BKG 2.0 - Moving beyond the

S. Molendi (IASF-MI/INAF)

Motivation

- Study low SB regions beyond current limitations
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- The "Sembay" approach – redefine the capabilities of current missions

BKG 2.0

- Can we Study low SB regions beyond current limitations with EPIC.

In a new mission you can work on:

1. experiment design
2. observational strategy
3. data analysis

- with EPIC or Chandra we have acted on 3) only, cannot do anything about 1)
- we can however work with 2) at least to

BKG 2.0

1. Reduce the level of the bkg

2. Improve knowledge of the bkg

Reducing the bkg

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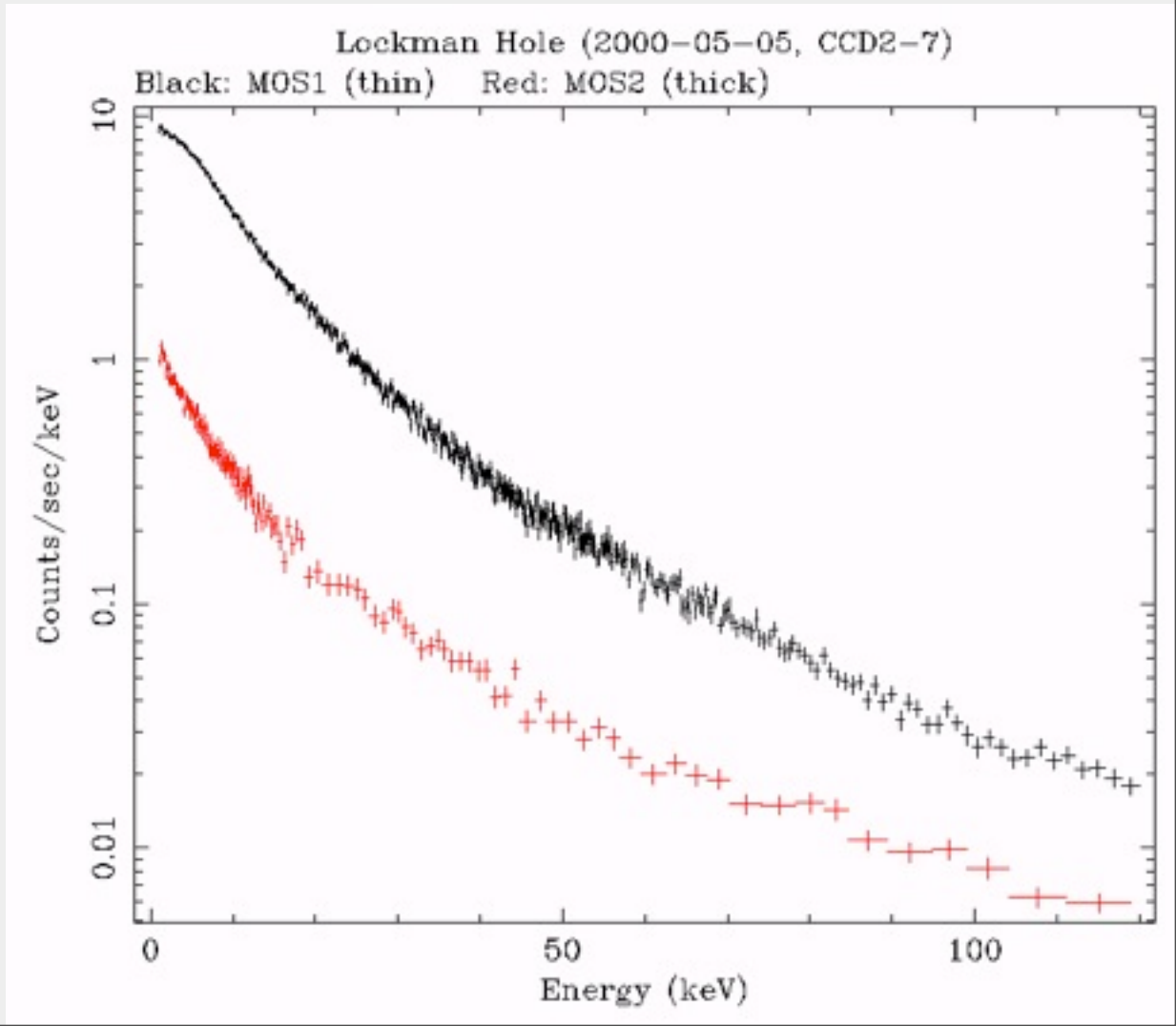
Arguably the most challenging component is the soft proton spectrally variable unlike NXB.

Can be reduced through the use of the thick filter



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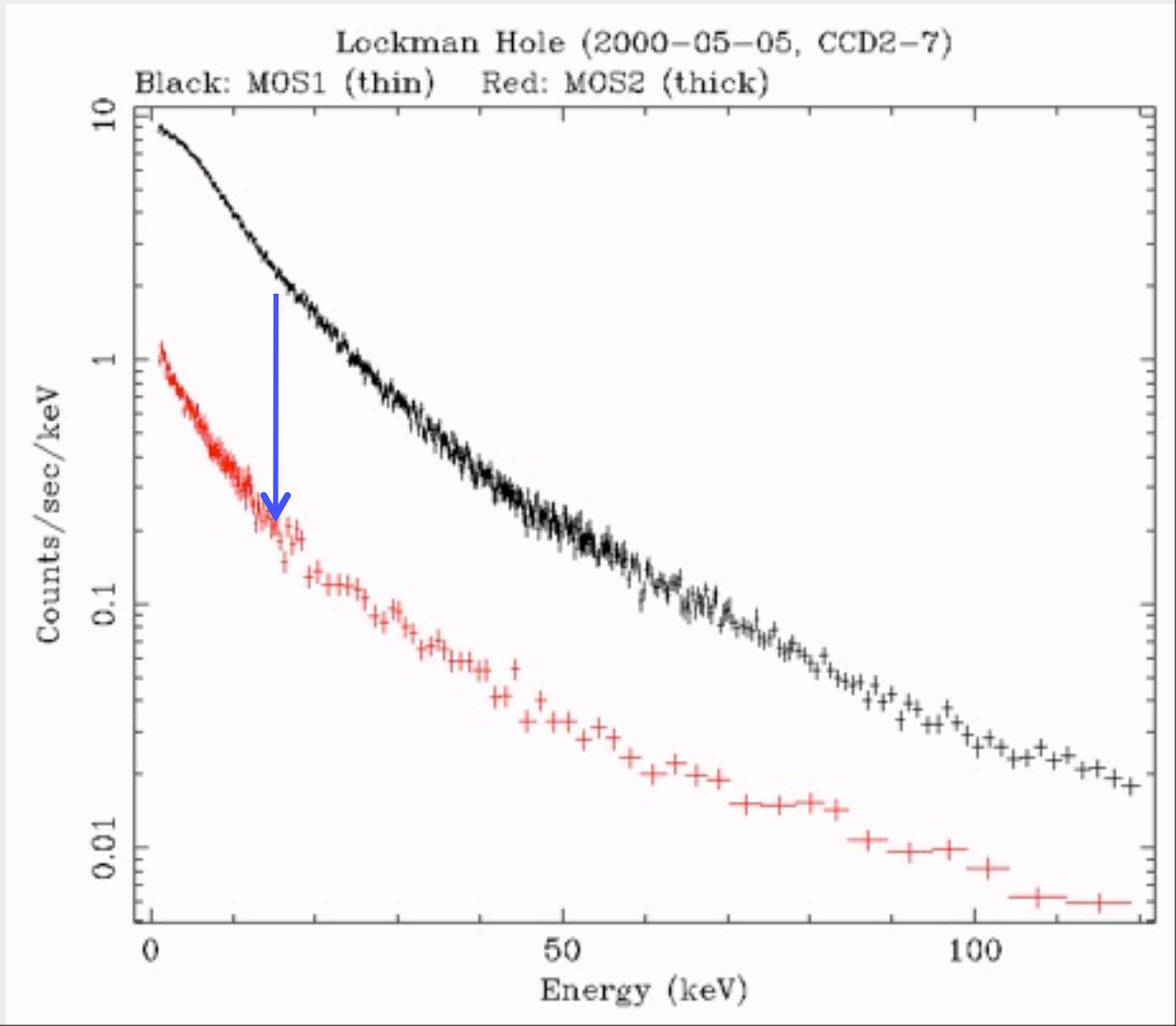

Characterizing the bkg

Perform supporting quasi-simultaneous observations

1. blank field
2. closed

A754 an application

Requested observing time on A754

Orbit 1			
Obs number	target	Filter	exposure
1	A754	THICK	50 ks
2	A754-closed1	CLOSED	15 ks
3	A754-offset	THICK	40 ks
Orbit 2			
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4	A754-closed2	CLOSED	15 ks
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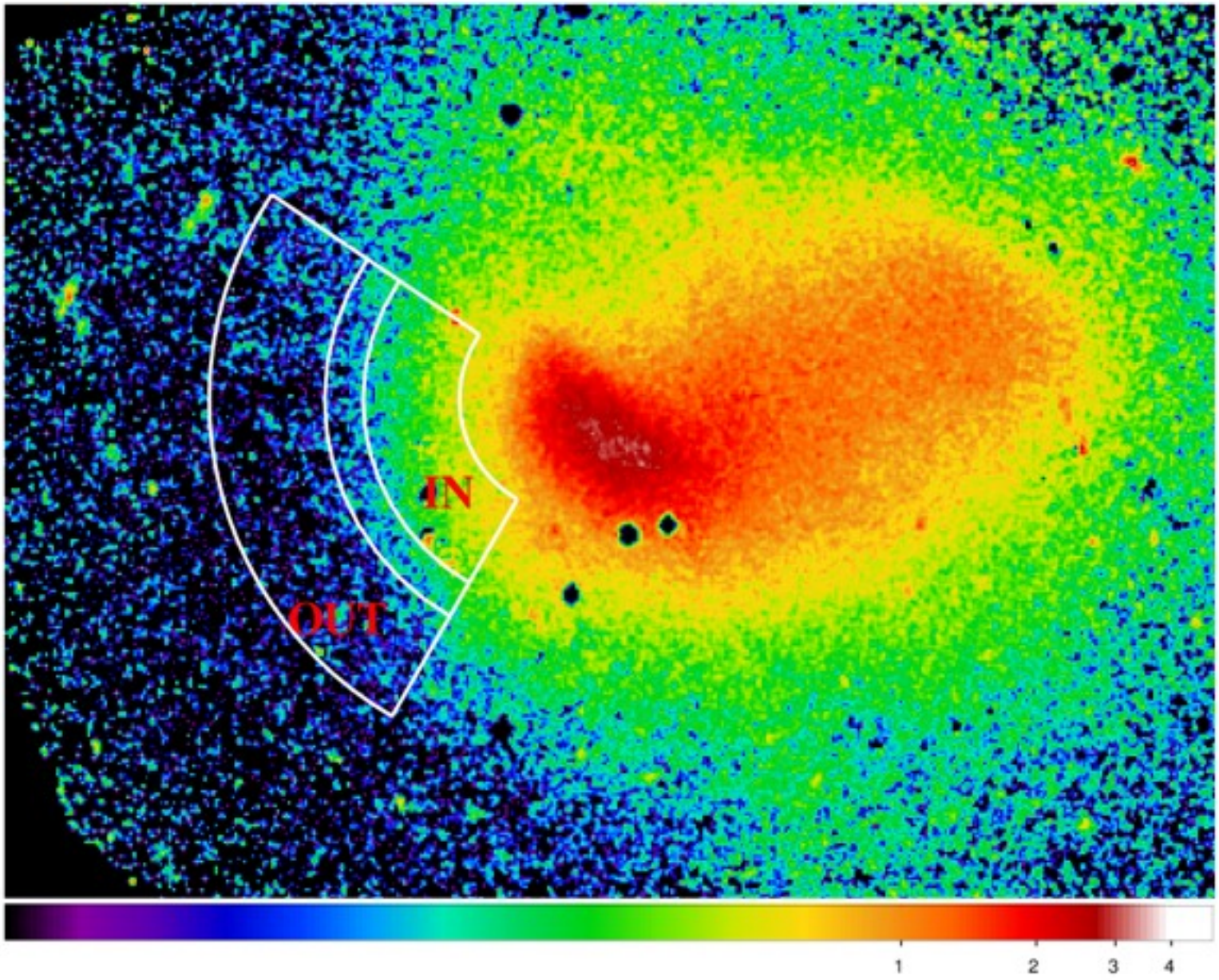
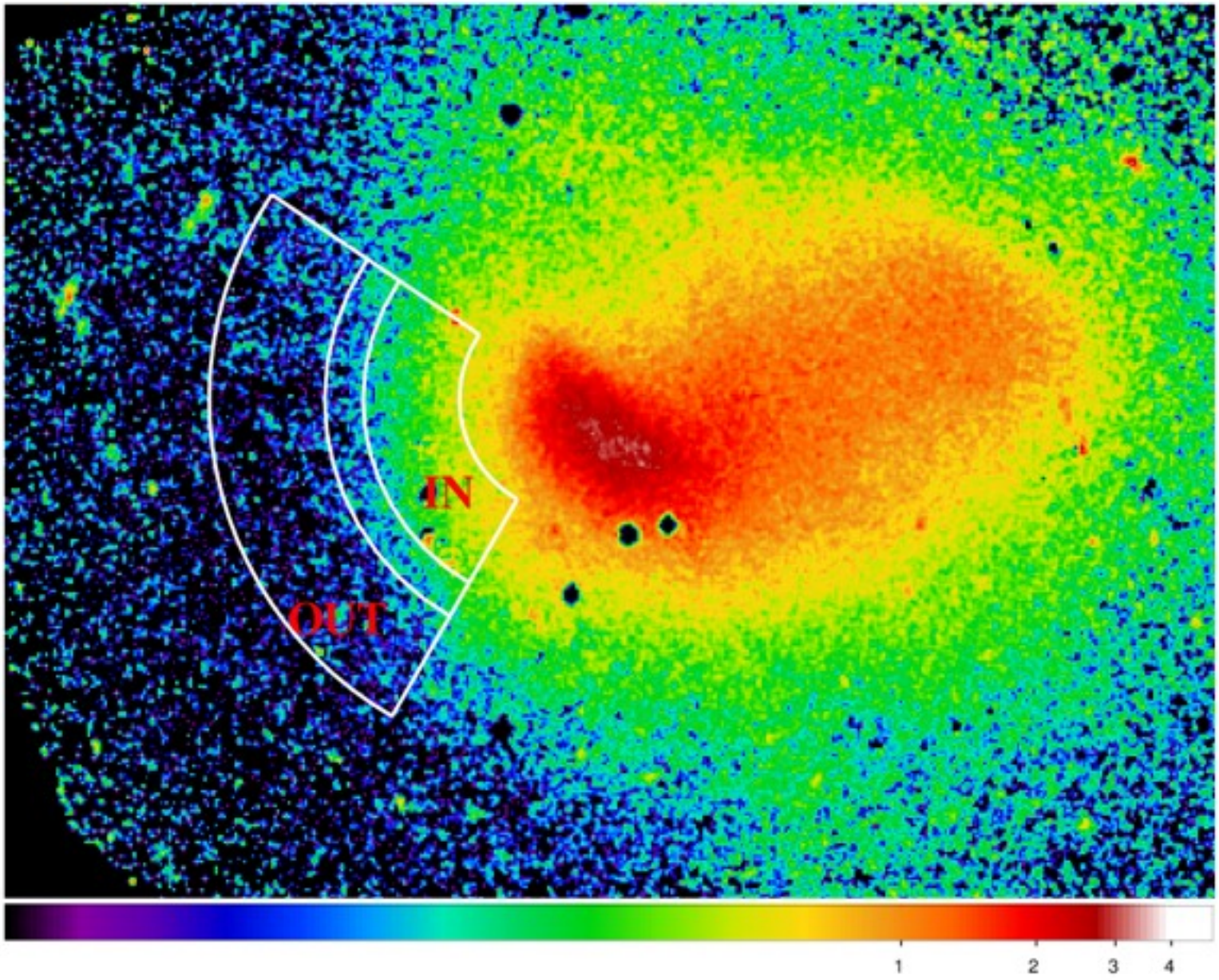
A754 results



A754 results



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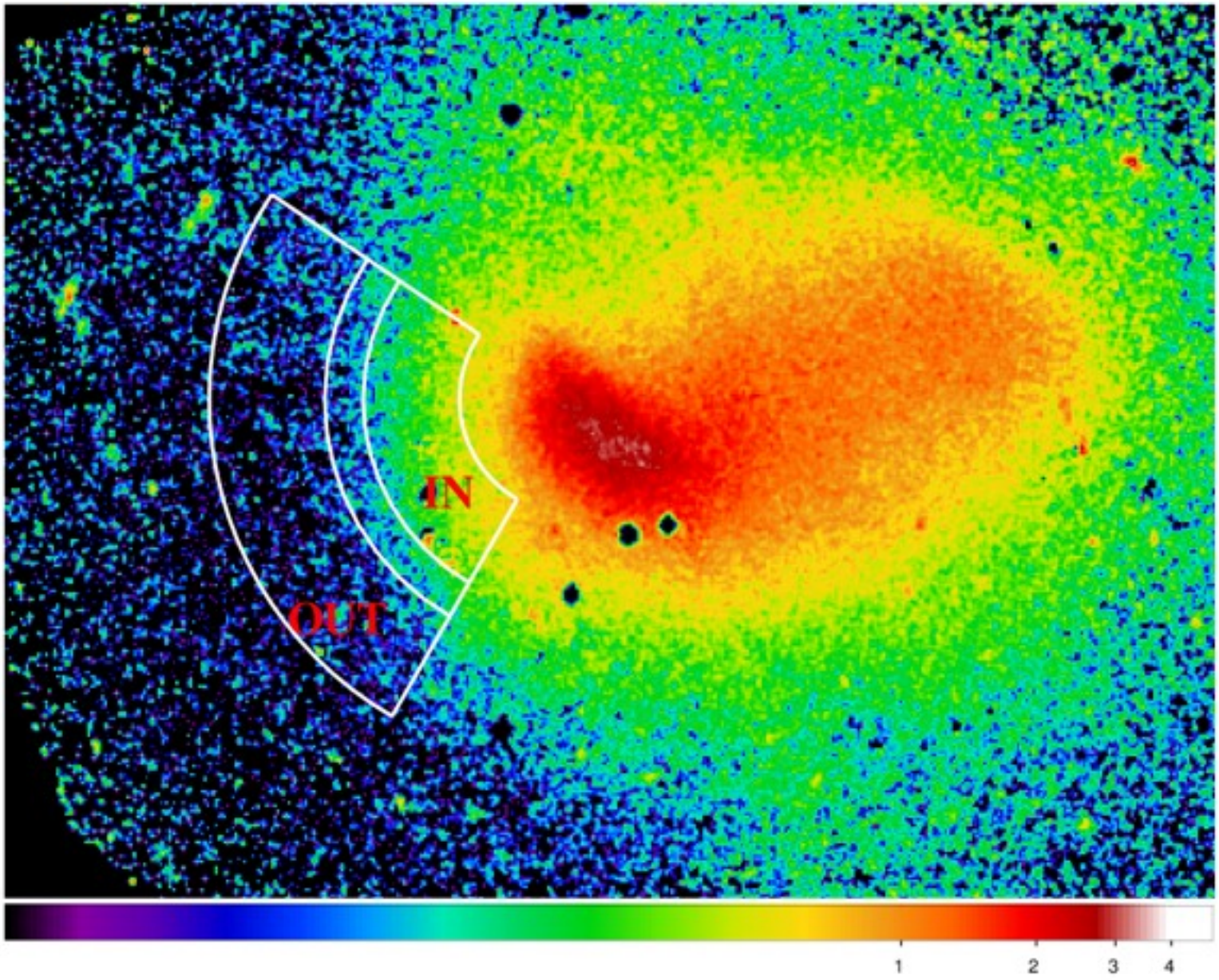
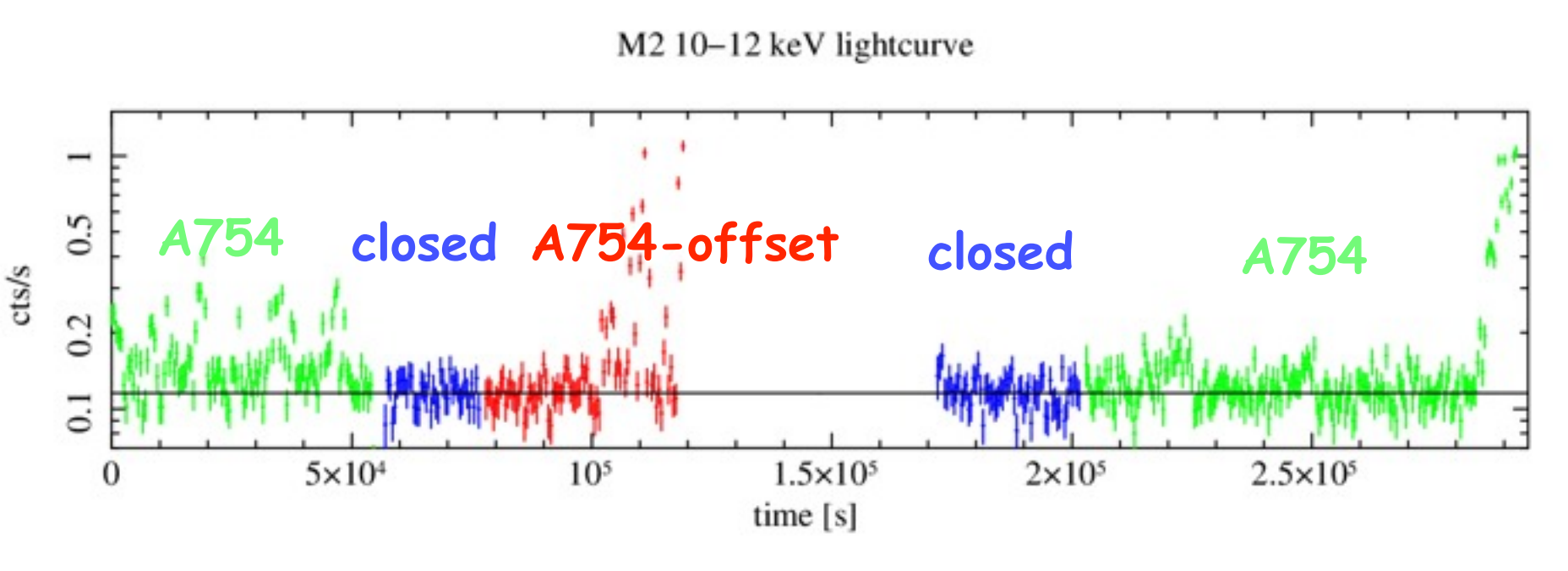


A754 lightcurve



Standard cleaning criteria applied

Time loss 20 %

in/out ratio good, not exceptional

Spectral analysis

spectral modelling methodology (modified version of Lec+Mol 2008 strategy)

For a given region

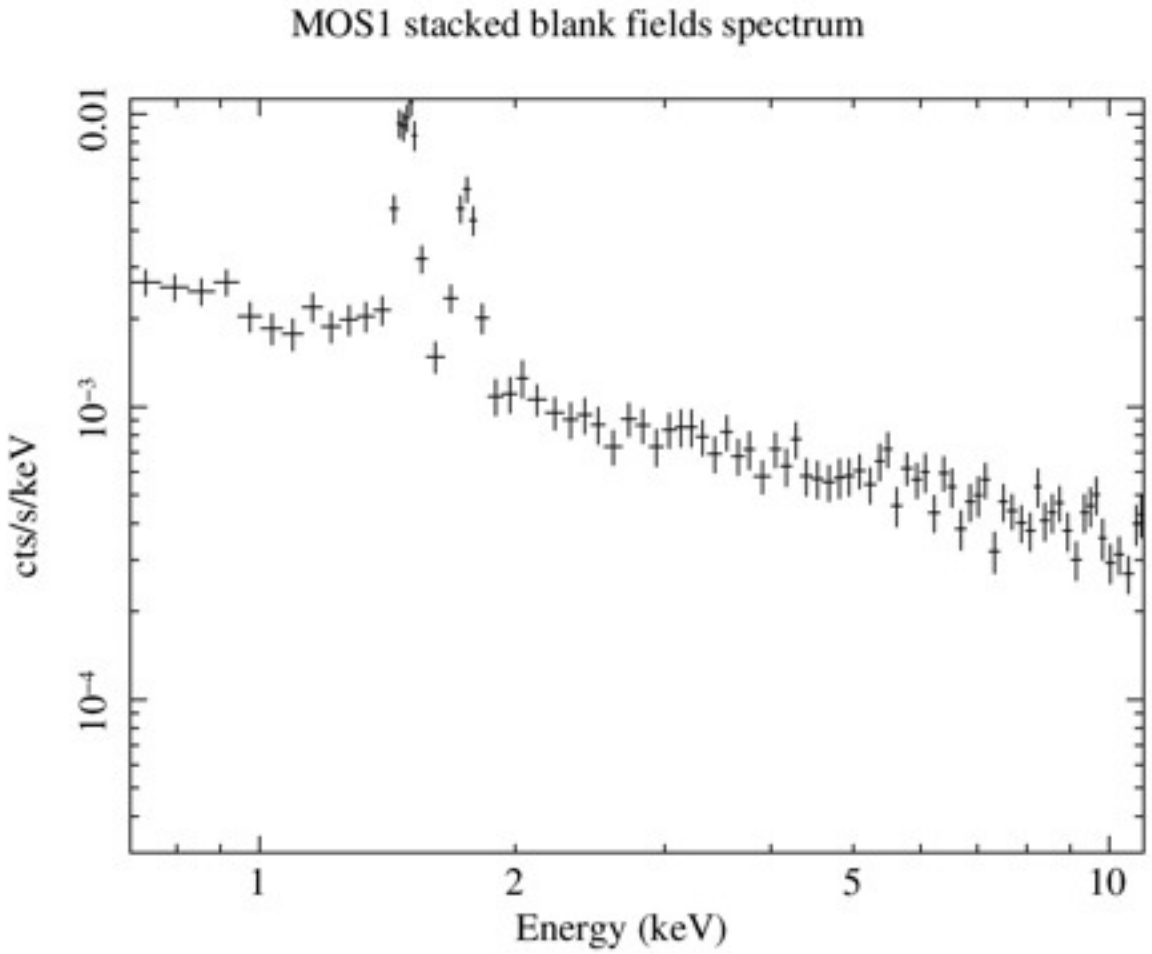
1) analize instrumental bkg spec from closed obs

2) analize stacked blank field instr. + cosmic bkg

3) analize offset field (same model as for stacked data)

4) analize source observation

Spectral analysis

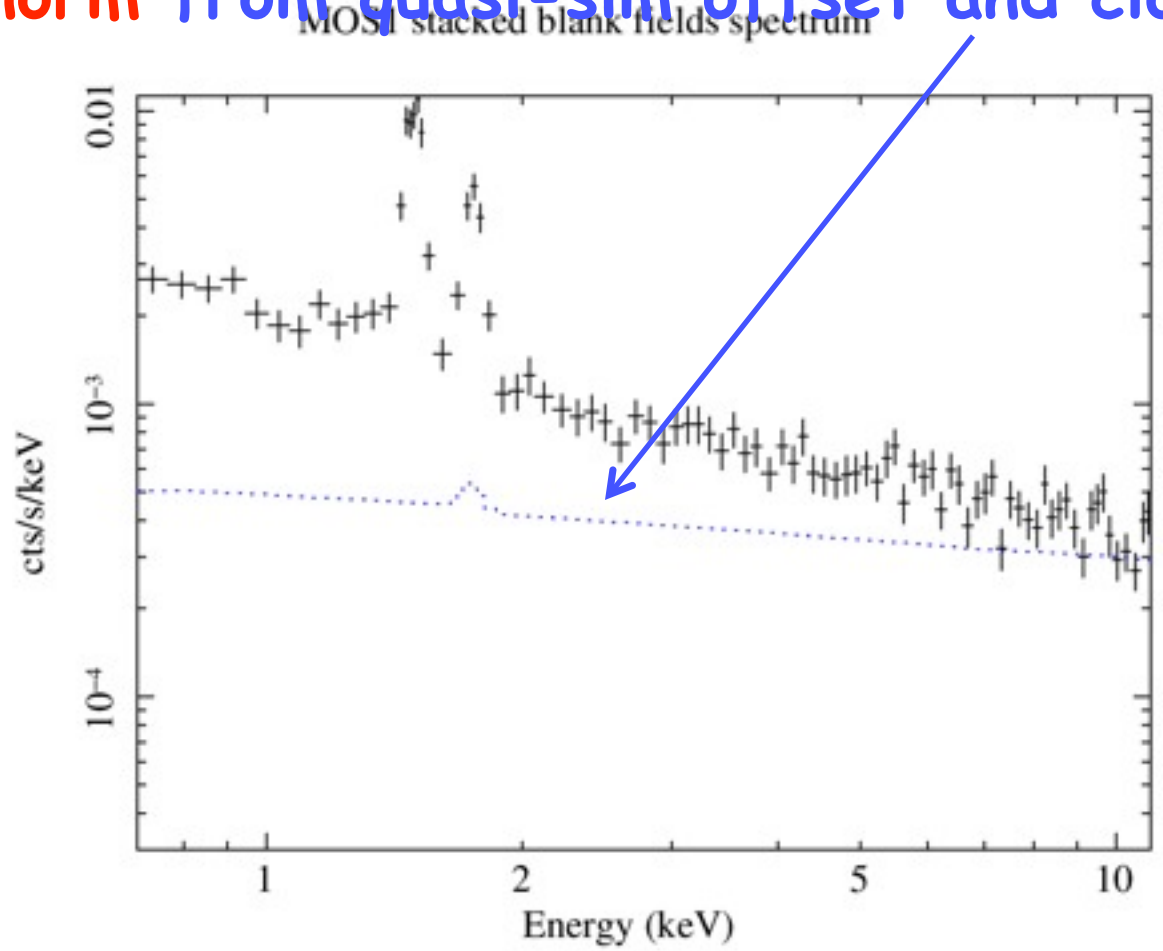


Spectral analysis

instrumental bkg continuum component

shape fixed,

norm from quasi-sim offset and closed obs

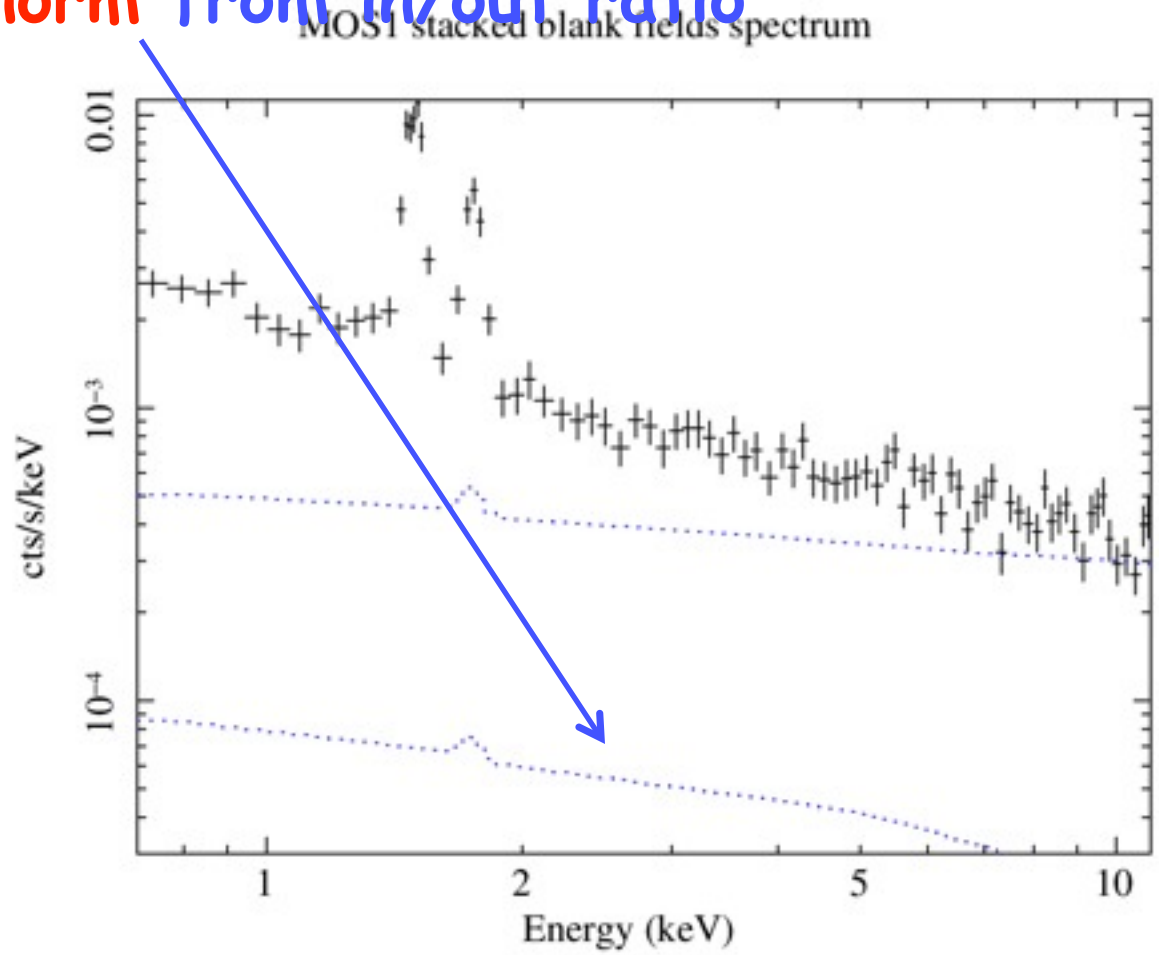


Spectral analysis

Soft proton component

shape fixed,

norm from in/out ratio

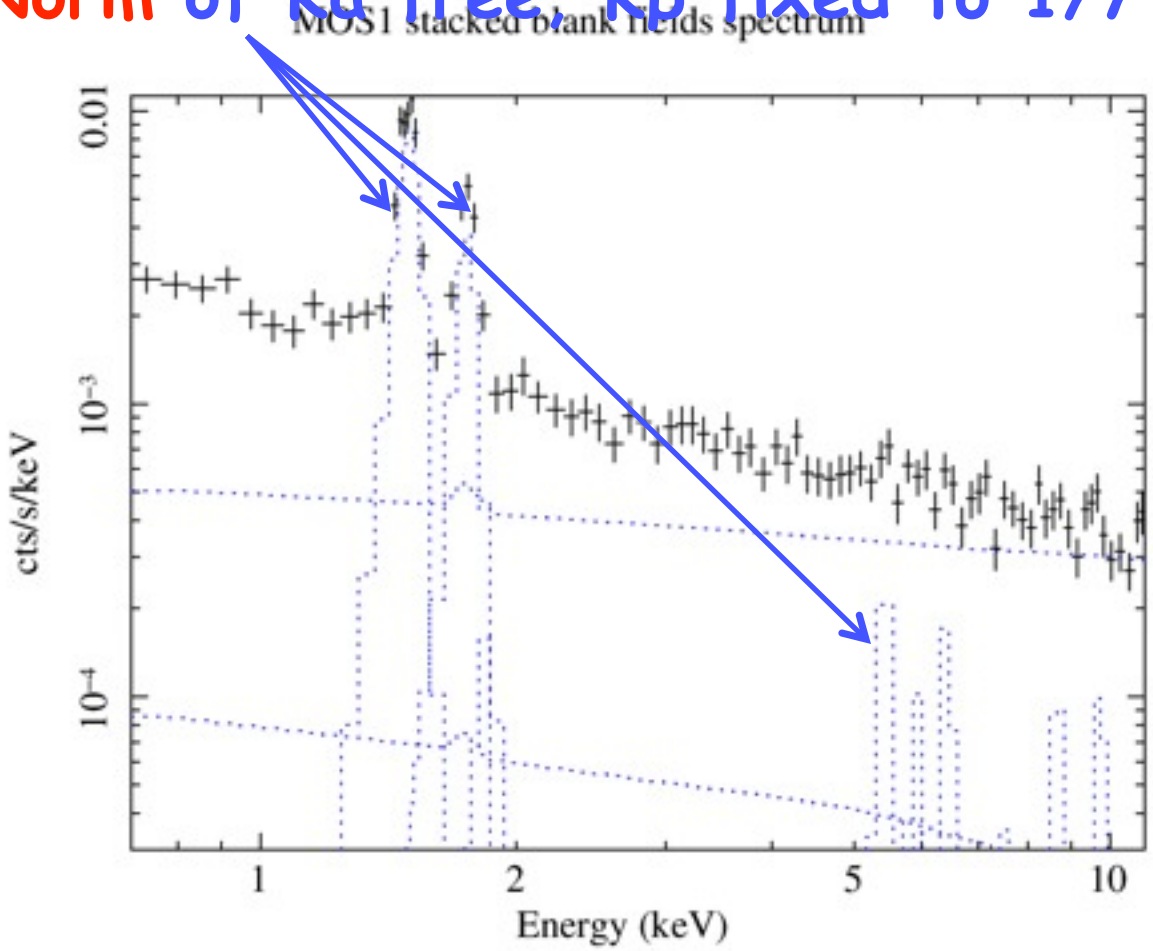


Spectral analysis

Fluorescence emission lines,

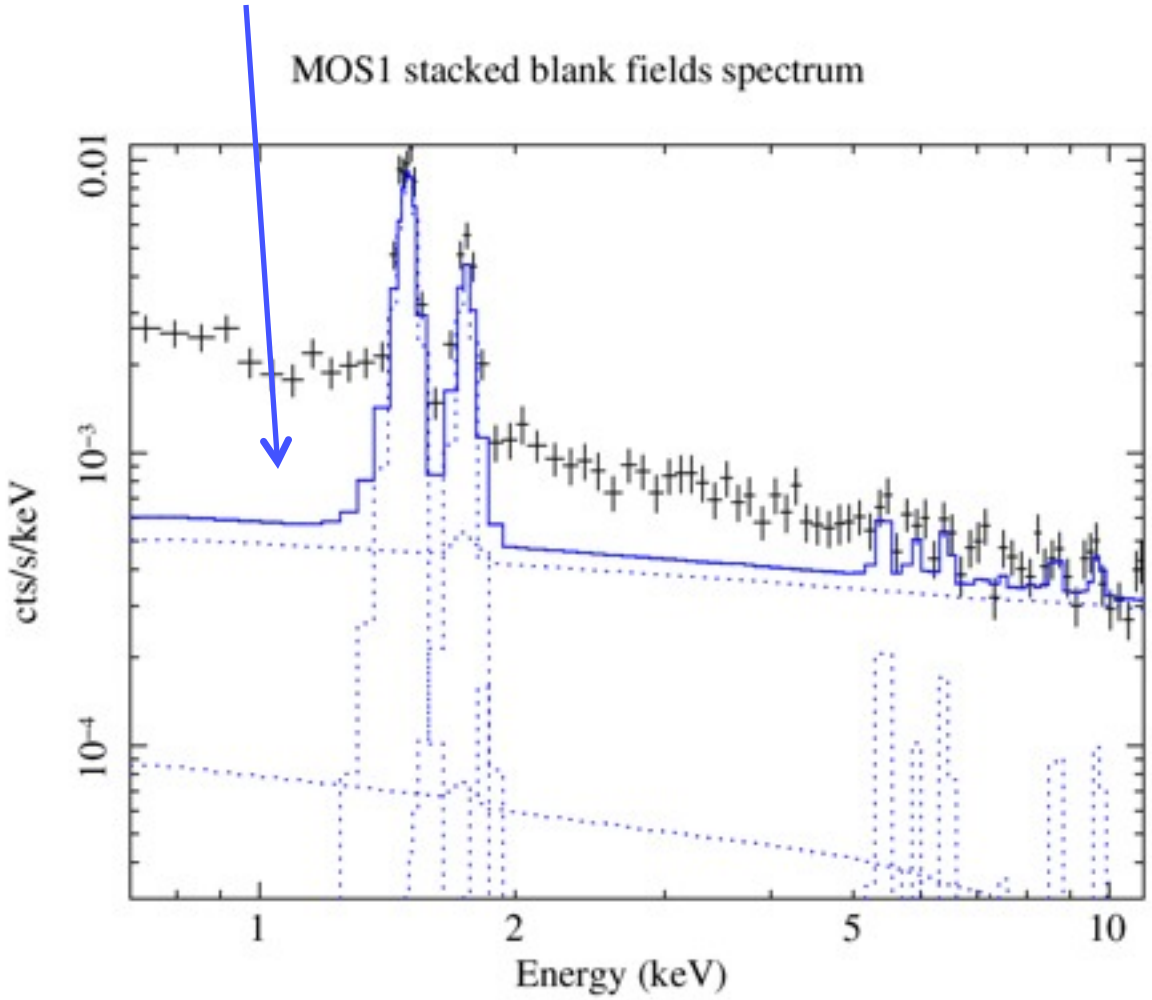
Energies fixed,

Norm of Kα free, Kβ fixed to 1/7 of Kα



Spectral analysis

Total instrumental bkg convolved with rmf, not with arf

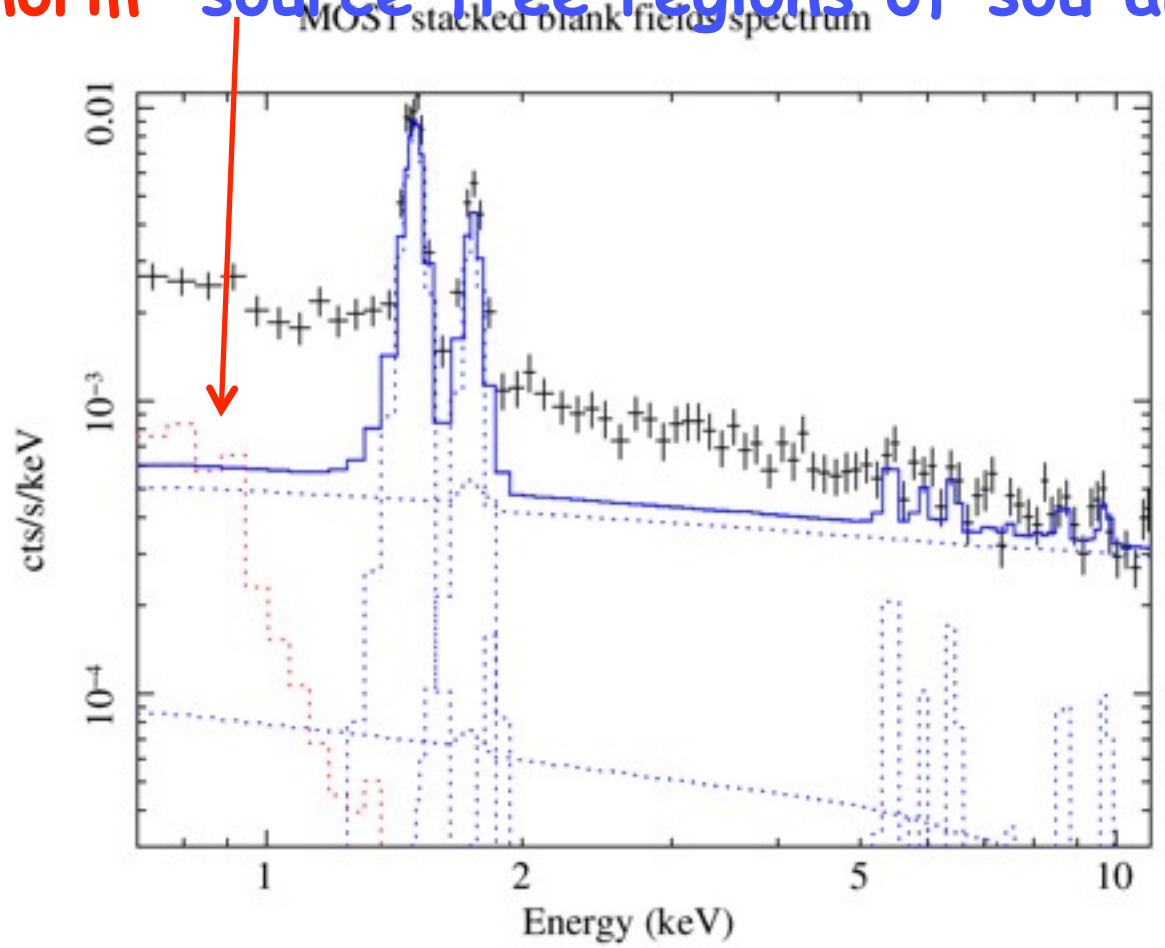


Spectral analysis

Galactic foreground

shape fixed, kT = 0.2 keV

norm source free regions of sou and offset pointings

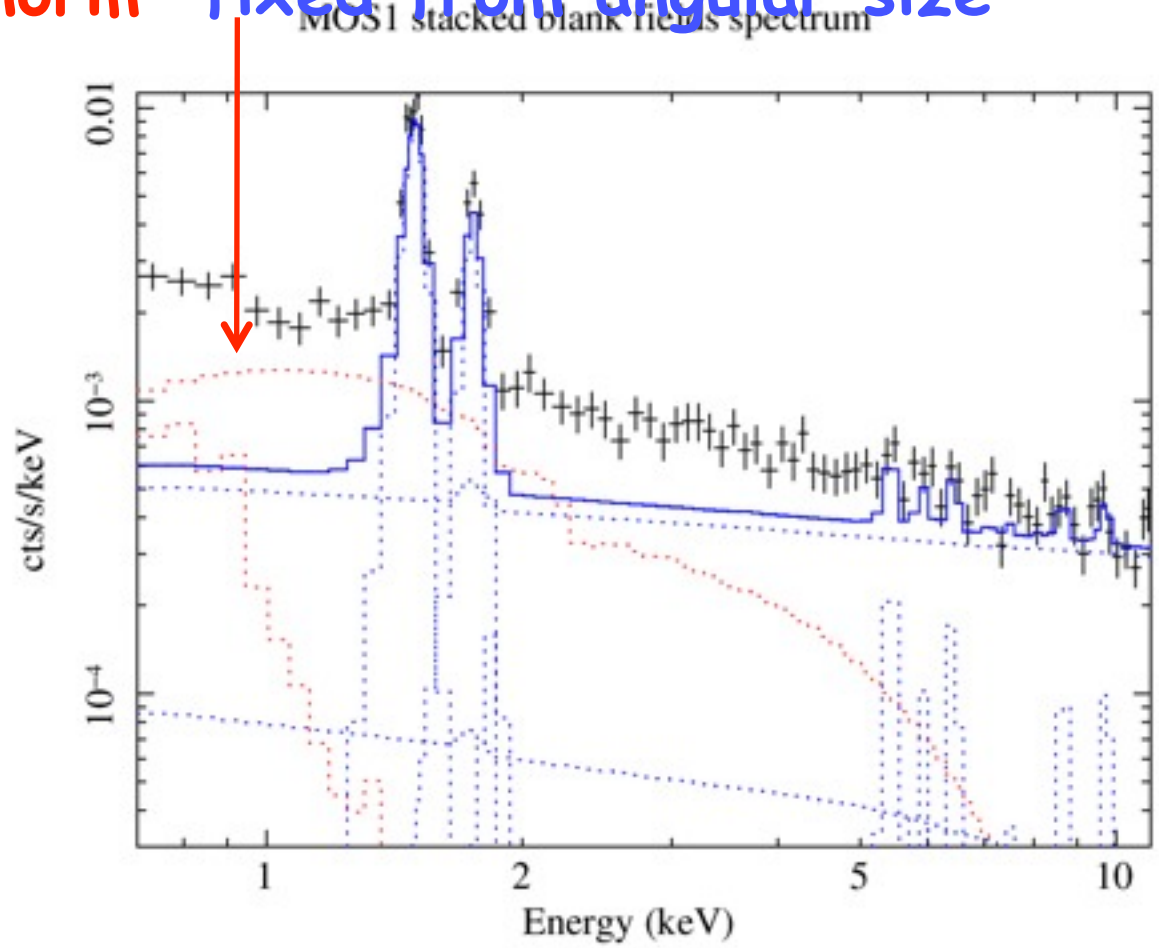


Spectral analysis

Extragalactic CXB

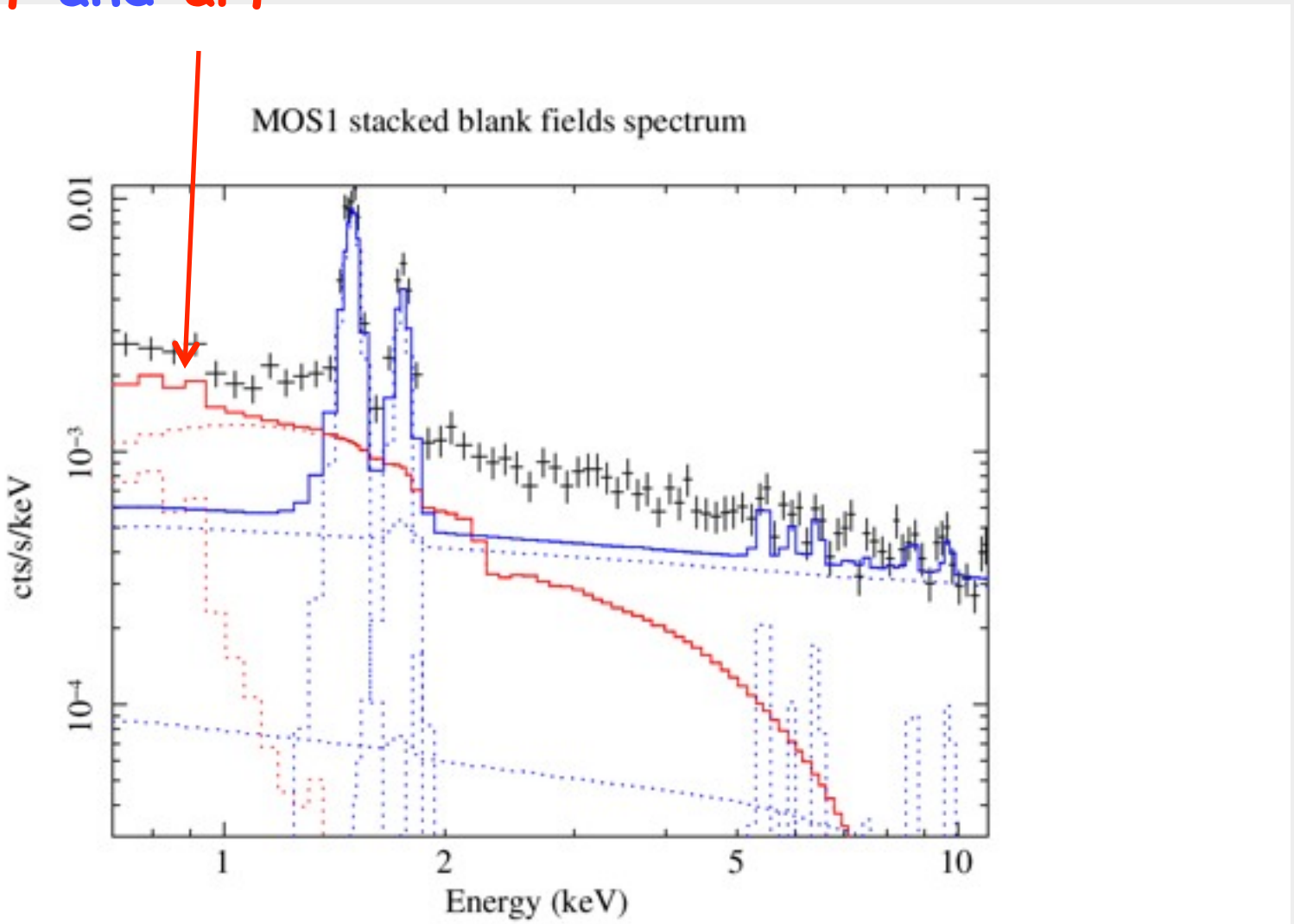
shape fixed

norm fixed from angular size

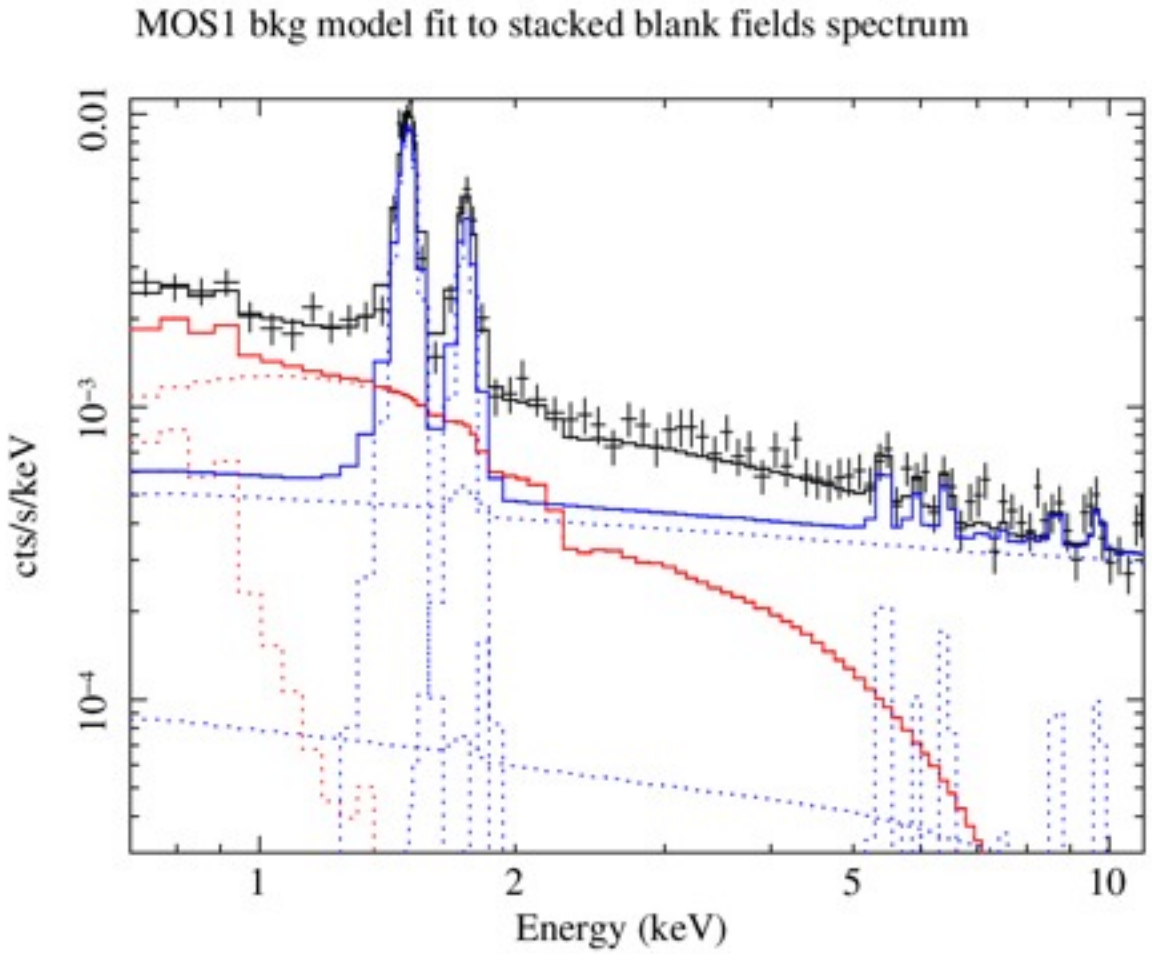


Spectral analysis

Total cosmic bkg, absorbed with NH, convolved with rmf and arf

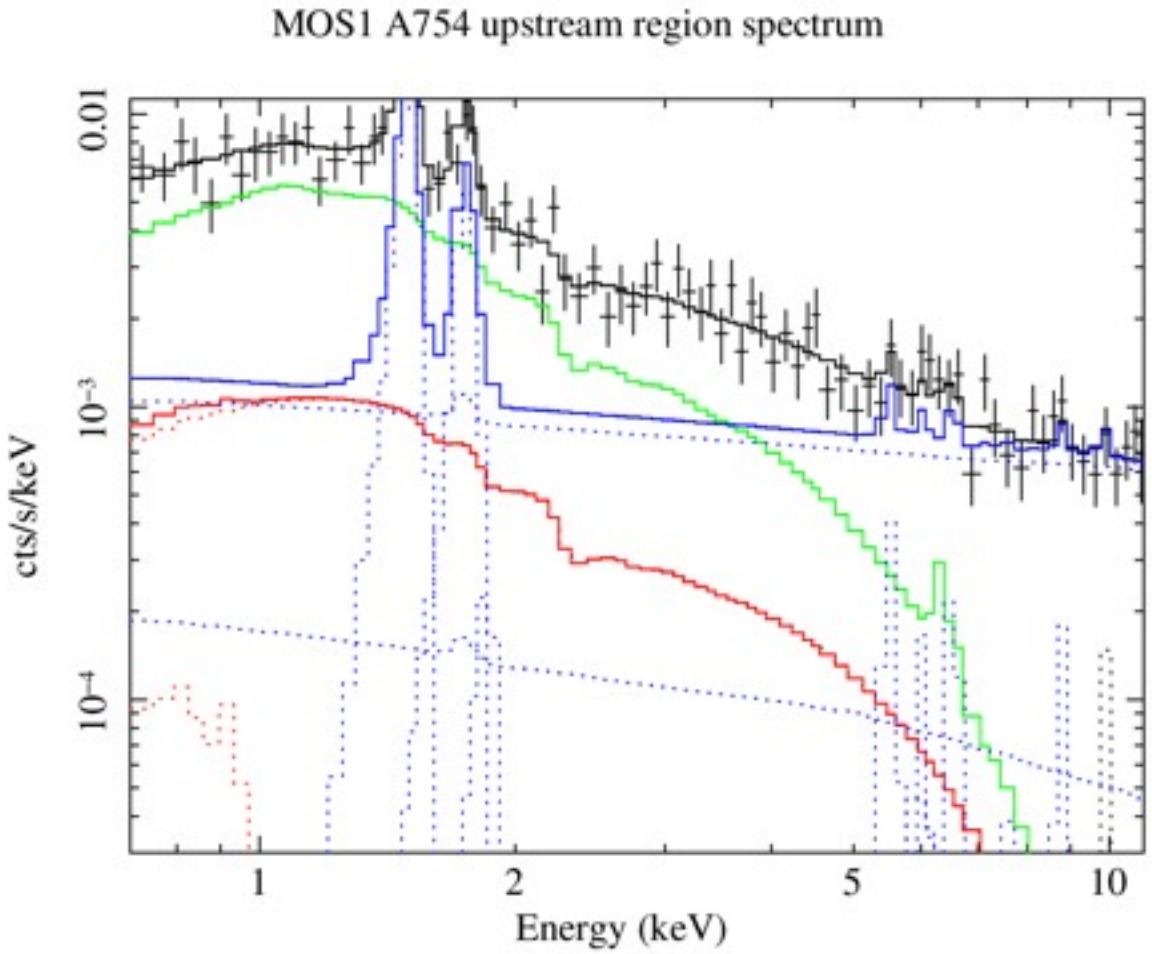


Spectral analysis

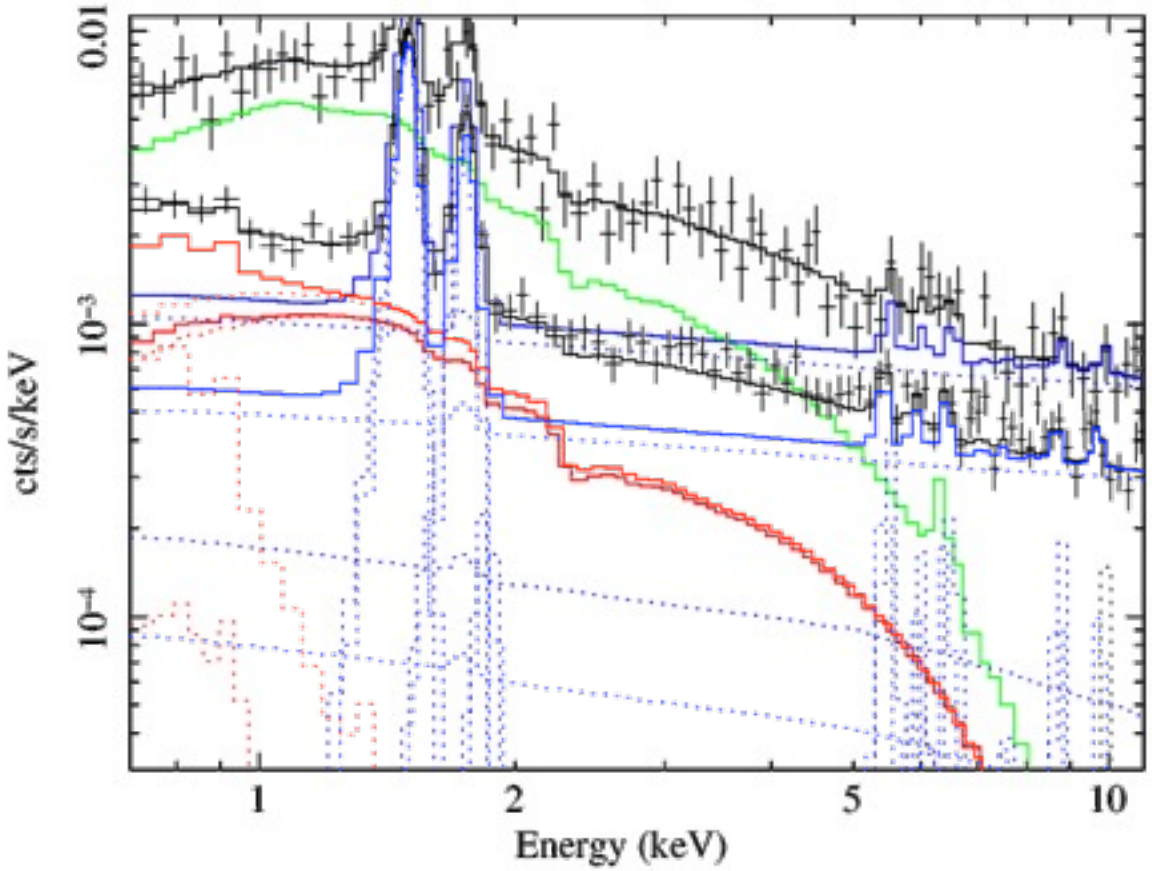


Spectral analysis

Source spectrum, kT and norm are free parameters

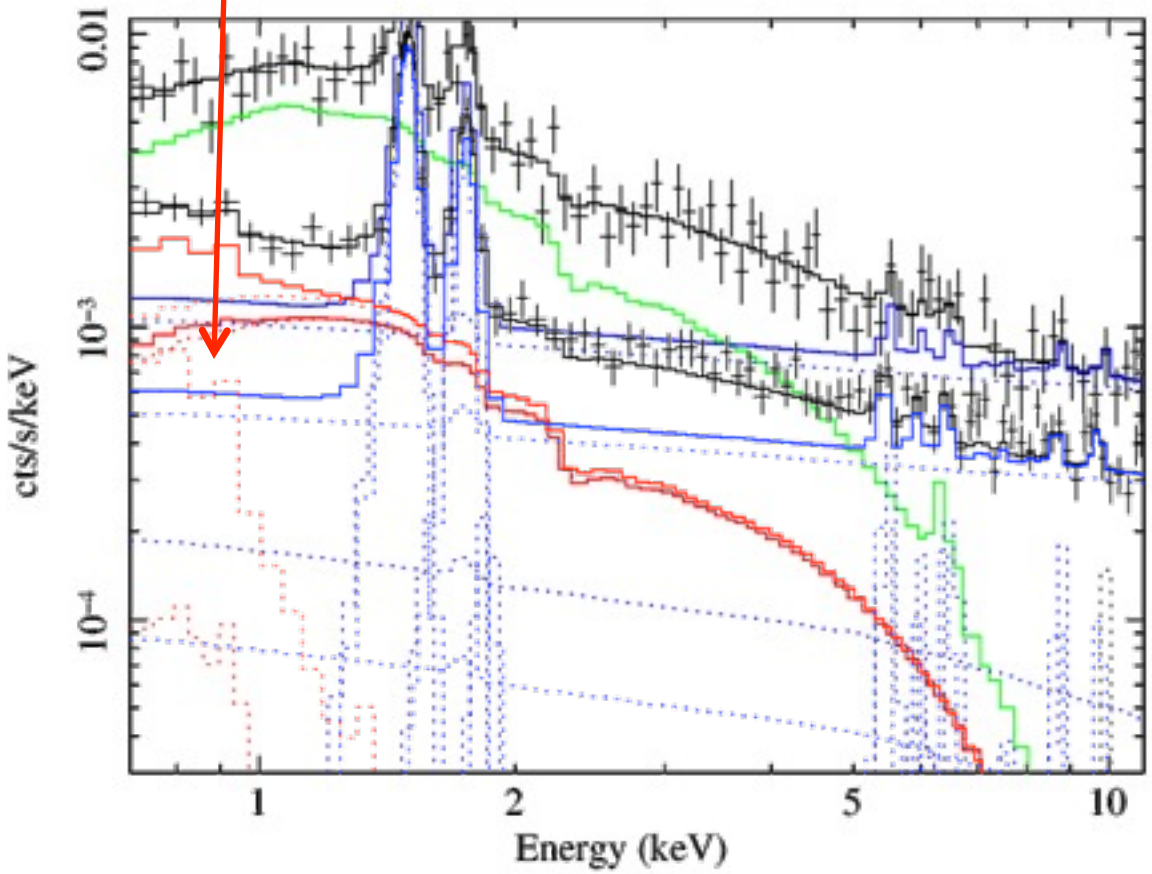


Spectral analysis



Spectral analysis

Galactic foreground



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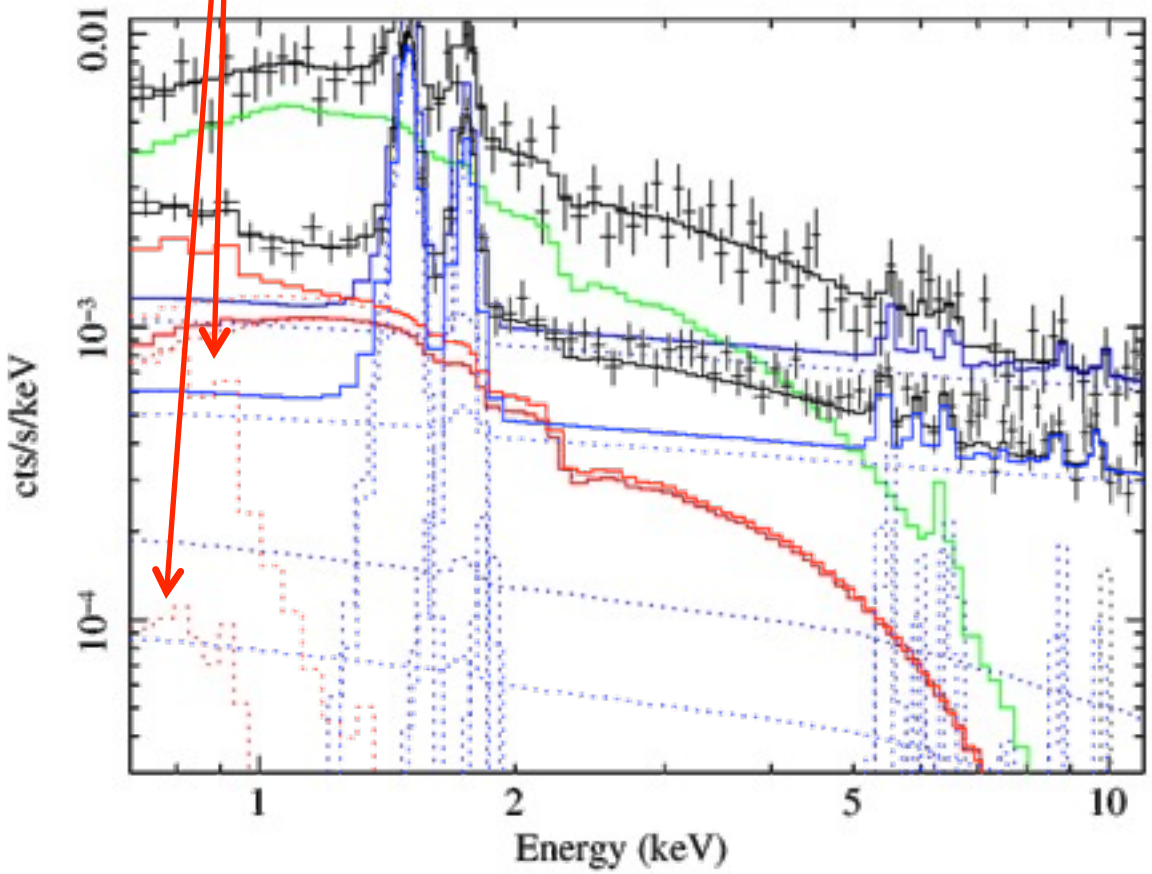
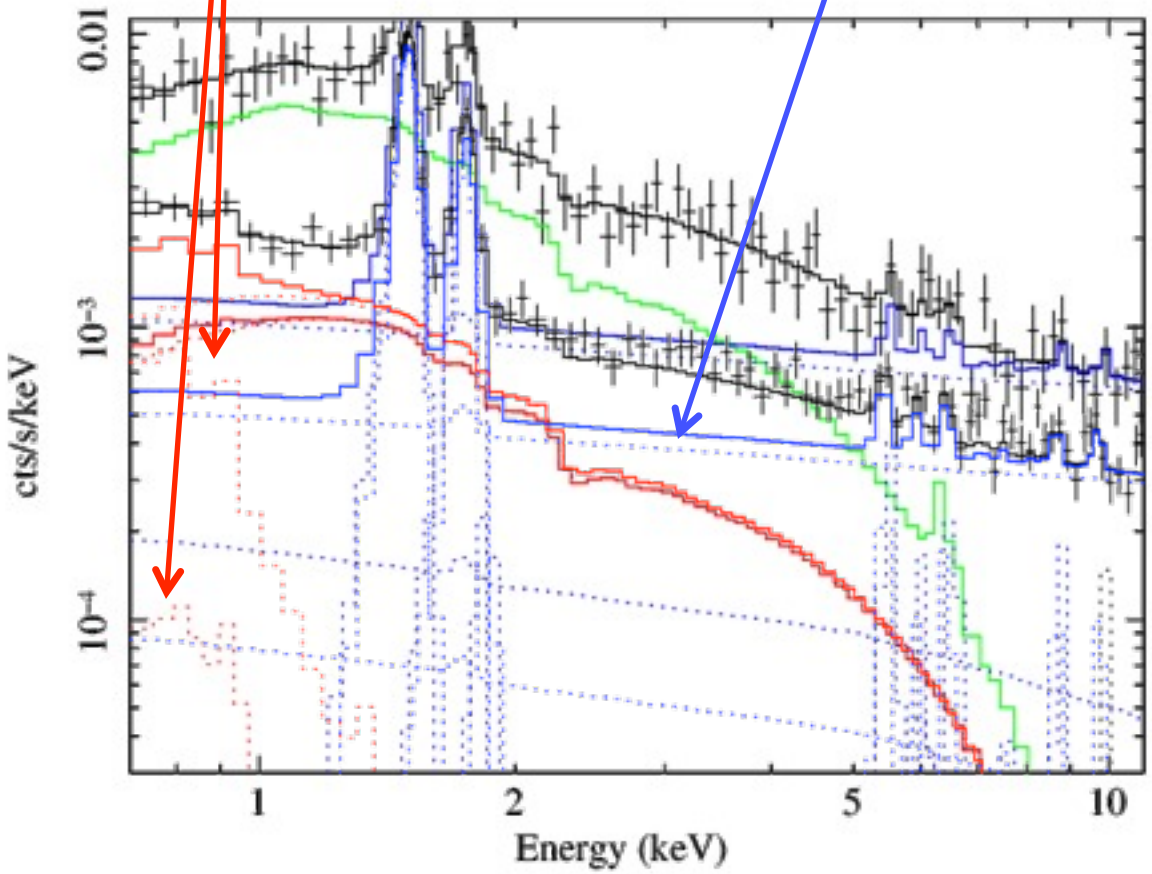


Spectral analysis

Galactic foreground

continuum instrumental bkg



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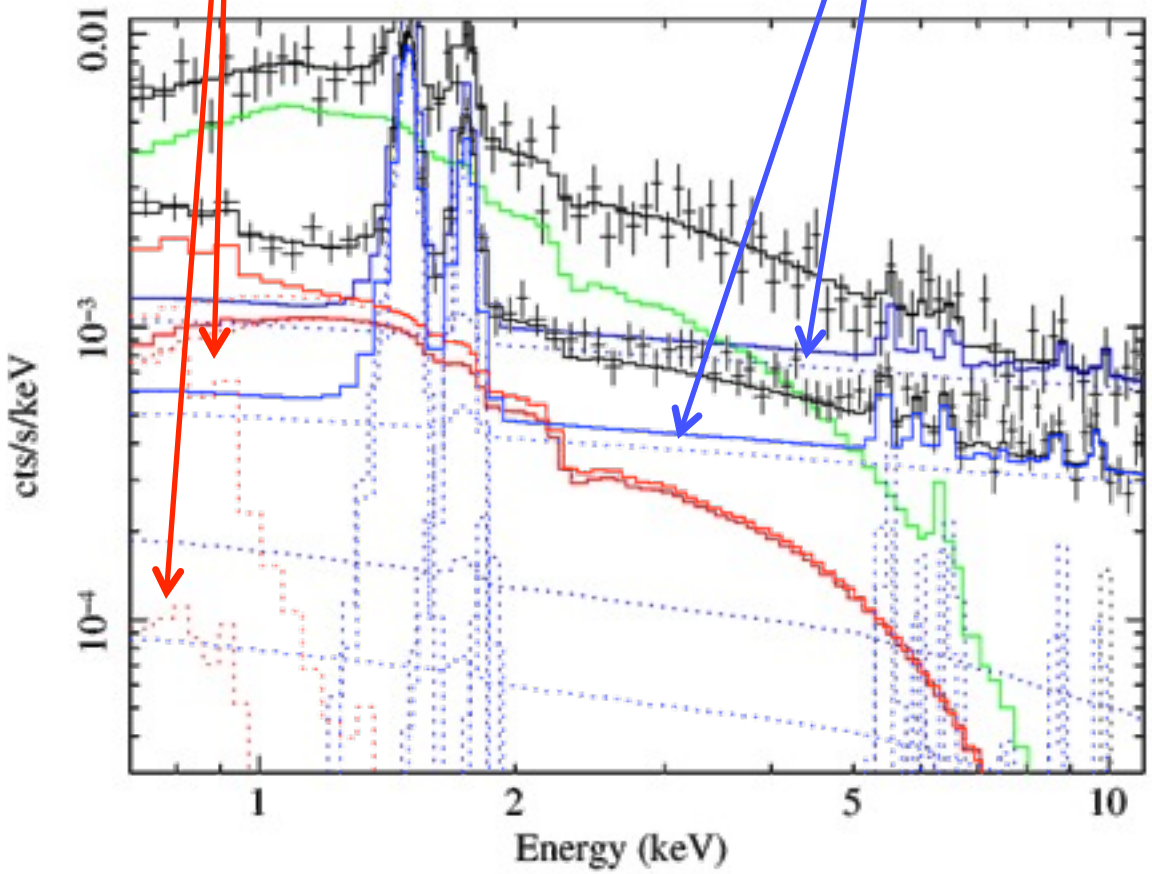

Results

Sou/bkg of out region is ~0.7, at the limit of previous measurements

	Norm	kT
	XSPEC units x10^{-5}	keV
MOS1	9.2±0.4	6.9 $^{+0.9}_{-0.5}$
MOS2	9.4±0.4	9.2 $^{+5.0}_{-2.0}$

Full analysis of systematic errors is in progress

Still working on pn: need template models for sp

Timeline

1. Finish MOS analysis
2. Perform pn analysis
3. Publish paper
4. Present "cluster outskirt" observation mode