N132D Fe K Region with Suzaku XIS

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IACHEC Thermal SNR WG
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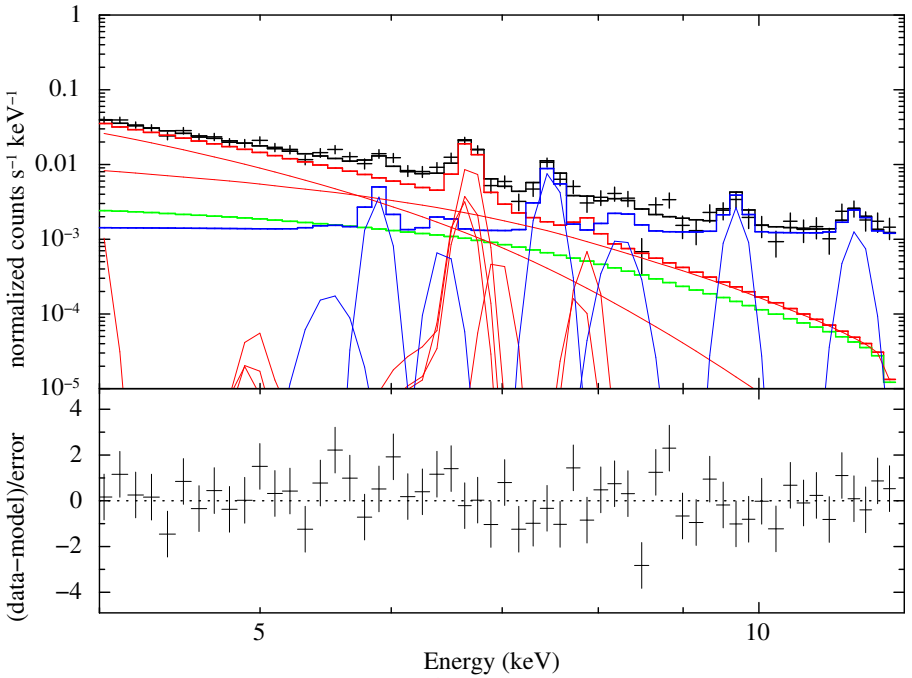
Summary

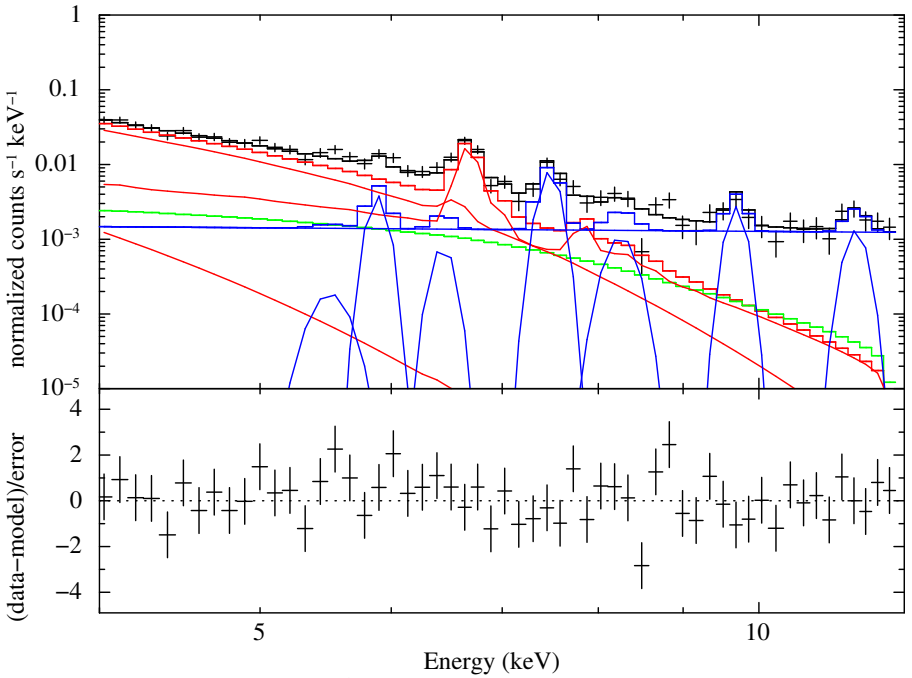
- Followed Paul's instructions.
- Simultaneously fit 11 observations with XIS0 including:
  - N132D model (empirical or physical)
  - CXB: Gamma=1.4 power law with fixed norm from Bautz et al. 2009
  - NXB: power laws + Gaussian fit to night Earth data, overall norm allowed to vary for each observations

N132D – XIS0 obs 20100727, IACHEC model v2.13_20210421

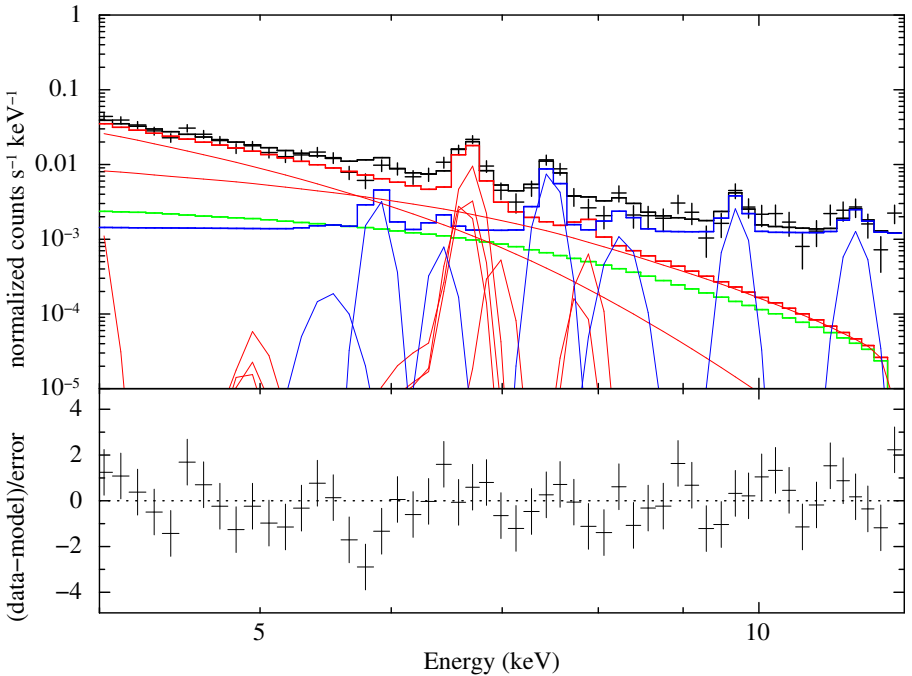


N132D
CXB
NXB

N132D – XIS0 obs 20100727, n132d_afoster_suzuki_vrnei_20210420



N132D – XIS0 obs 20110425, IACHEC model v2.13_20210421



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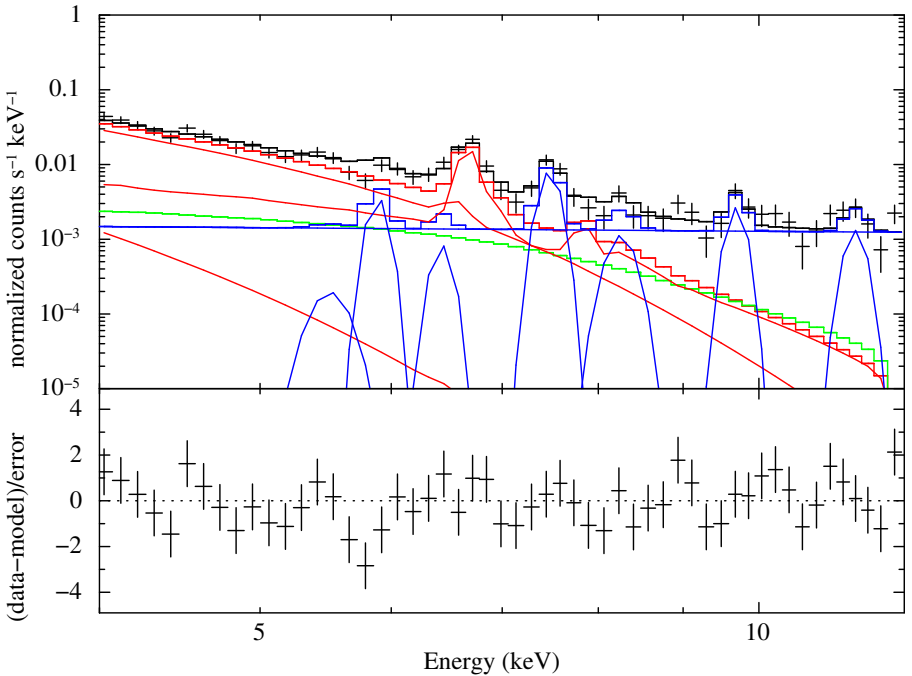
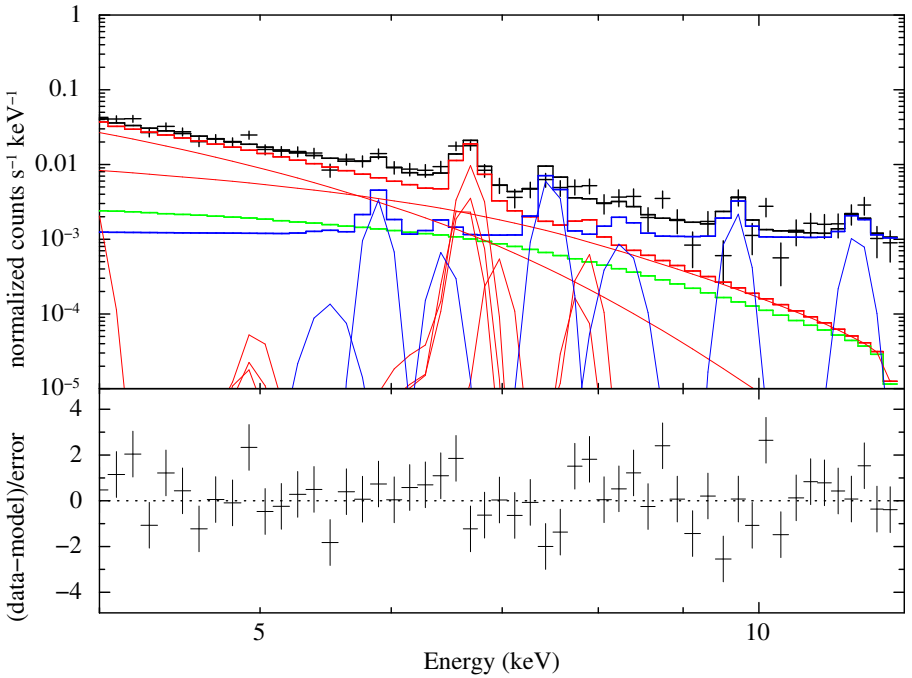


N132D – XIS0 obs 20111007, IACHEC model v2.13_20210421



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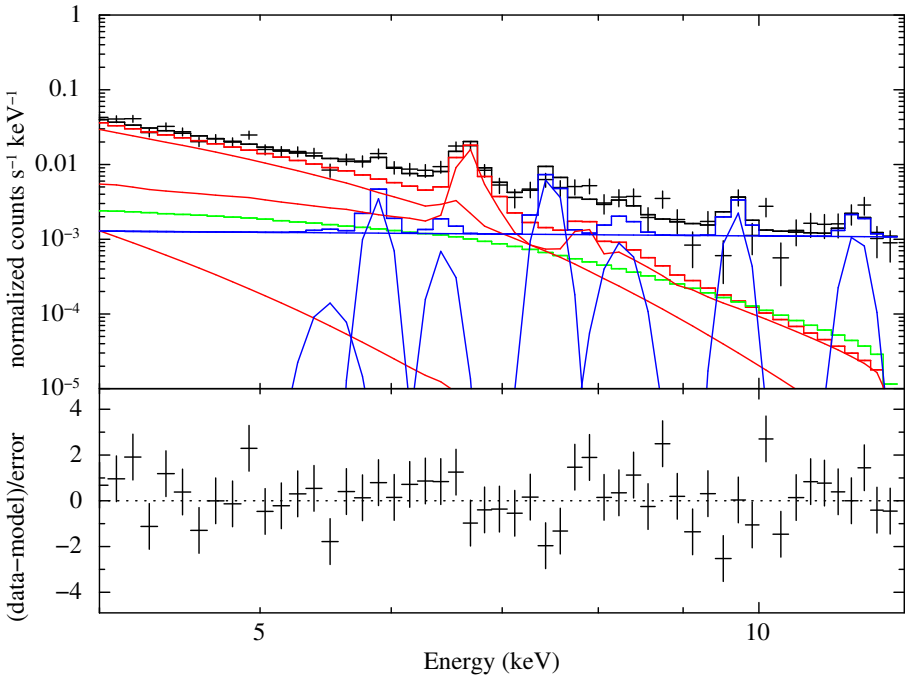
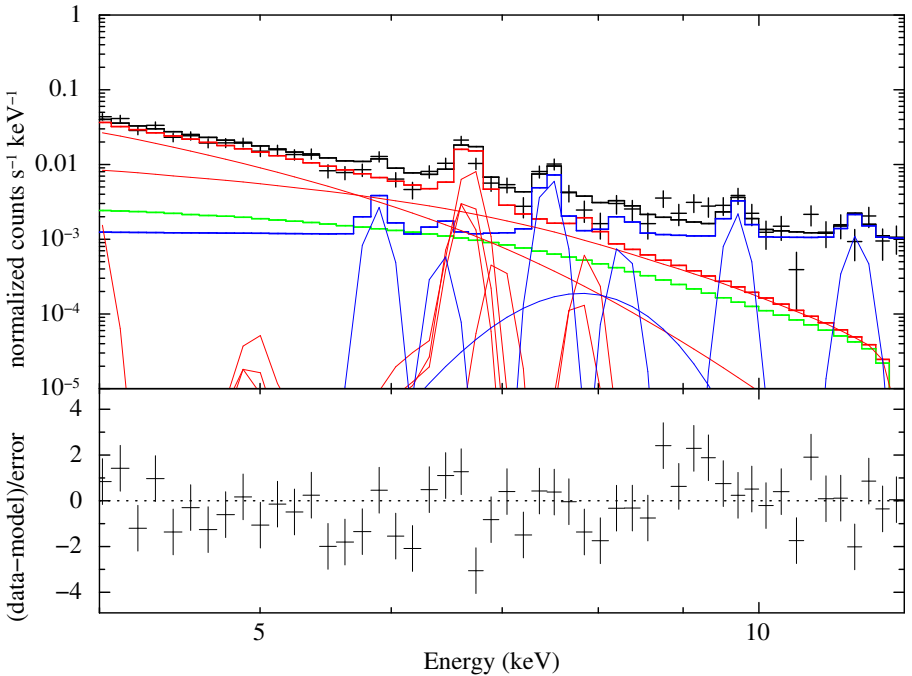


N132D

CXB

NXB

N132D – XIS0 obs 20121020, IACHEC model v2.13_20210421



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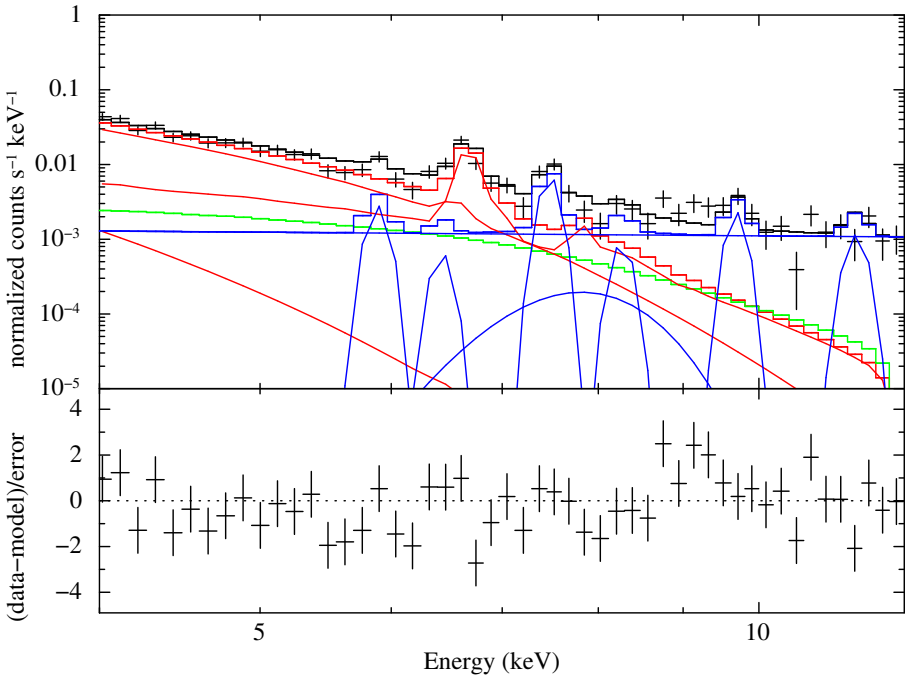
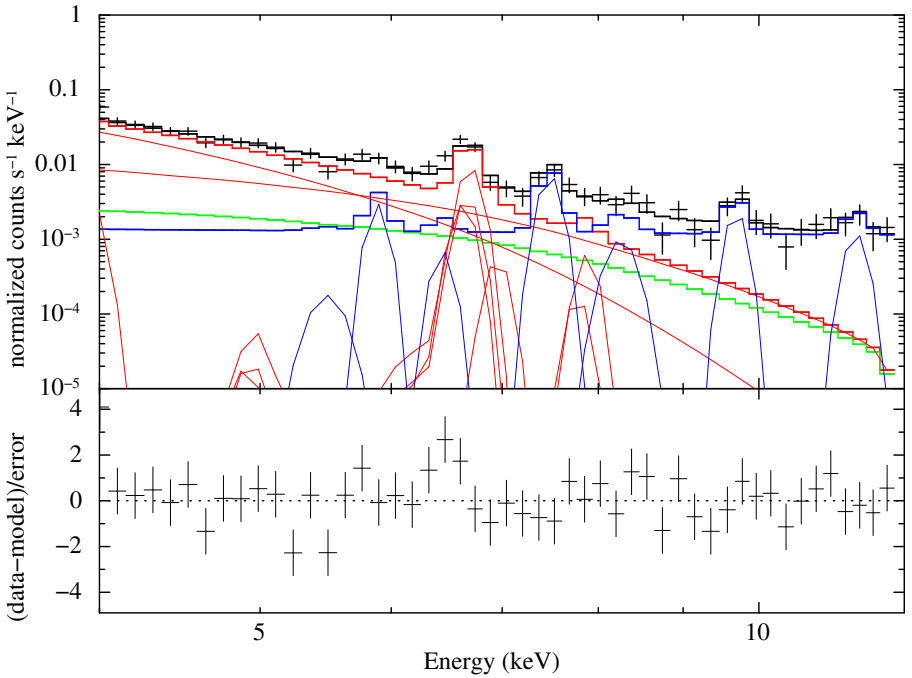


N132D – XIS0 obs 20130326, IACHEC model v2.13_20210421



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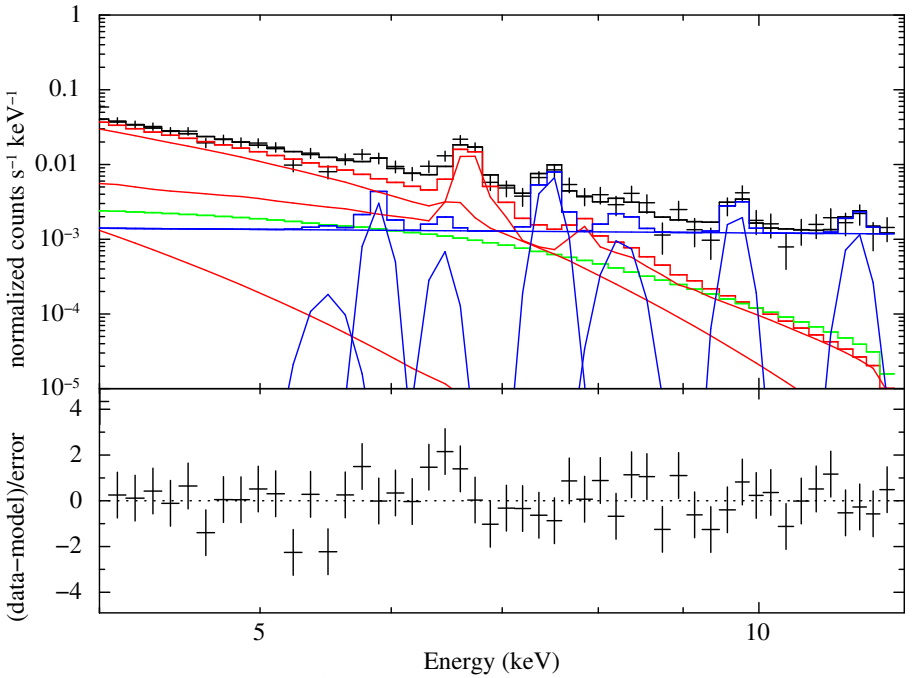

N132D
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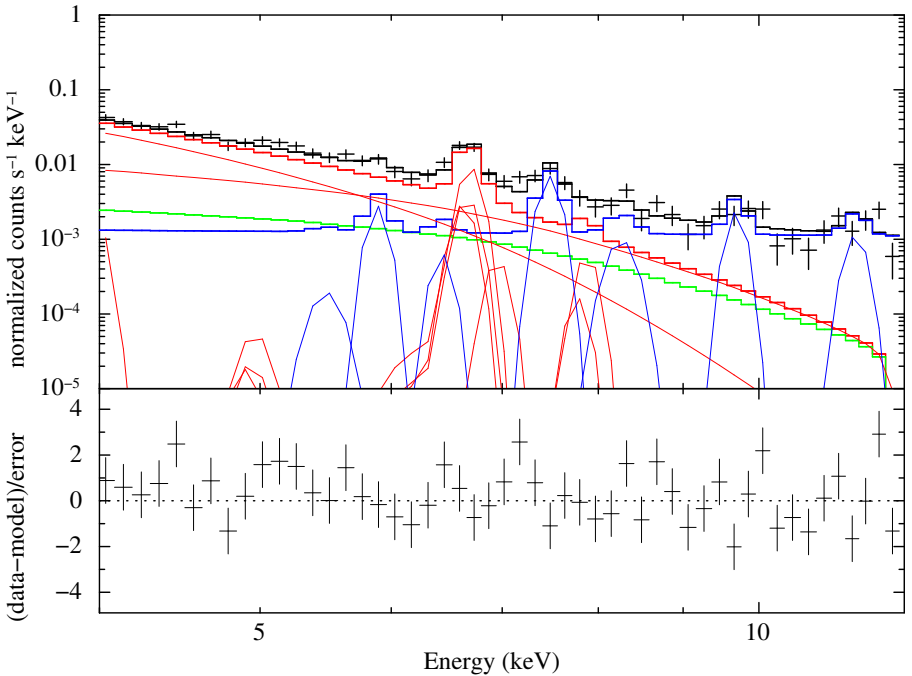
NXB

N132D – XIS0 obs 20130522, IACHEC model v2.13_20210421



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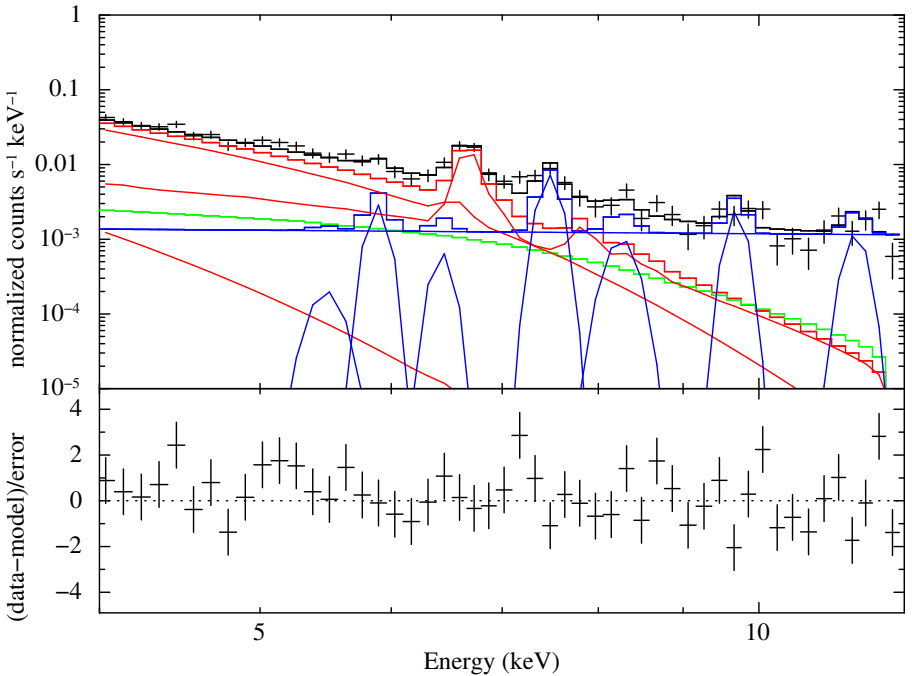
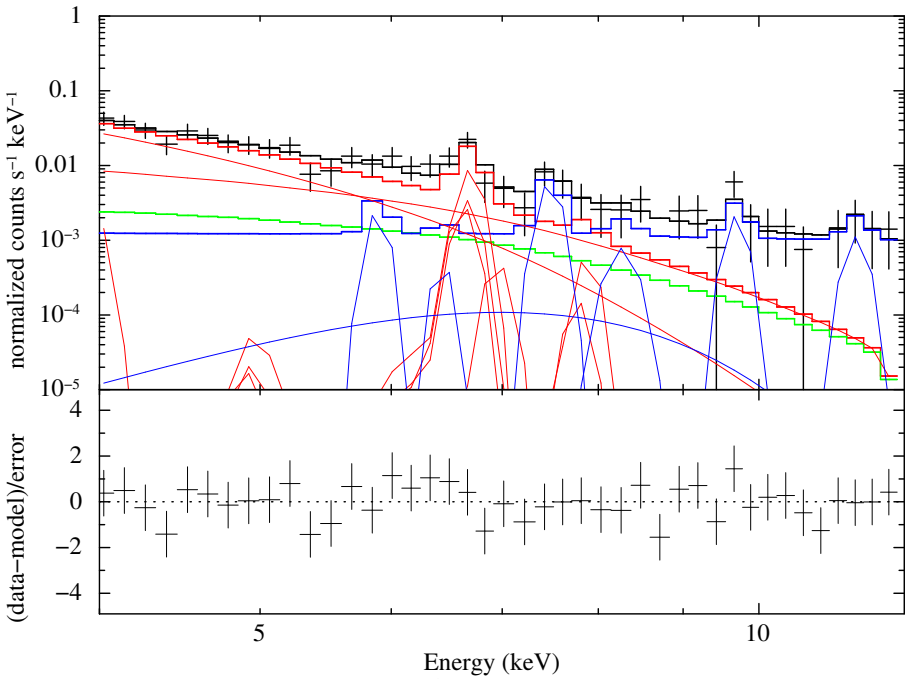


N132D – XIS0 obs 20131006, IACHEC model v2.13_20210421



N132D

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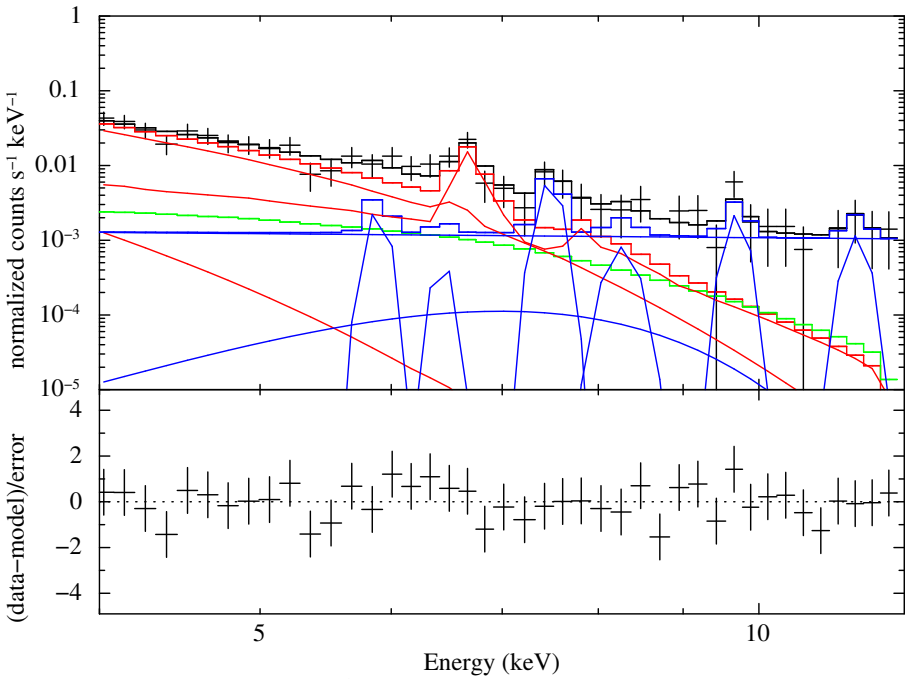
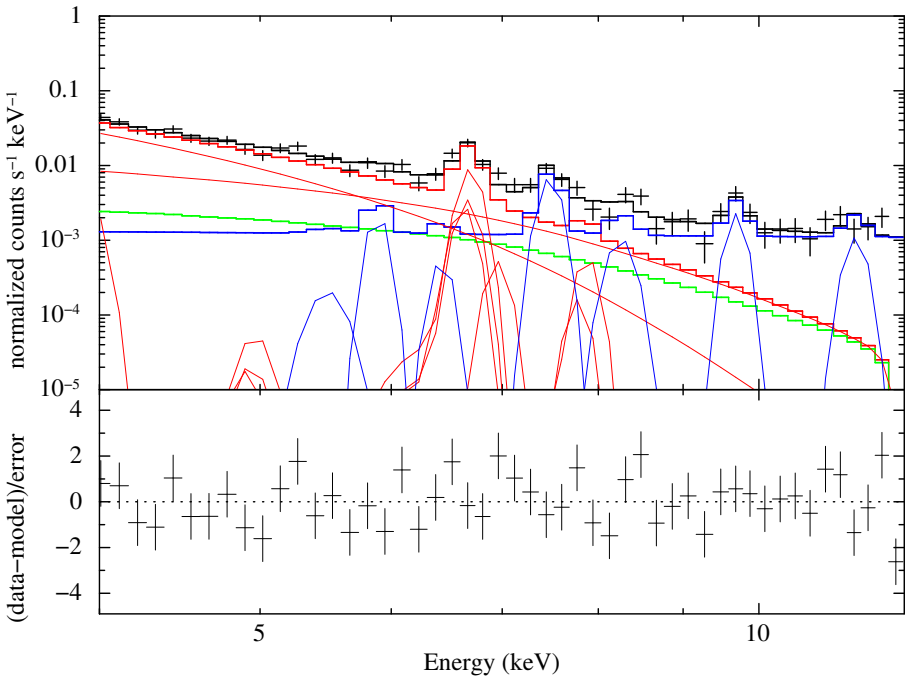
NXB

N132D – XIS0 obs 20131006, model n132d_afoster_suzuki_vrnei_20210420



N132D – XIS0 obs 20131125, IACHEC model v2.13_20210421



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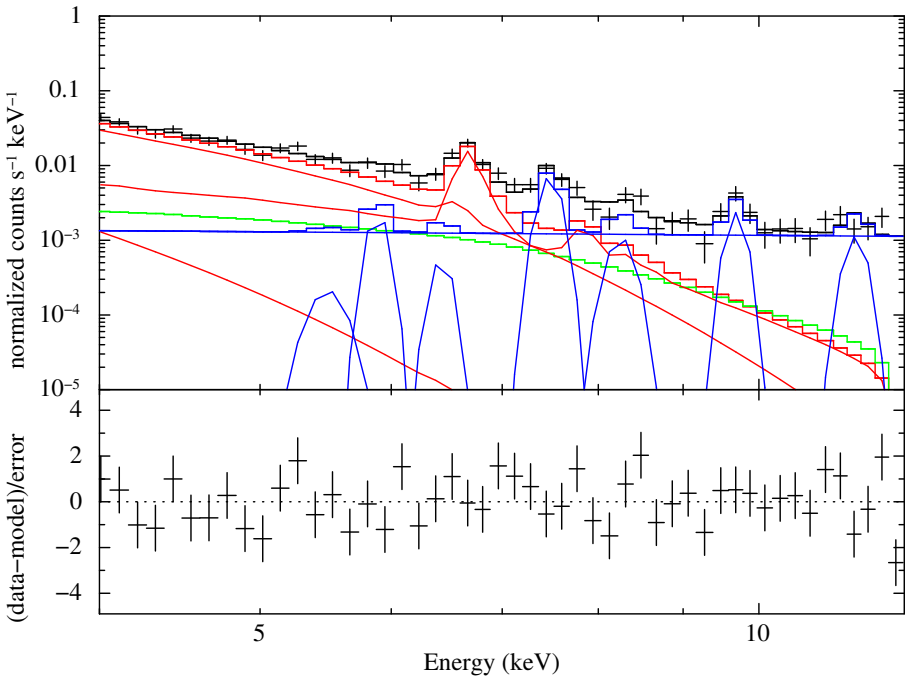
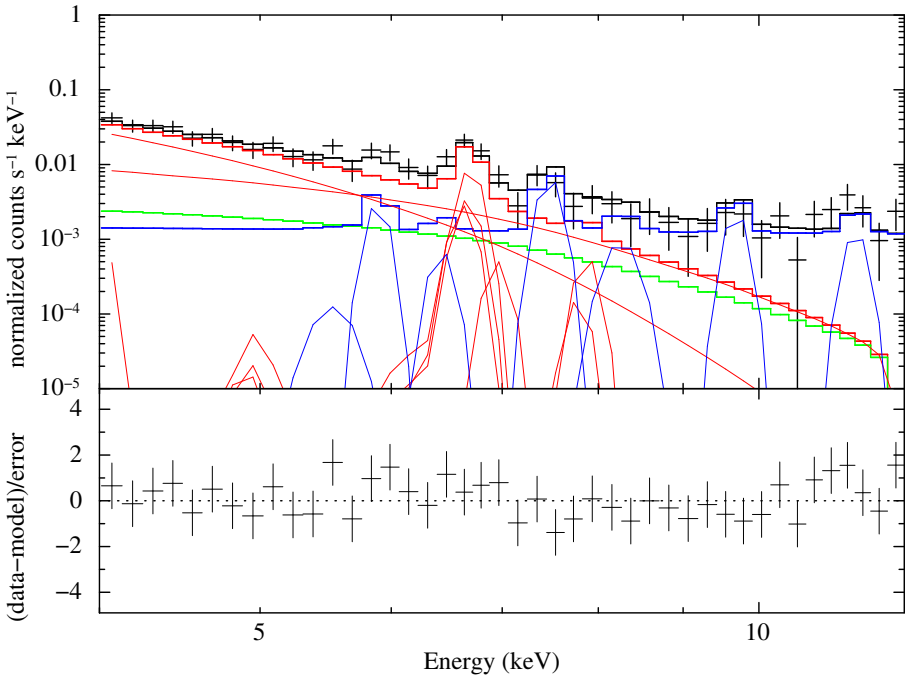
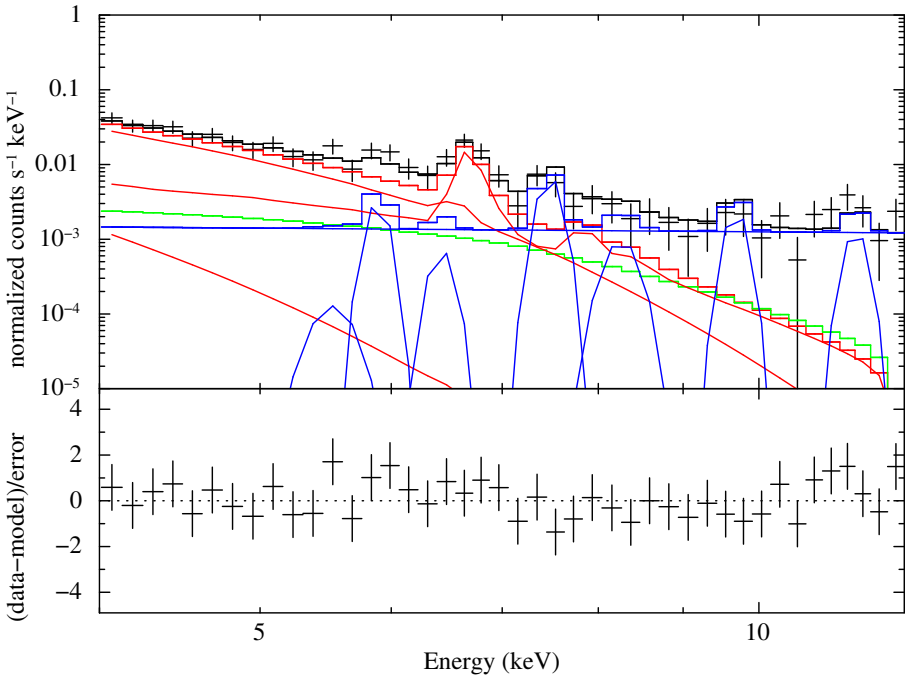


N132D – XIS0 obs 20140113, IACHEC model v2.13_20210421

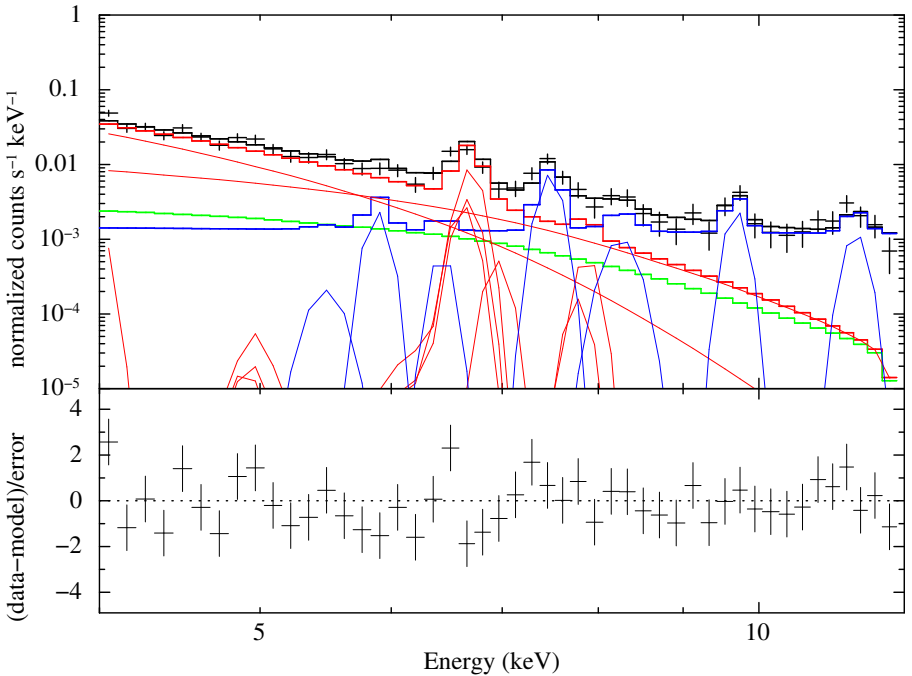


N132D
CXB
NXB

N132D – XIS0 obs 20140113, model n132d_afoster_suzuki_vrnei_20210420



N132D – XIS0 obs 20140417, IACHEC model v2.13_20210421



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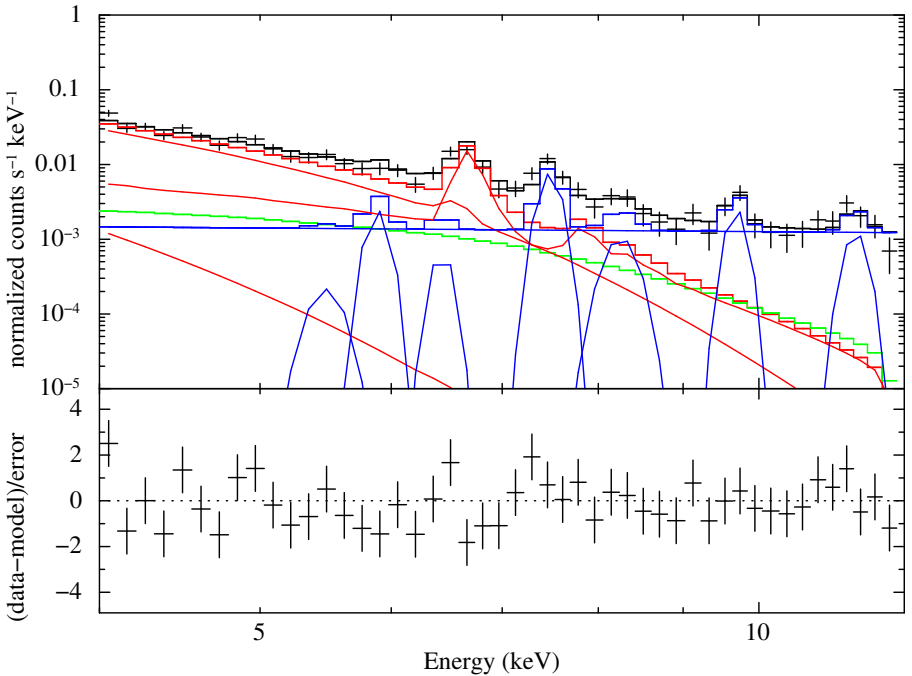
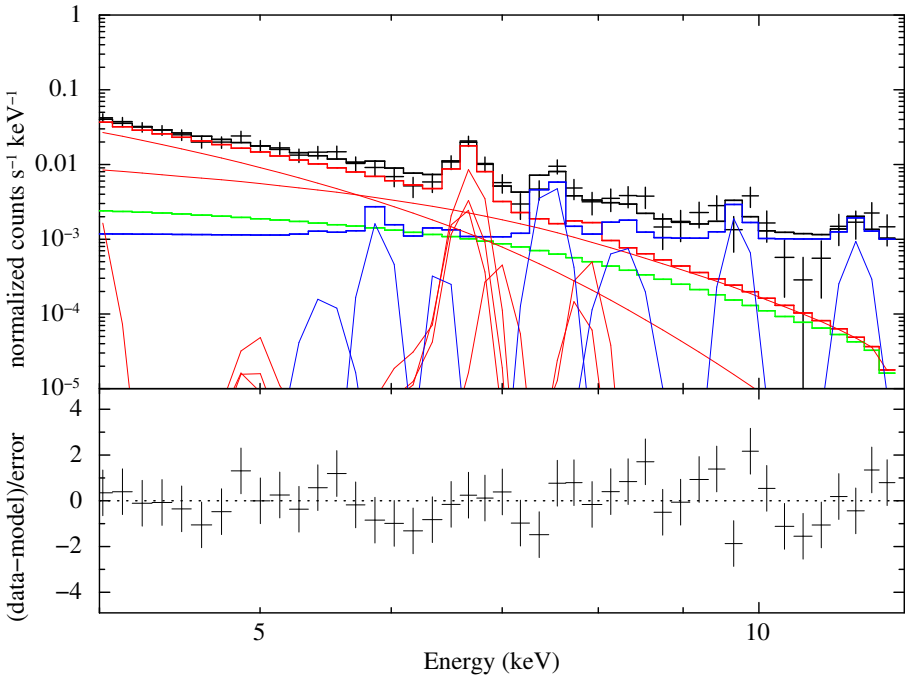


N132D – XIS0 obs 20141030, IACHEC model v2.13_20210421

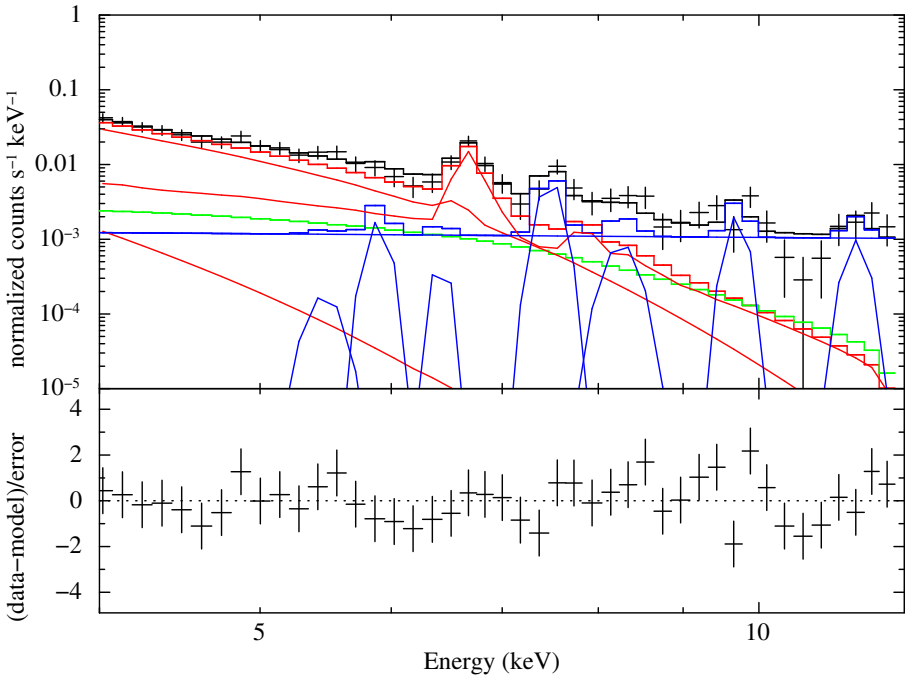


N132D

CXB

NXB

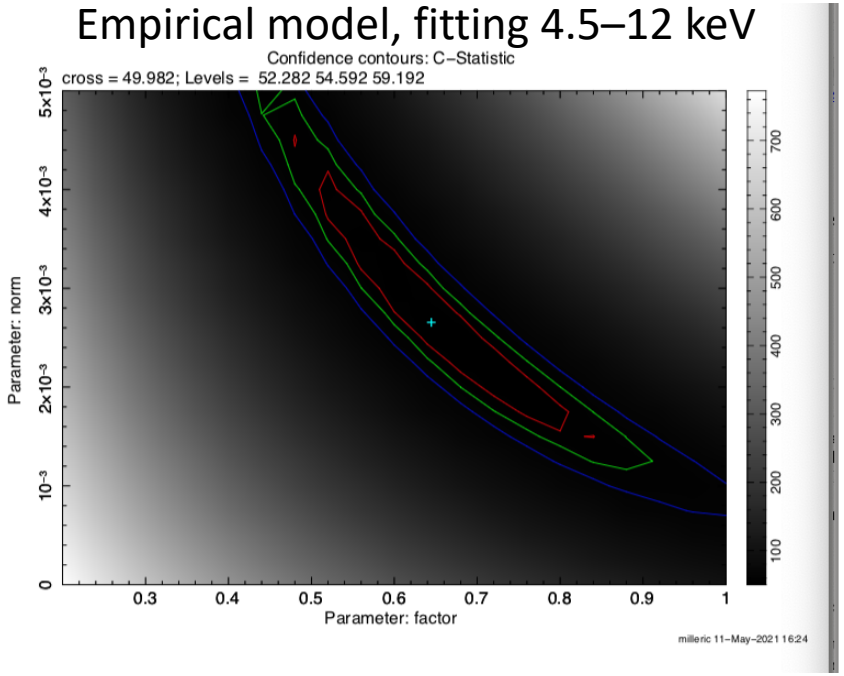
N132D – XIS0 obs 20141030, model n132d_afoster_suzuki_vrnei_20210420



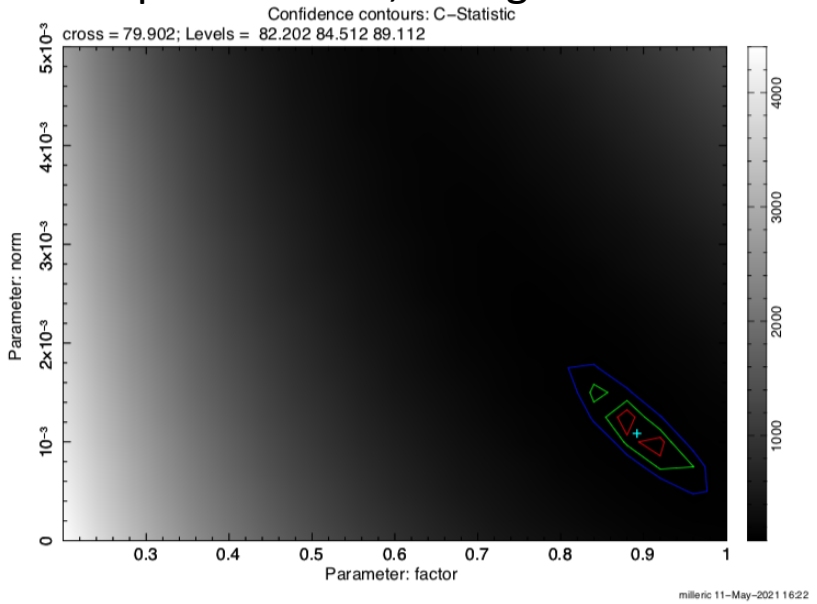
Fit Results

	Overall norm	nlapec/vrnei norm	He Fe norm	H Fe norm	C stat/dof	P chi/bins	Goodness
Empirical	0.71±0.05	1.8±0.3 e-3	4.4±0.3 e-6	9±6 e-7	543.9/478	529.6/493	94%
Physical	1.12±0.03	7.5±0.4 e-4	—	—	520.9/480	507.5/493	84%

Empirical model, fitting 4.5–12 keV

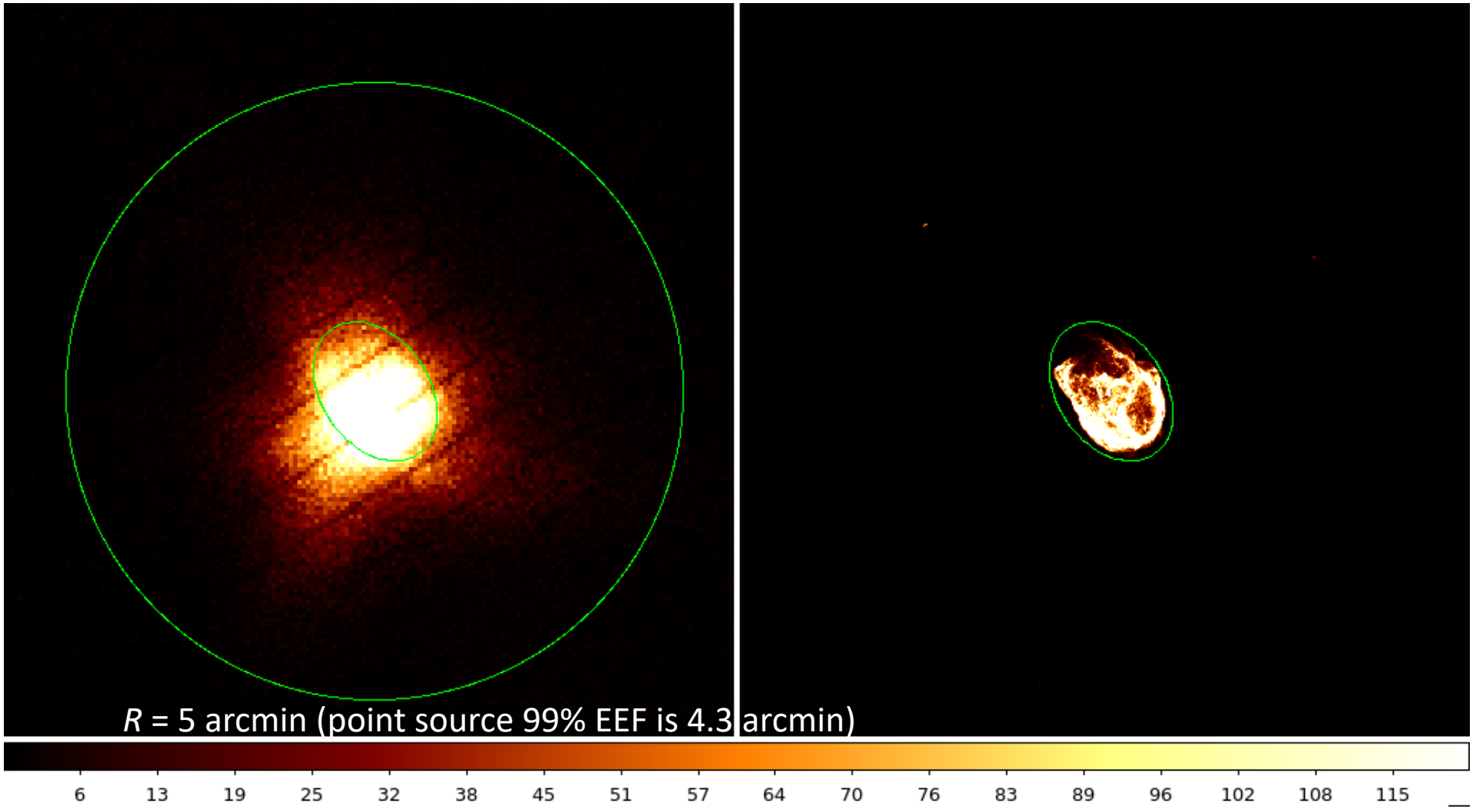


Empirical model, fitting 3–12 keV

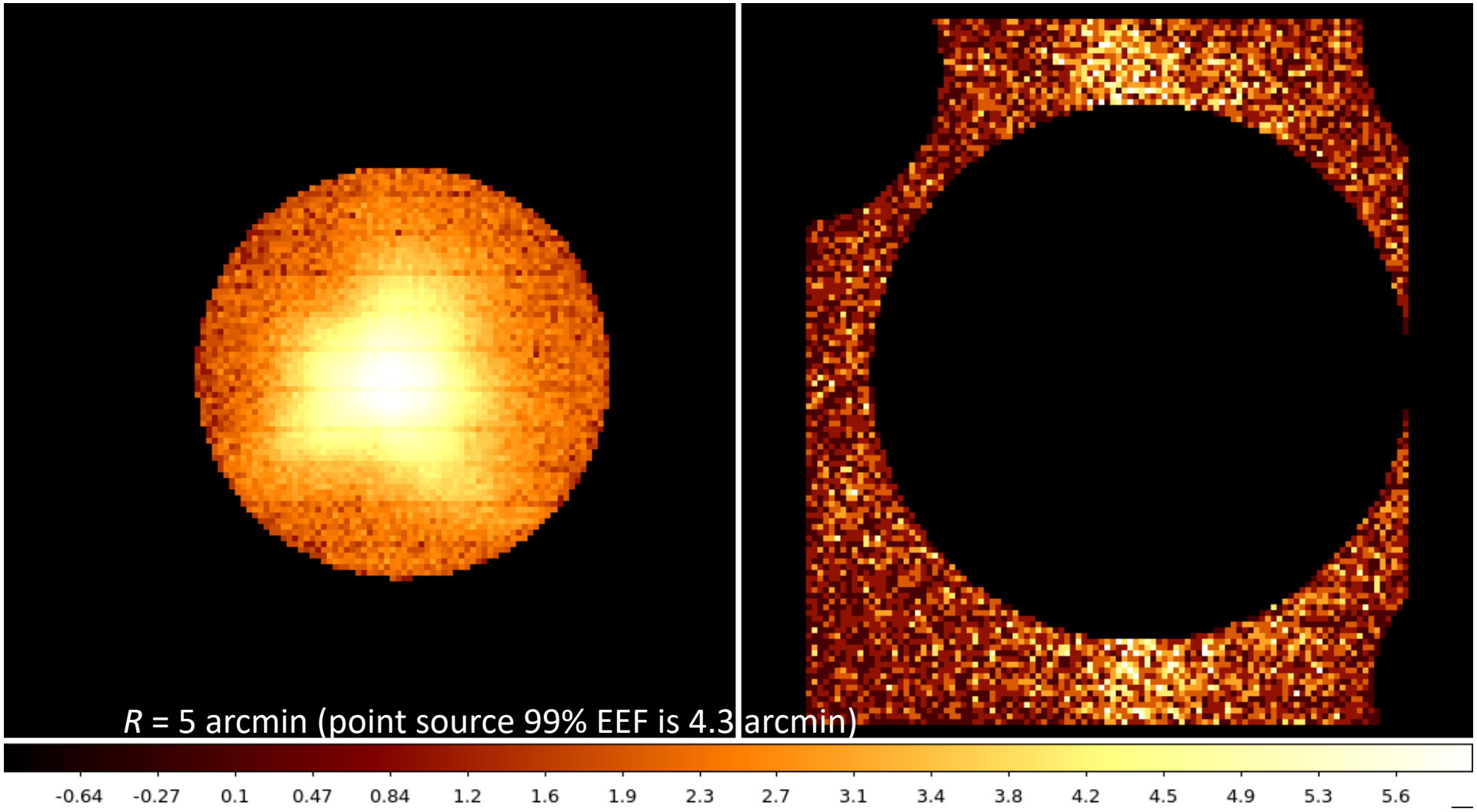


Reference

N132D — Suzaku vs. Chandra



Suzaku Source vs. “BG” Regions



Methodology

- Create model for NXB (powerlaws + Gaussians)
- Extract source spectrum
- Extract NXB spectrum from night Earth data using same DET coords, COR distribution as source extraction
- For single N132D observation:
  - Read source spectrum, RMF, ARF
  - Read NXB spectrum, diagonal RMF, no ARF
    - Many lines are from framestore, so RMF with CTI is too broad.
    - Could use narrow or pre-flight RMF (calibration vs. model errors).
  - Simultaneously fit source + CXB + NXB models to source spectrum and NXB model to NXB spectrum
    - If we had an offset pointing, we'd fit CXB+NXB to that.

XIS NXB data from night Earth obs.