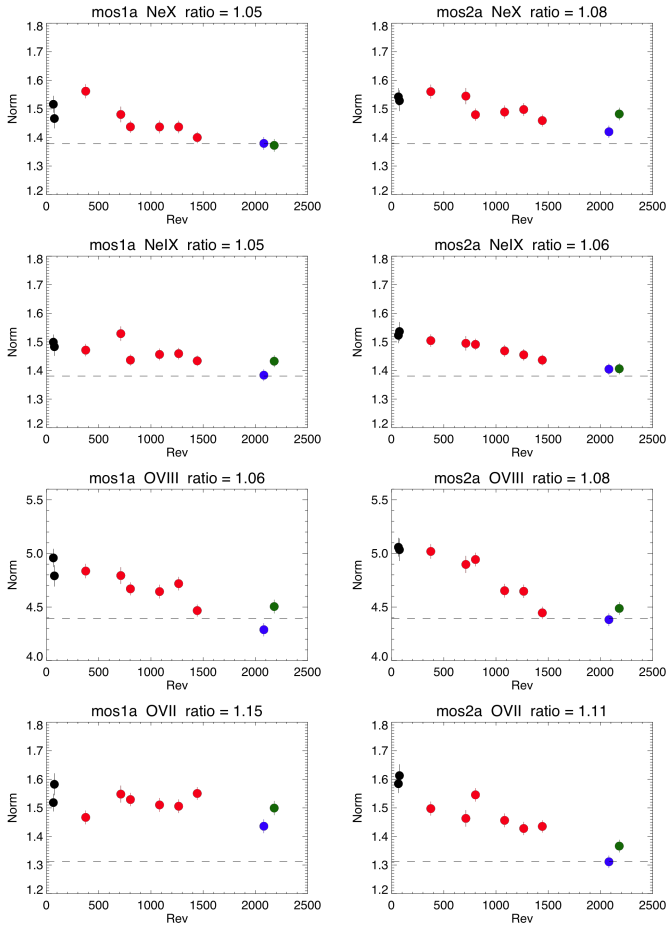
This presentation is a summary report of this group's work:

XMM-Newton	Andy Pollock & *Matteo Guainazzi* (ESAC)
Chandra HETG	Dan Dewey (MIT)
XMM-Newton MOS	*Steve Sembay* (Leicester)
XMM-Newton pn	Frank Haberl (MPE)
Chandra ACIS	*Jenny Posson-Brown*, Joe DePasquale, & *Paul Plucinsky* (SAO)
Suzaku XIS	*Eric Miller* (MIT)
Swift XRT	*Andrew Beardmore* (Leicester)
Models	Adam Foster & Randall Smith (SAO)

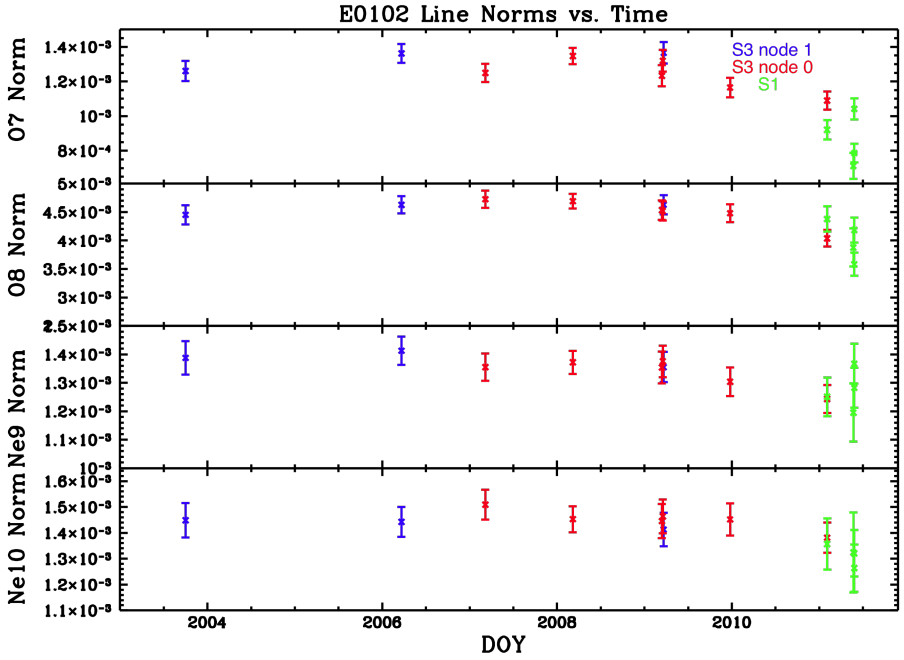
E0102: How to Compare the Instruments ?

The major challenge over the last few years has been characterizing ***the time-dependent*** performance of the various instruments. How do we perform a meaningful comparison ??

MOS:



ACIS:



E0102: How to Compare the Instruments ?

Steve Sembay had the brilliant suggestion:

Don't Do It !!!

Organization of an A&A Paper on E0102:

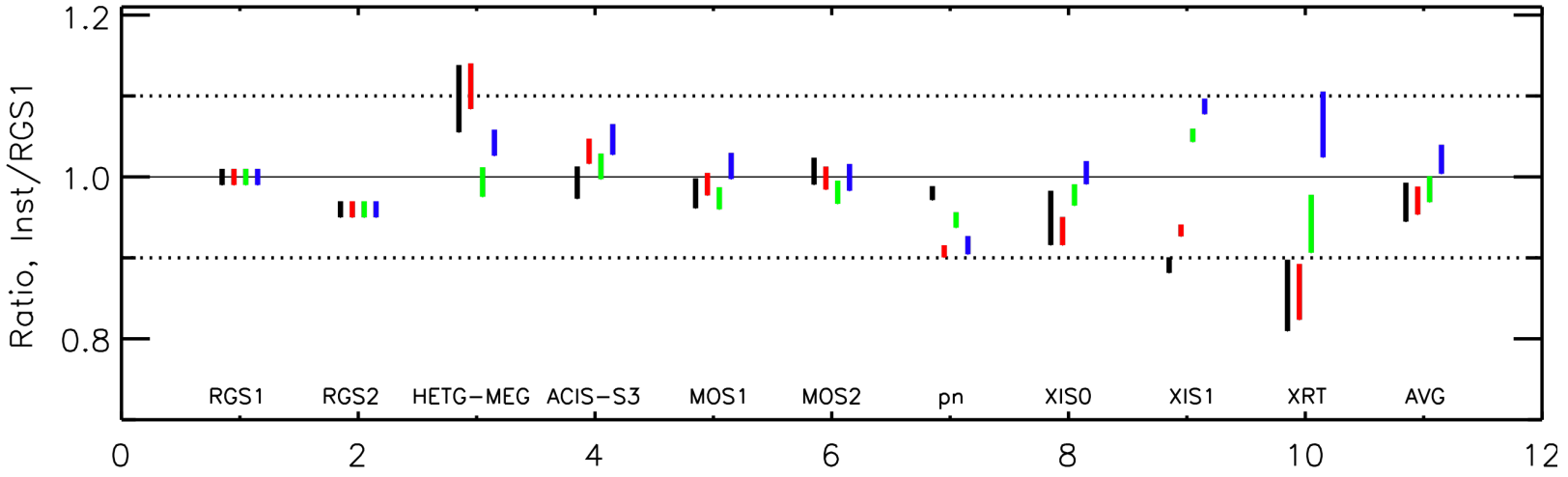
① Compare line normalizations/effective areas for the early mission data sets used in the 2008 SPIE paper with the calibration available today.

② Each instrument will write its own section on its time dependence.

Comparison of Fluxes for Bright Line Complexes:

- 2008 SPIE results updated in 2010

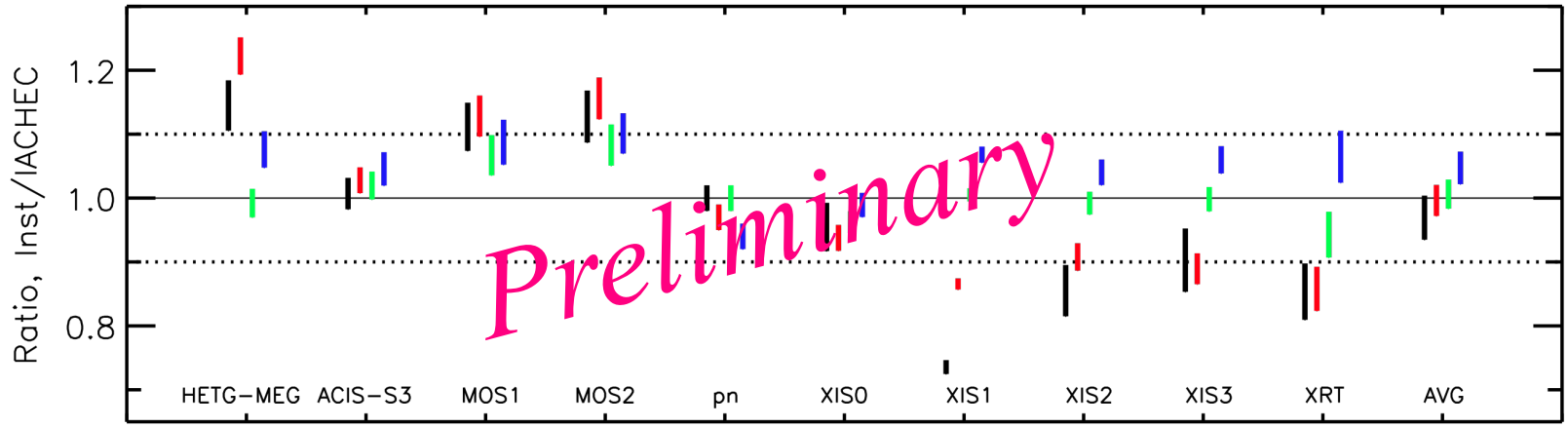
DePasquale(SAO)



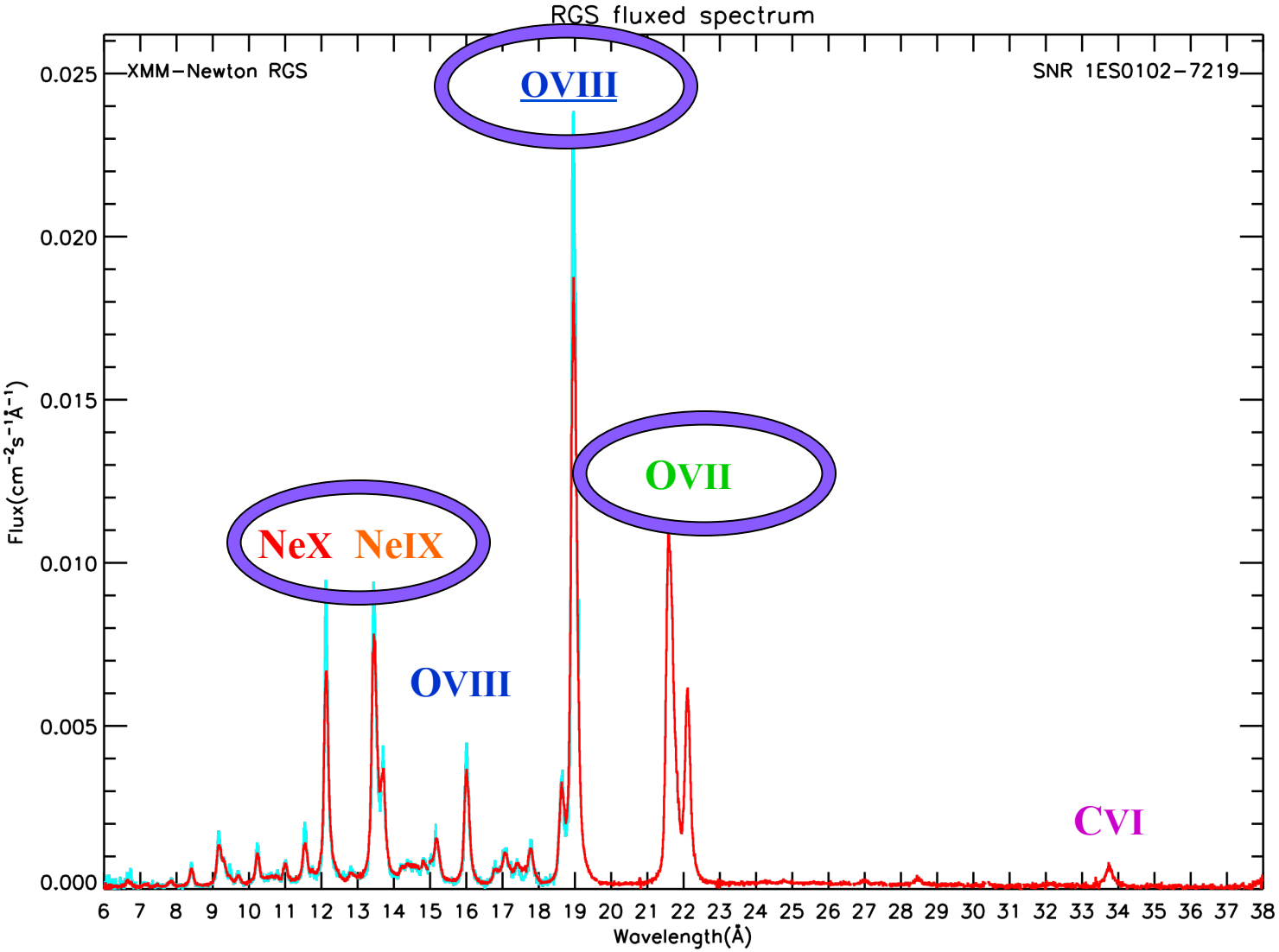
OVII black **OVIII red** **NeIX green** **NeX blue**

Posson-Brown(SAO)

IACHEC 7, 28 Mar 2012



XMM-Newton RGS Spectrum of E0102:



Pollock (ESAC)

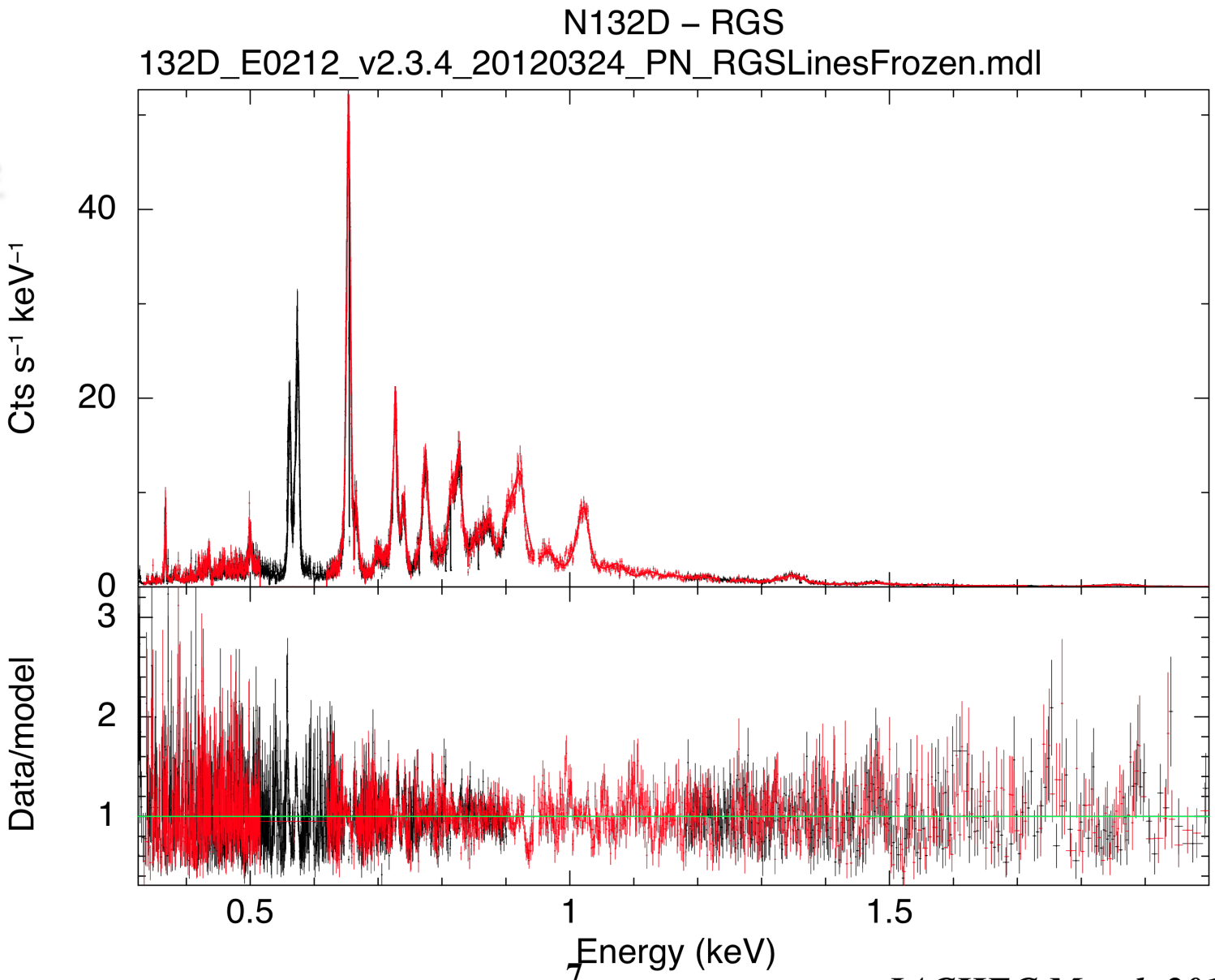
Relatively simple spectrum dominated by O & Ne,

little or no Fe emission

In most applications, line energies & widths are frozen, only 4 normalizations are allowed to vary **OVII**, **OVIII**, **NeIX**, & **NeX**

N132D: Brightest SNR in the LMC

Guainazzi, Stuhlinger, & Pollock ***(ESAC)***



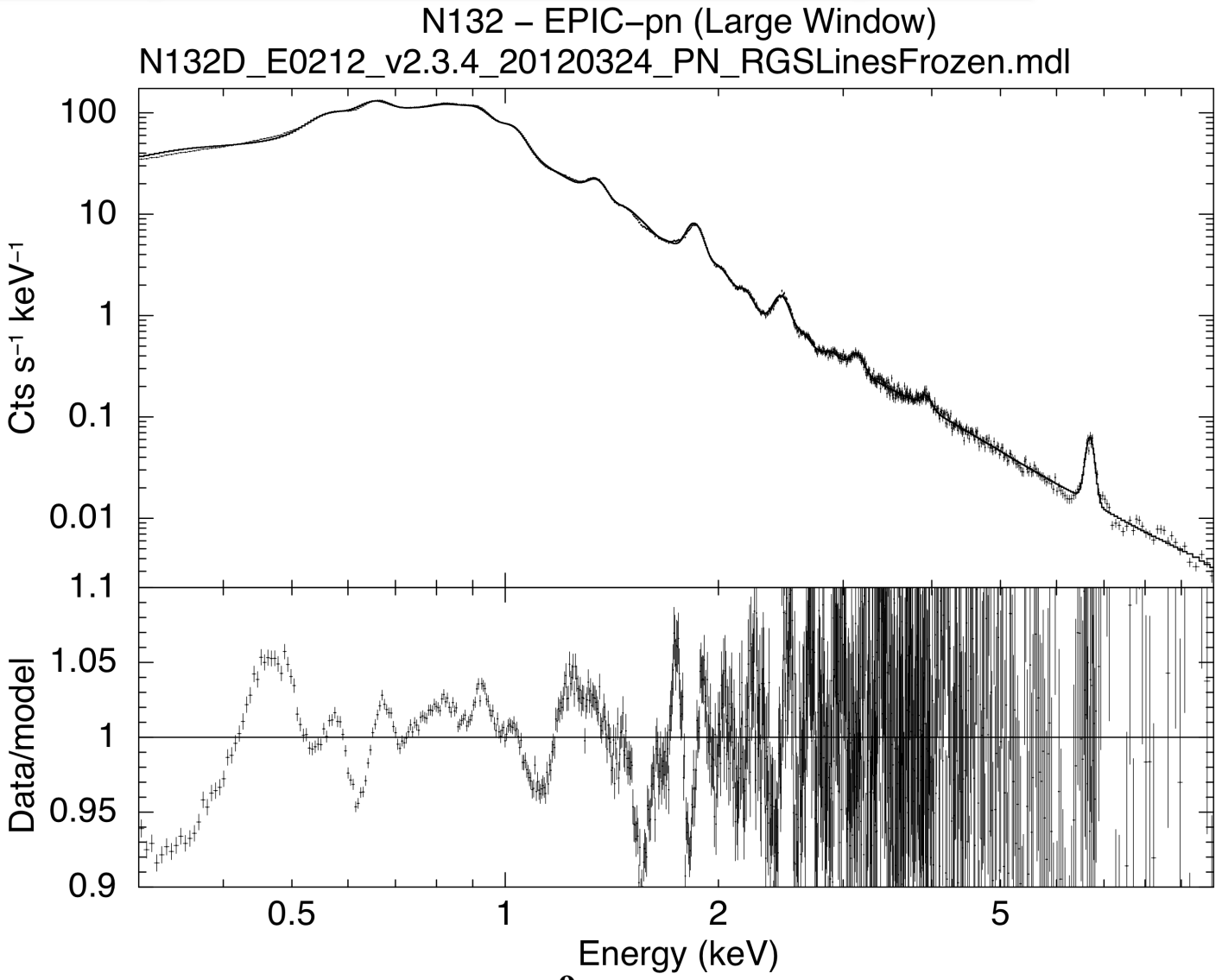
N132D: Development of IACHEC model

Guainazzi, Stuhlinger, & Pollock ***(ESAC)***

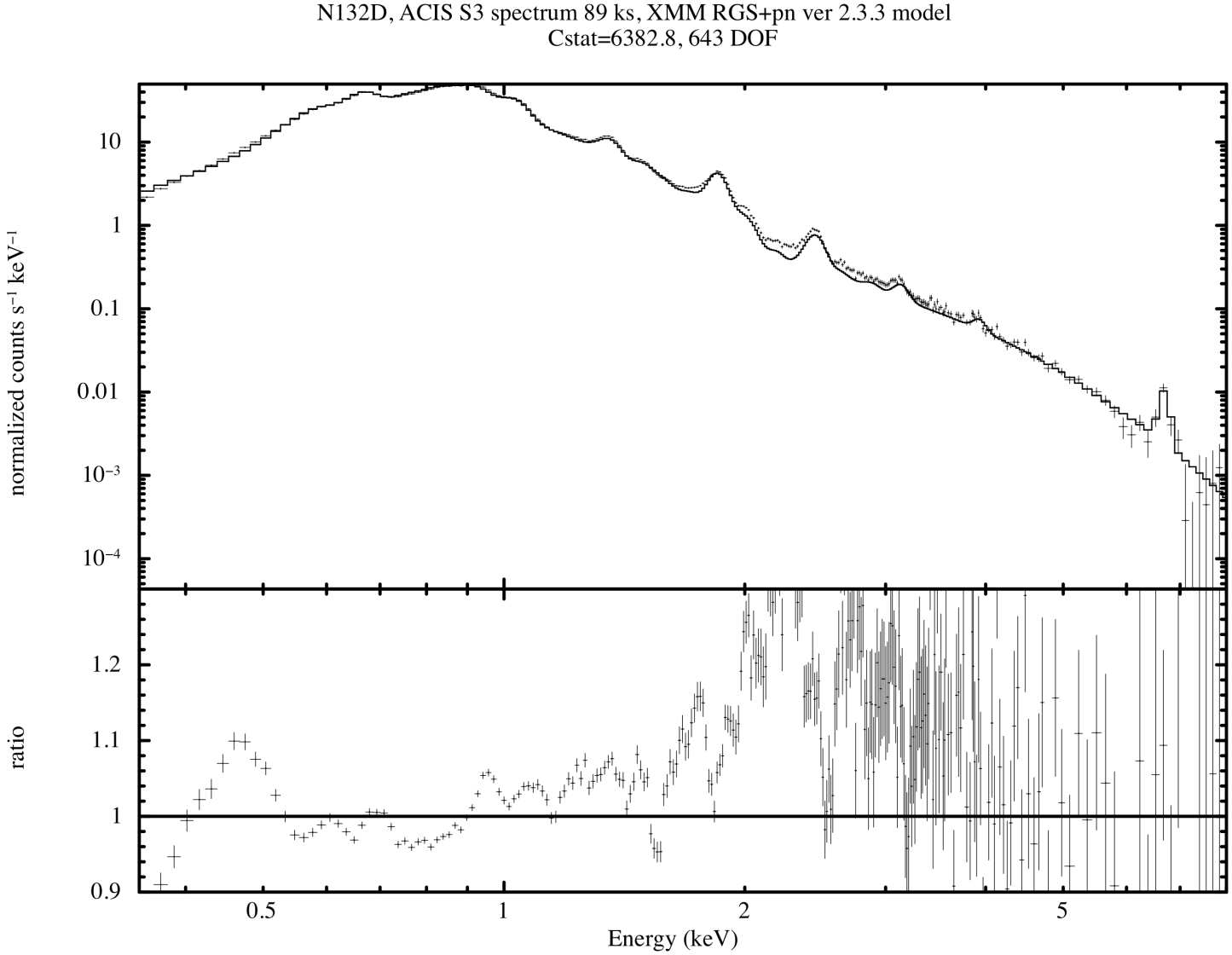
- Fit the EPIC-pn spectrum in the 2-10 keV band
  - Continuum+Σunresolved Gaussian lines+power-law (high-energy background)
- Freeze all the parameters in #1, and fit the RGS spectrum
  - Another continuum+photoelectric absorption+Σunresolved Gaussian lines
  - We try to add full "atomic series" of lines (e.g.: OVIII, NeIX, FeXX …) rather then being simply driven by the statistics.
  - Lines are identified and their energy frozen to the value in ATOMDB (via the XSPEC identify command)
  - Once the lines are identified, a fit cycle is run on the whole model to determine the best-fit line width for each series. The width of each line in each series is calculated rescaling linearly with energy the width of its first line
  - This is: N132D_E0212_v2.3_20120324_RGS.mdl
  - This model does not necessarily work well above 2 keV
- Freeze the energy and the width of the Gaussian components in the RGS energy bandpass in #2. and fit the EPIC-pn spectrum again
  - This is: N132D_E0212_v2.3_20120324_PN.mdl
- Free the energy, the widths *and the normalizations* of the Gaussian components in the RGS energy bandpass in #2, and fit the EPIC-pn spectrum again
  - This is: N132D_E0212_v2.3_20120324_PN_RGSLinesFrozen.mdl

N132D: Comparison of IACHEC model to pn data

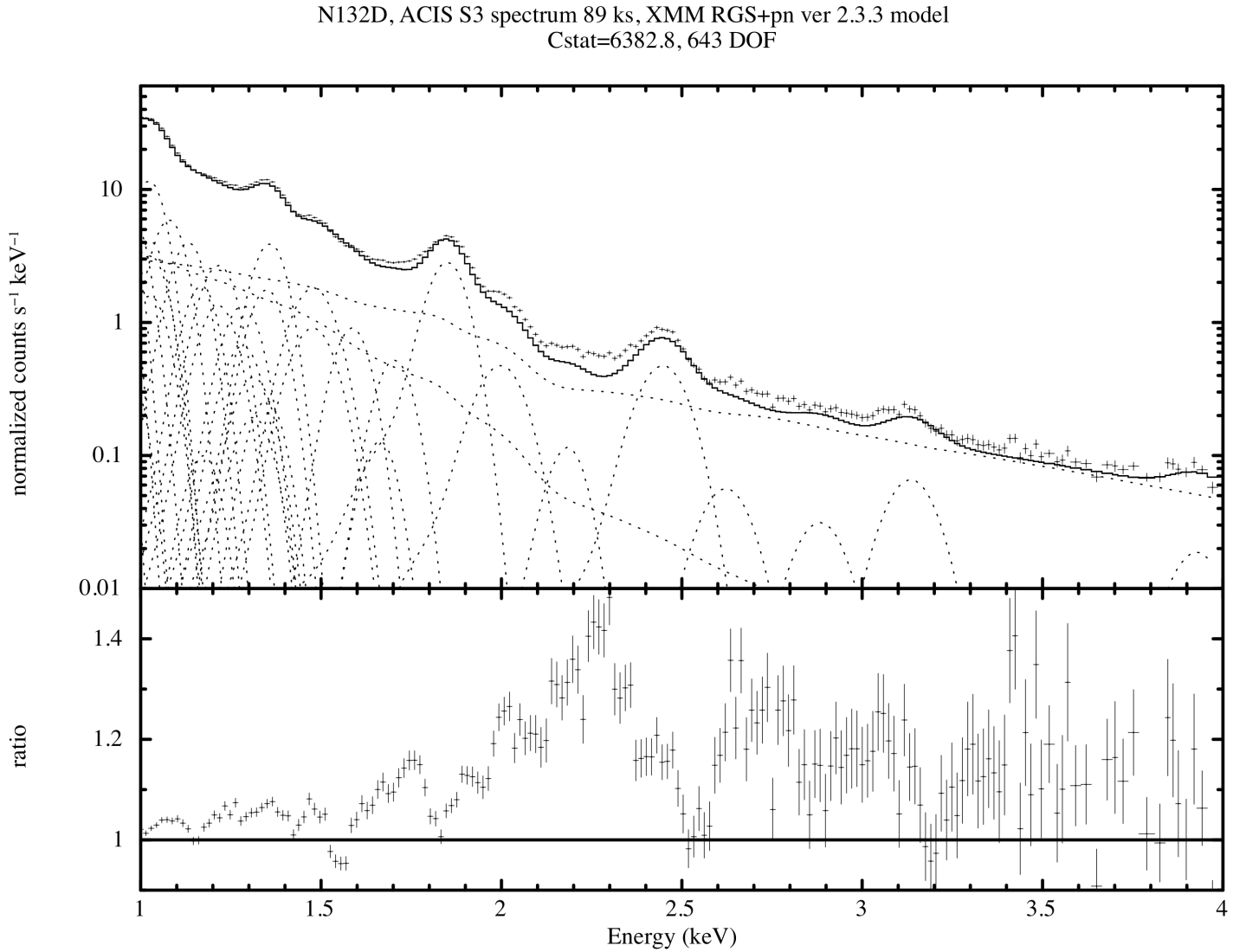
Guainazzi (ESAC)



N132D: Comparison of IACHEC model to ACIS data

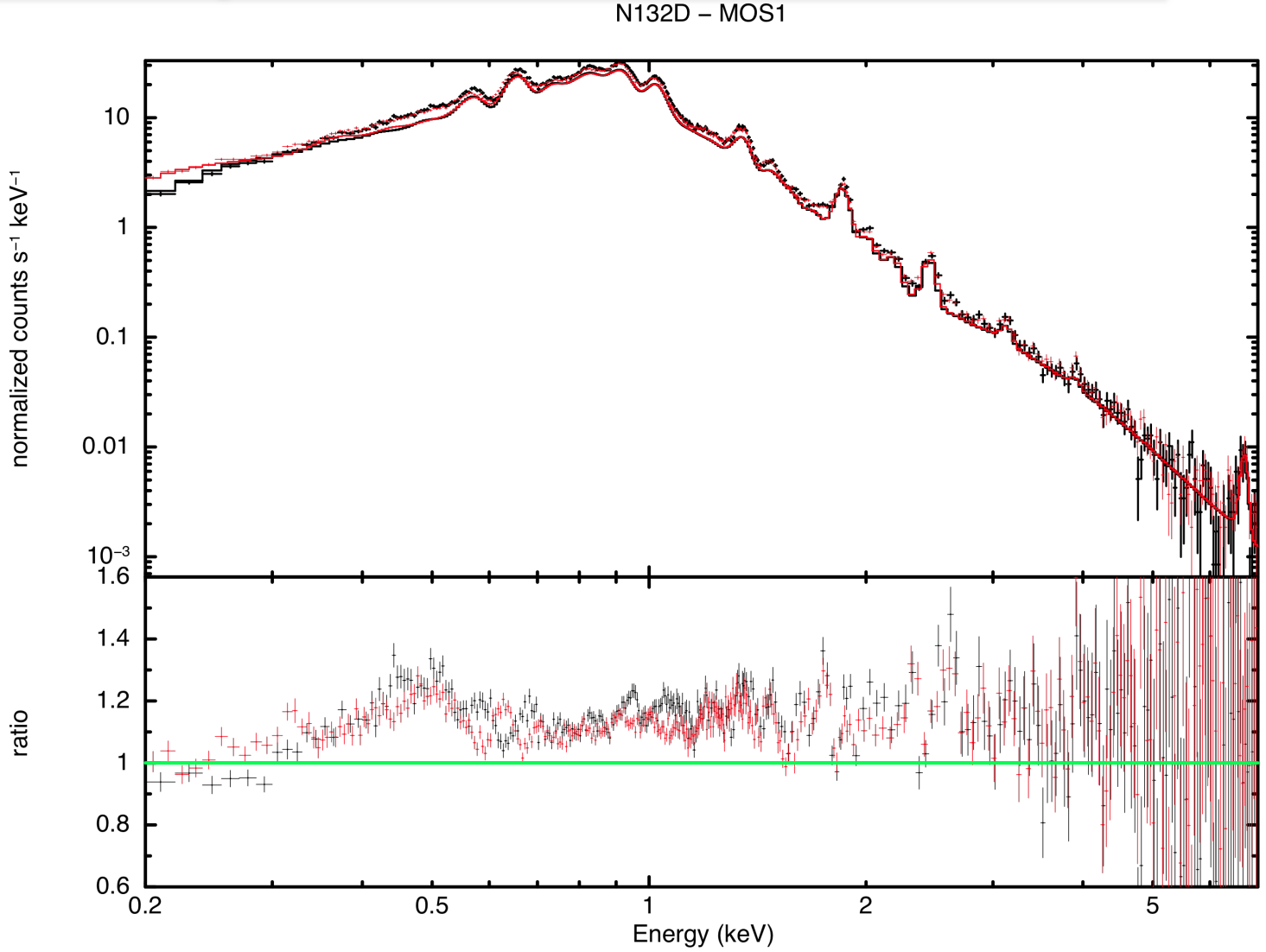


N132D: Comparison of IACHEC model to ACIS data



N132D: Comparison of IACHEC model to MOS data

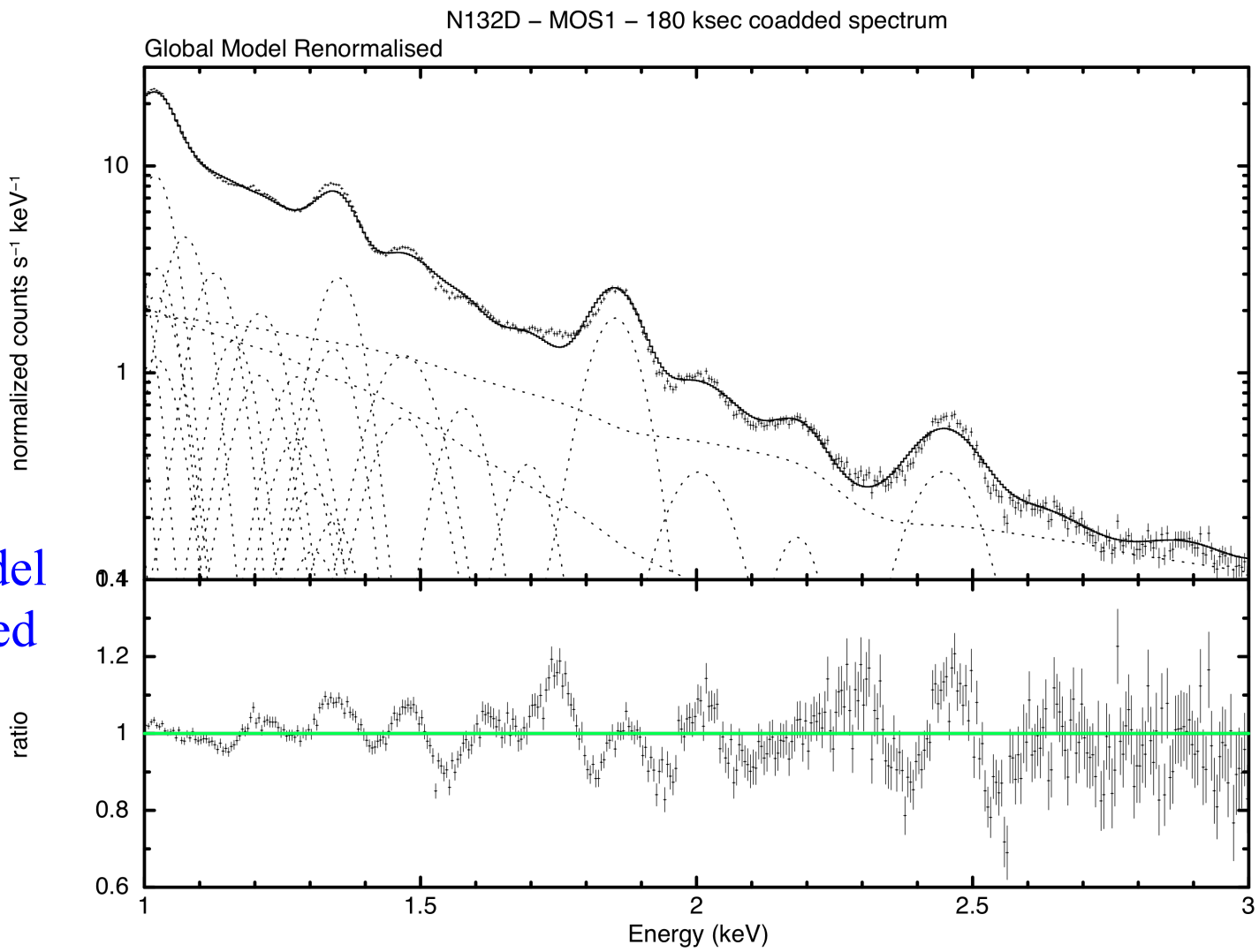
Sembay (Leicester)



N132D: Comparison of IACHEC model to MOS data

Sembay (Leicester)

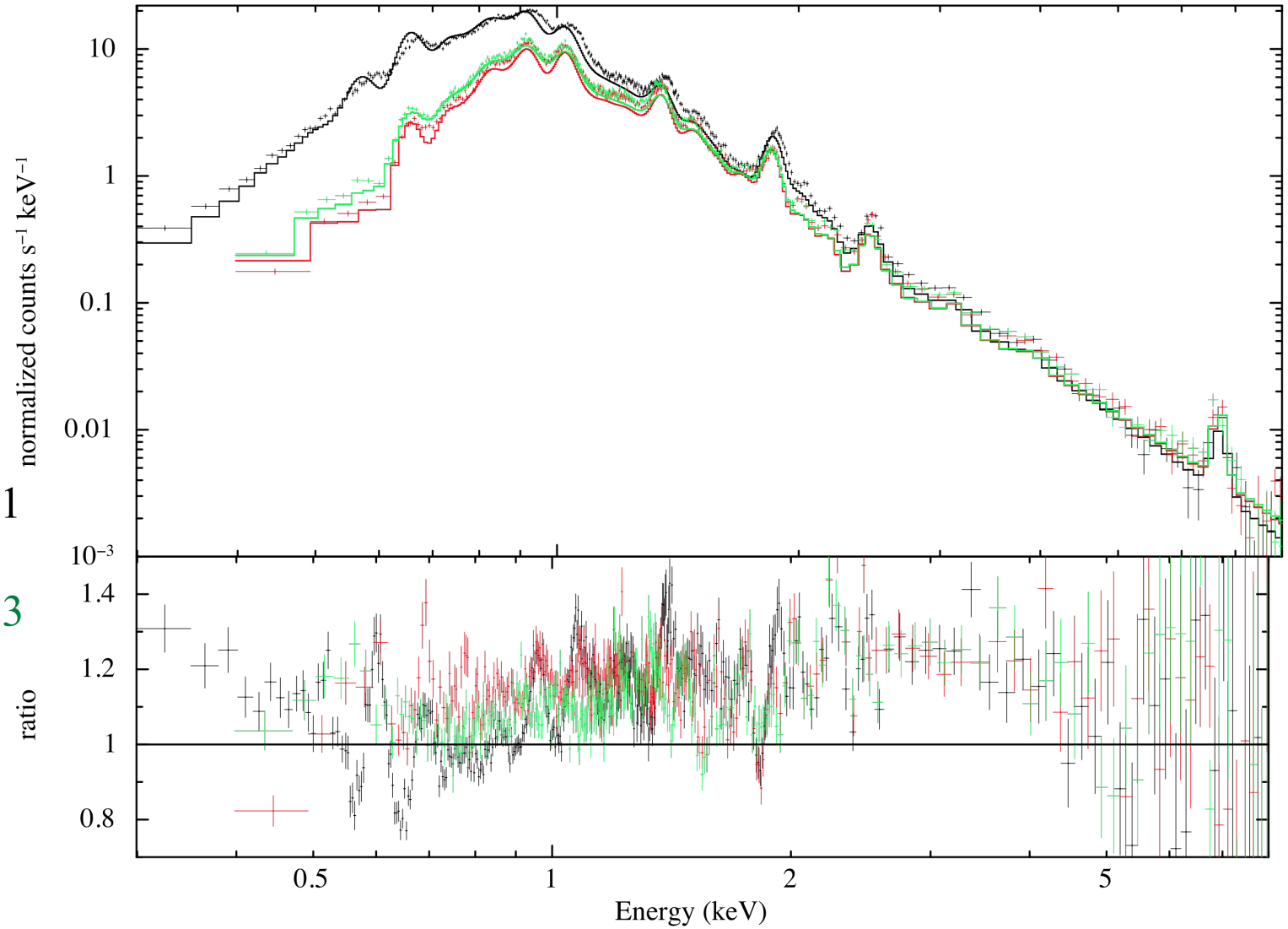
Global model renormalized



N132D: Comparison of IACHEC model to XIS data

Miller
(MIT)

black = XIS1
red = XIS0
green = XIS3



Summary

1 E0102-7219:

• We need to decide what we want to publish (if anything) on the multiple measurements over the course of the mission

N132D:

• We want to develop a standard IACHEC model of N132D that we can use for calibration purposes

Fitting Methodology:

• We want adopt the approach of using unbinned spectra, modeling the background, & using the C statistic

• We believe the IACHEC should take the lead in encouraging the User community to adopt this approach