Analysis of the September 04 Outburst of X0115+63

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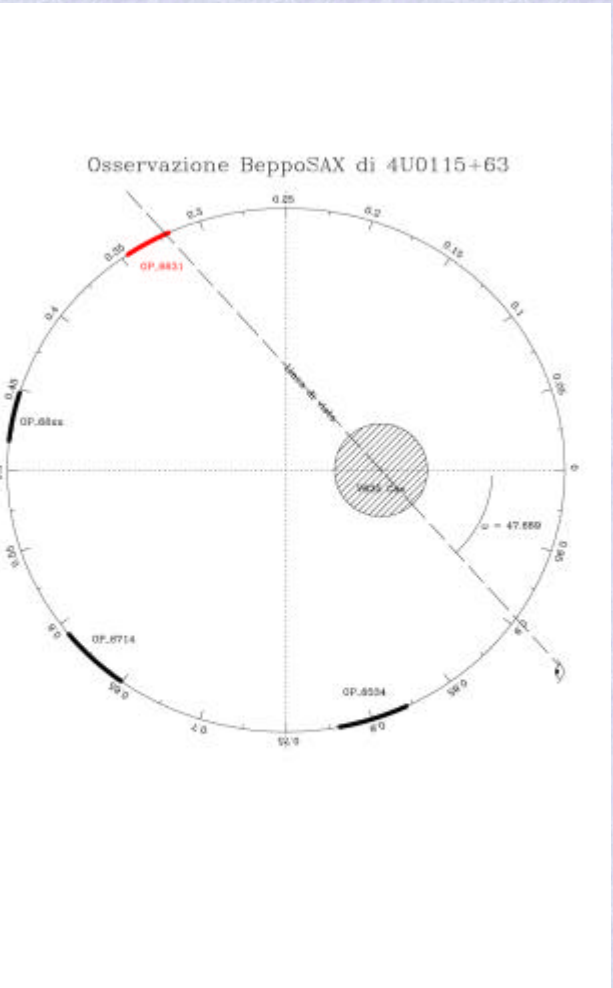
MPE-München etc…

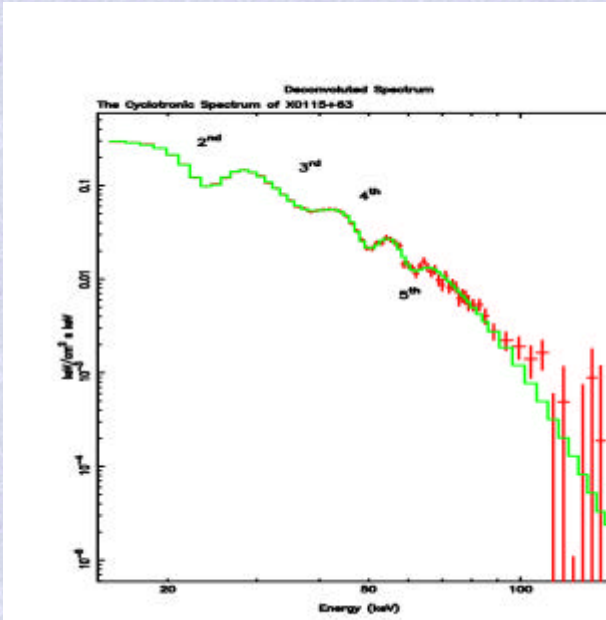
Outline

- The source and the Outburst
- Preliminary SPI results
- Light curves (with IBIS)
- IBIS results

The source

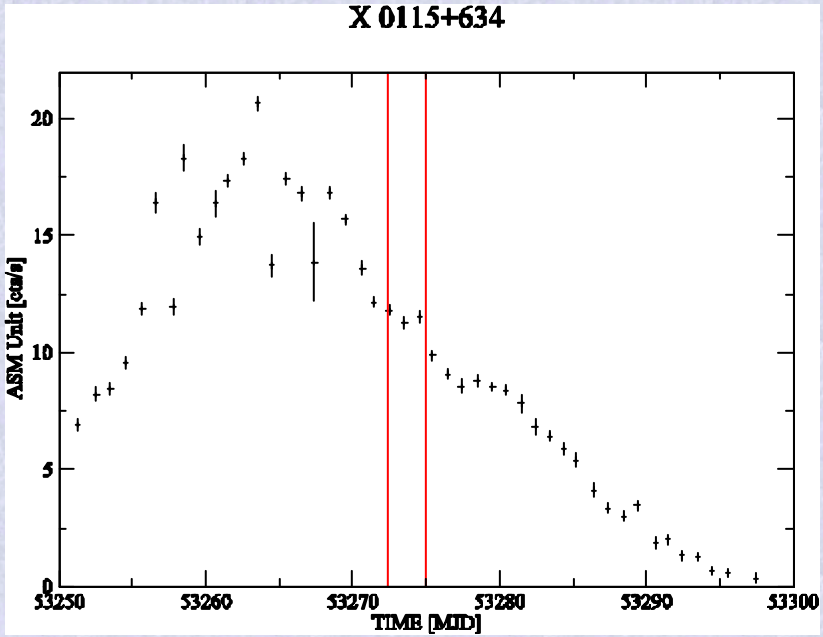


- Recurrent Transient
- Orbiting with a 24.3 days Oe9 star V635 Cassiopeae
- e=0.34 d~7 kpc
- Luminosity ranges from 10^{37}-10^{38} ergs/s



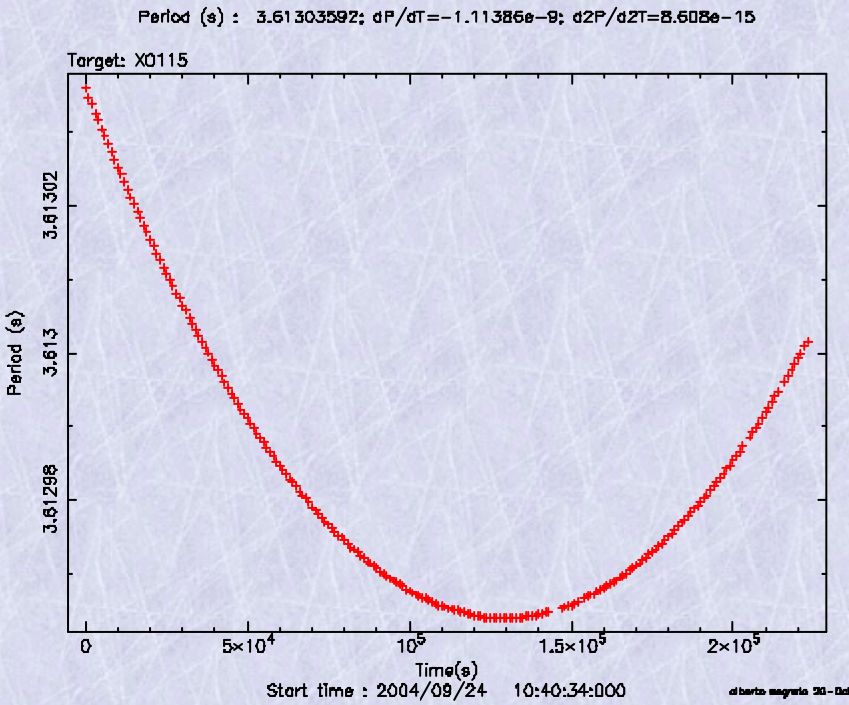
The 2004 Outburst

ASM light curve



T_{exp} ~ 200 ks

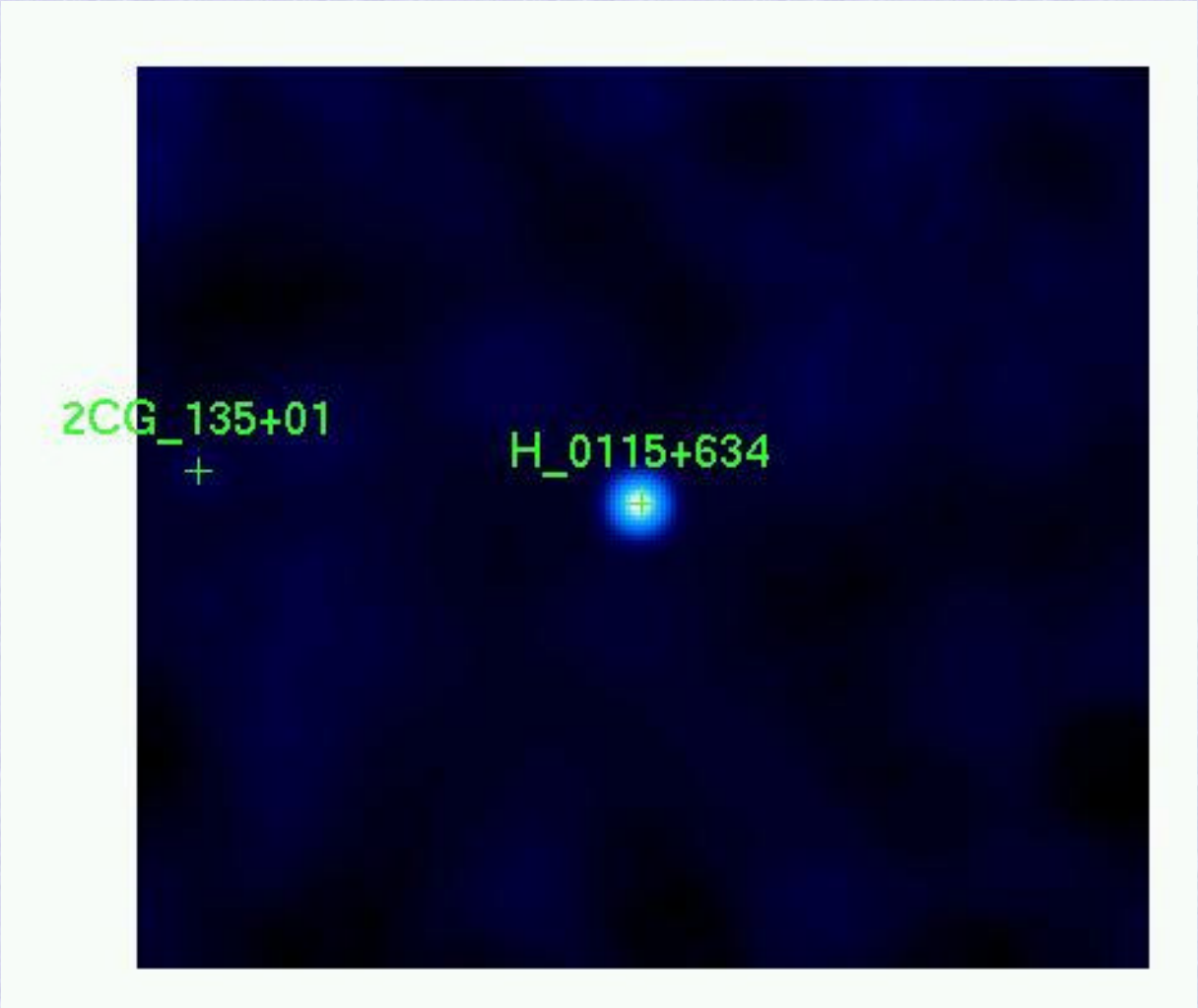
P_{spin} ~ 3.6130 s

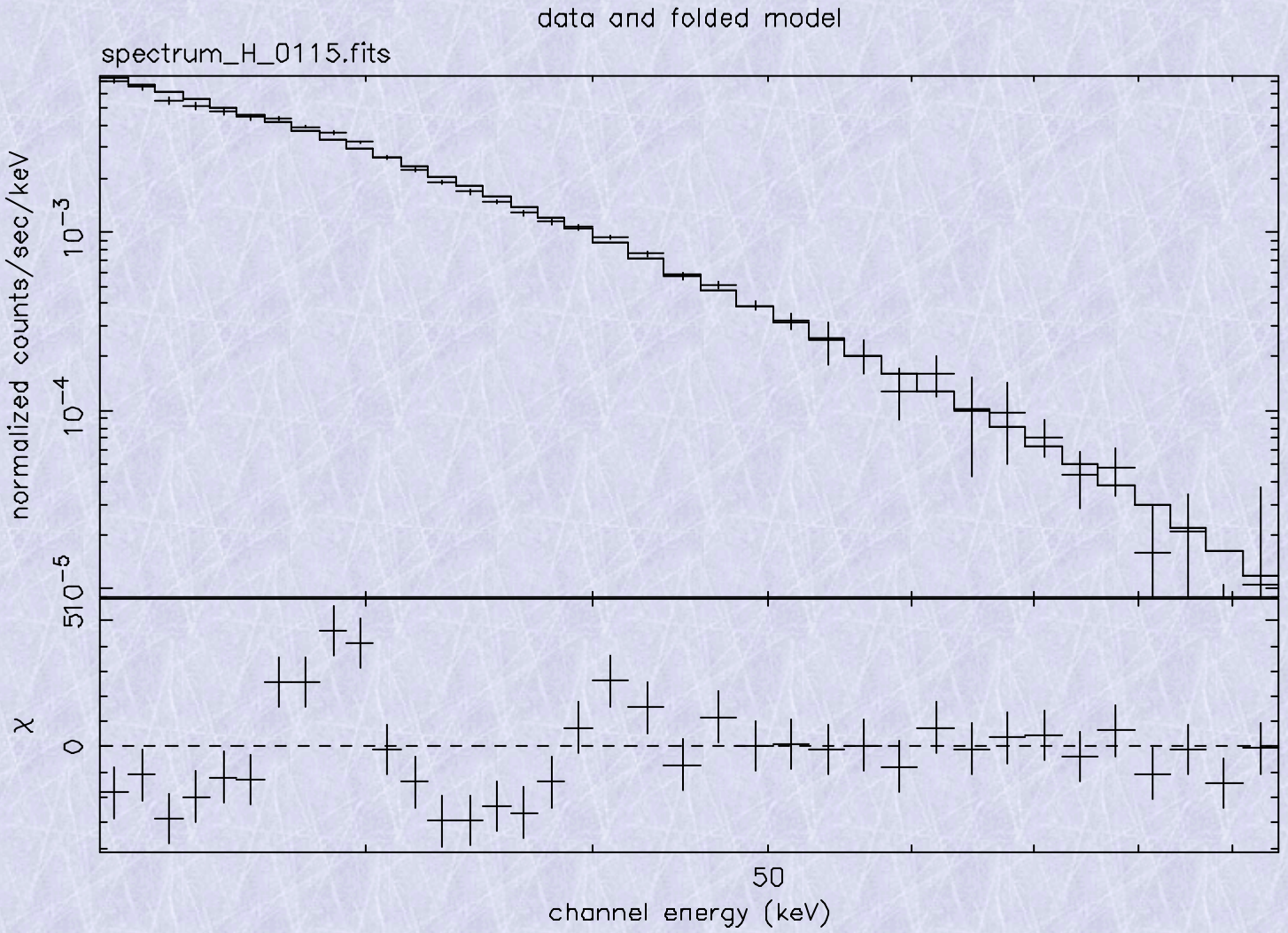


Luminosity 360 mCrab (20-40keV)

Triggered Early September Rev 238

X0115+63 as seen by SPI





$$NPEX = (A_1 E^{+\alpha_1} + A_2 E^{-\alpha_2}) e^{-EkT} \leftarrow (E^2 + o(E^2)) e^{-EkT}$$

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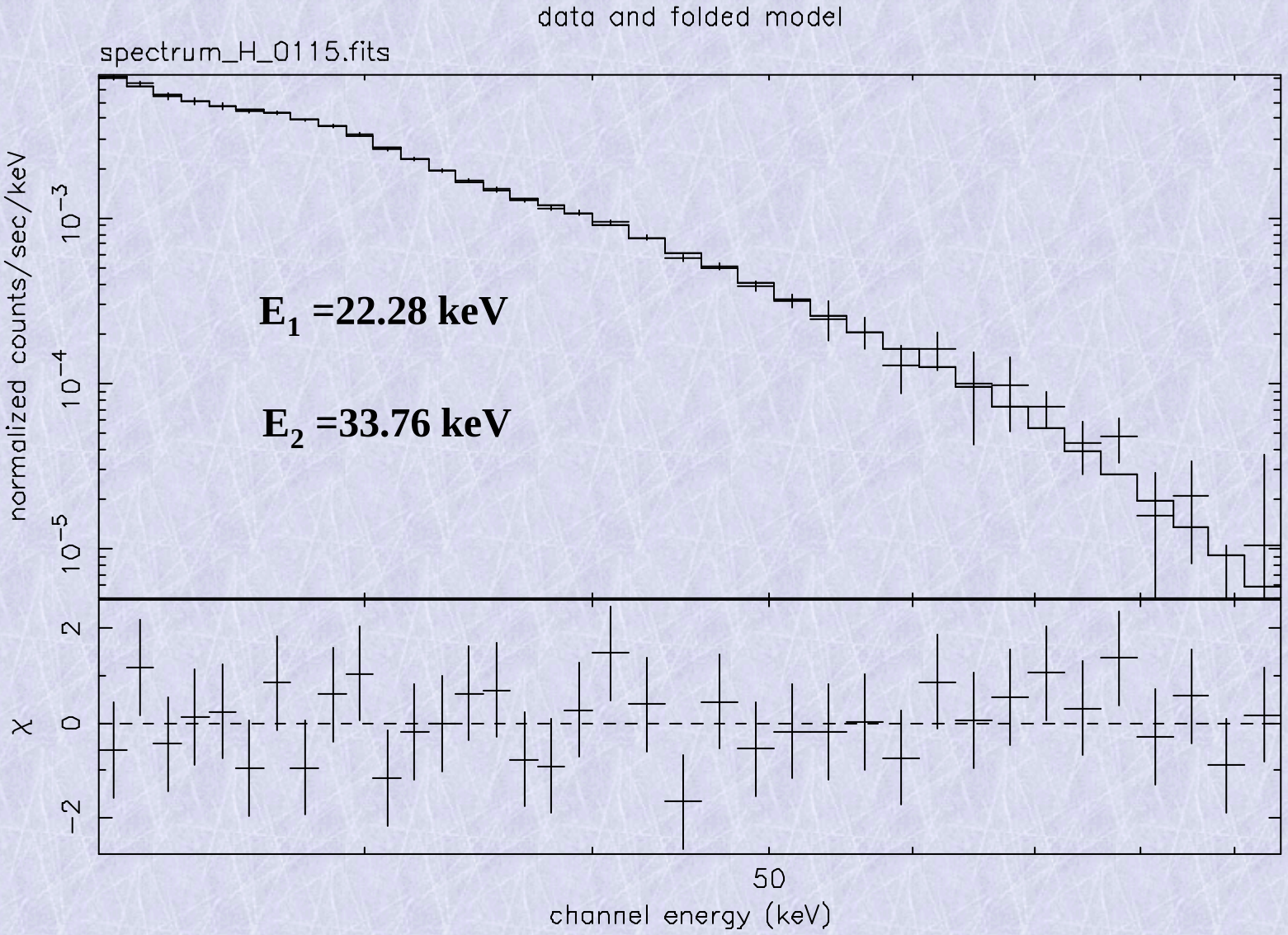
pproximates thermal comptonization Sunyaev and Titarchuk, 1980


data and folded model
spectrum_H_0115.fits
normalized counts/sec/keV
10^{-3}
10^{-4}
10^{-5}
E_1 =22.28 keV
E_2 =33.76 keV
χ
2
0
-2
50
channel energy (keV)
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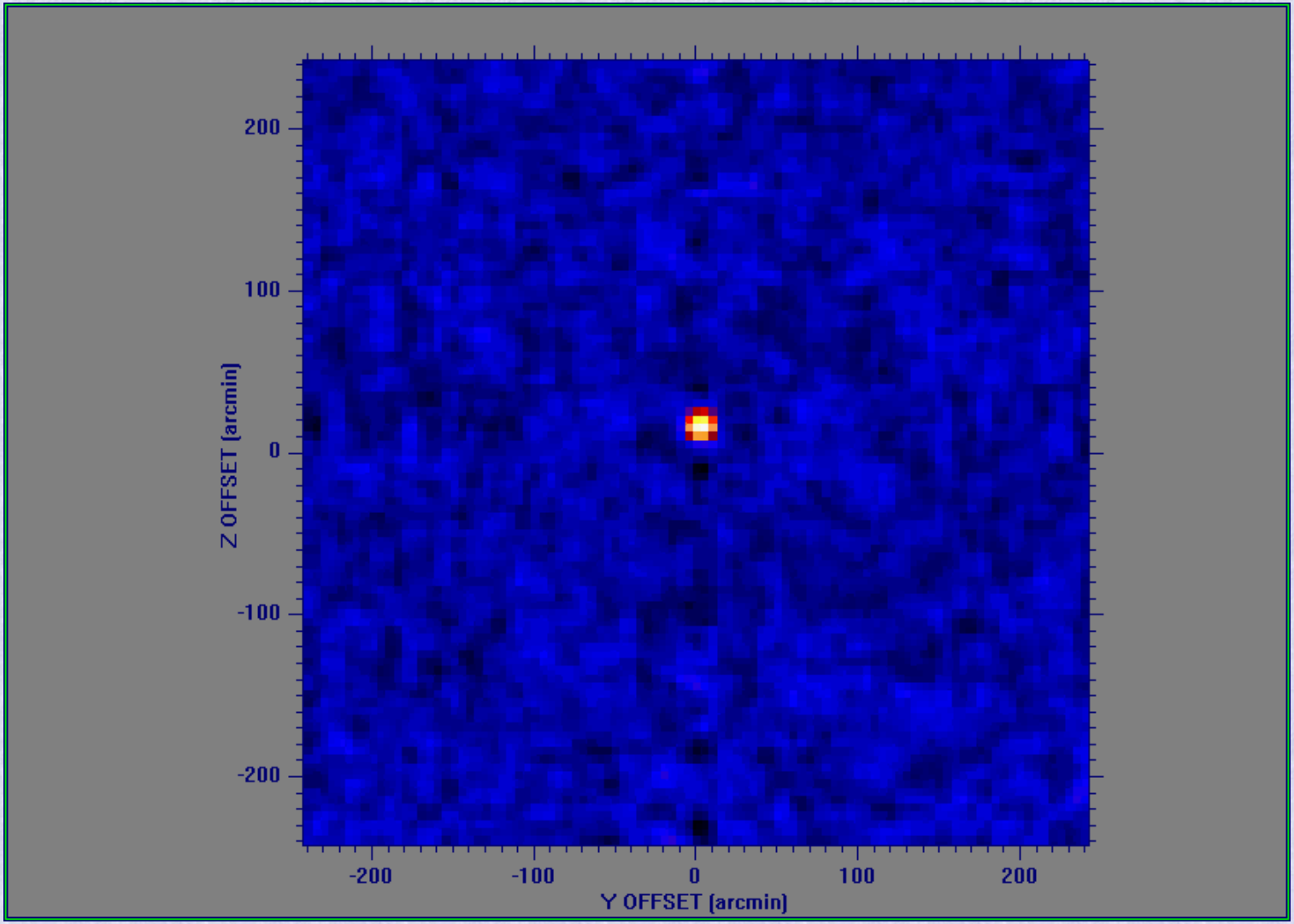
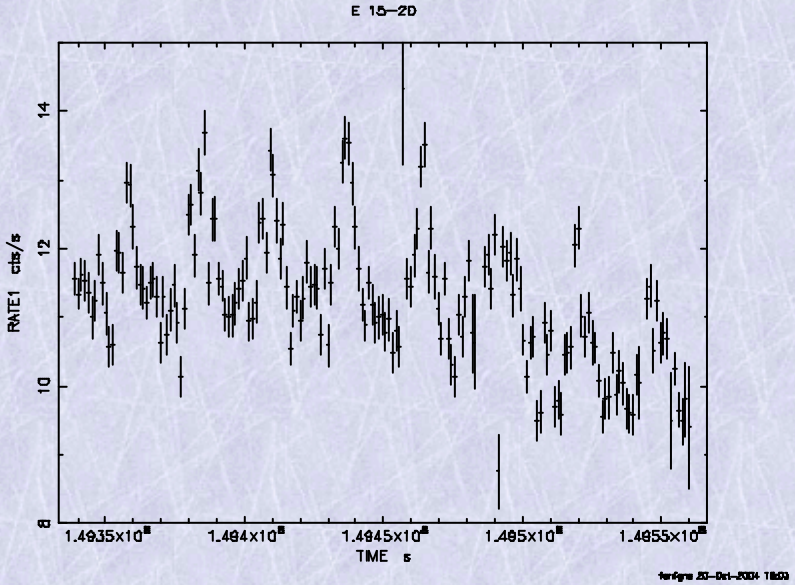
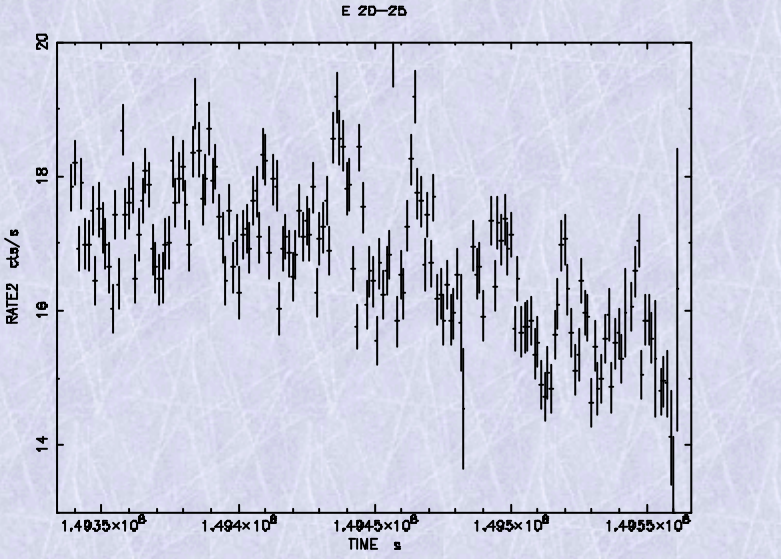
X0115+63 as seen by IBIS



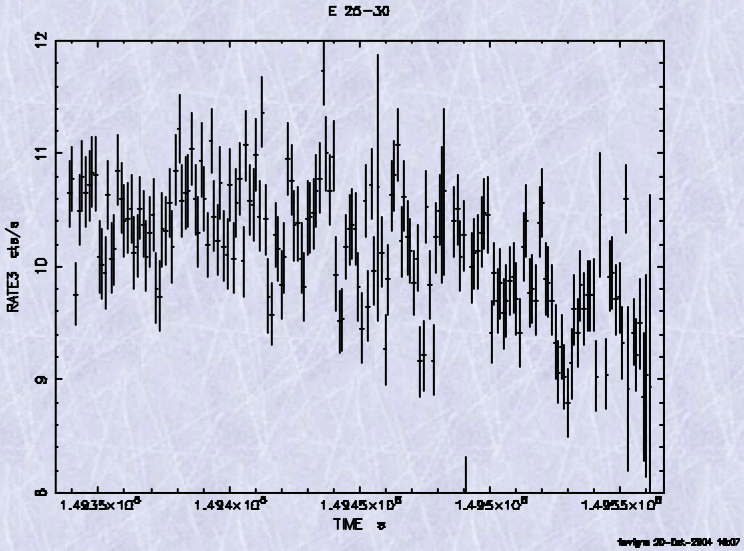
15 – 20 keV



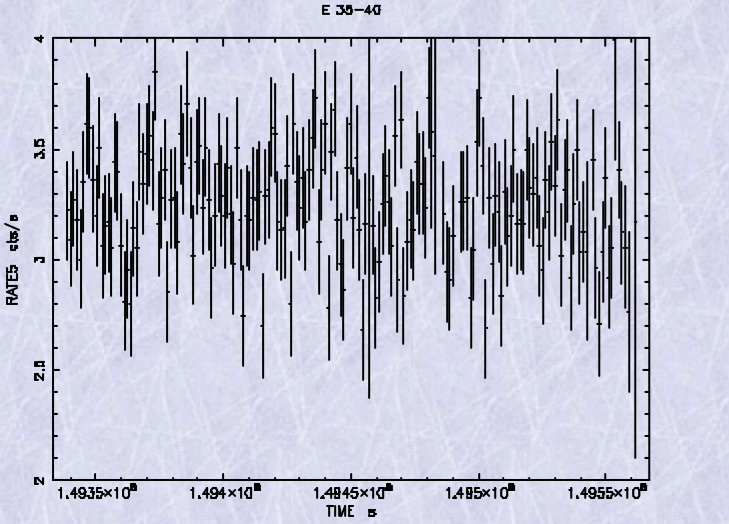
20 – 25 keV

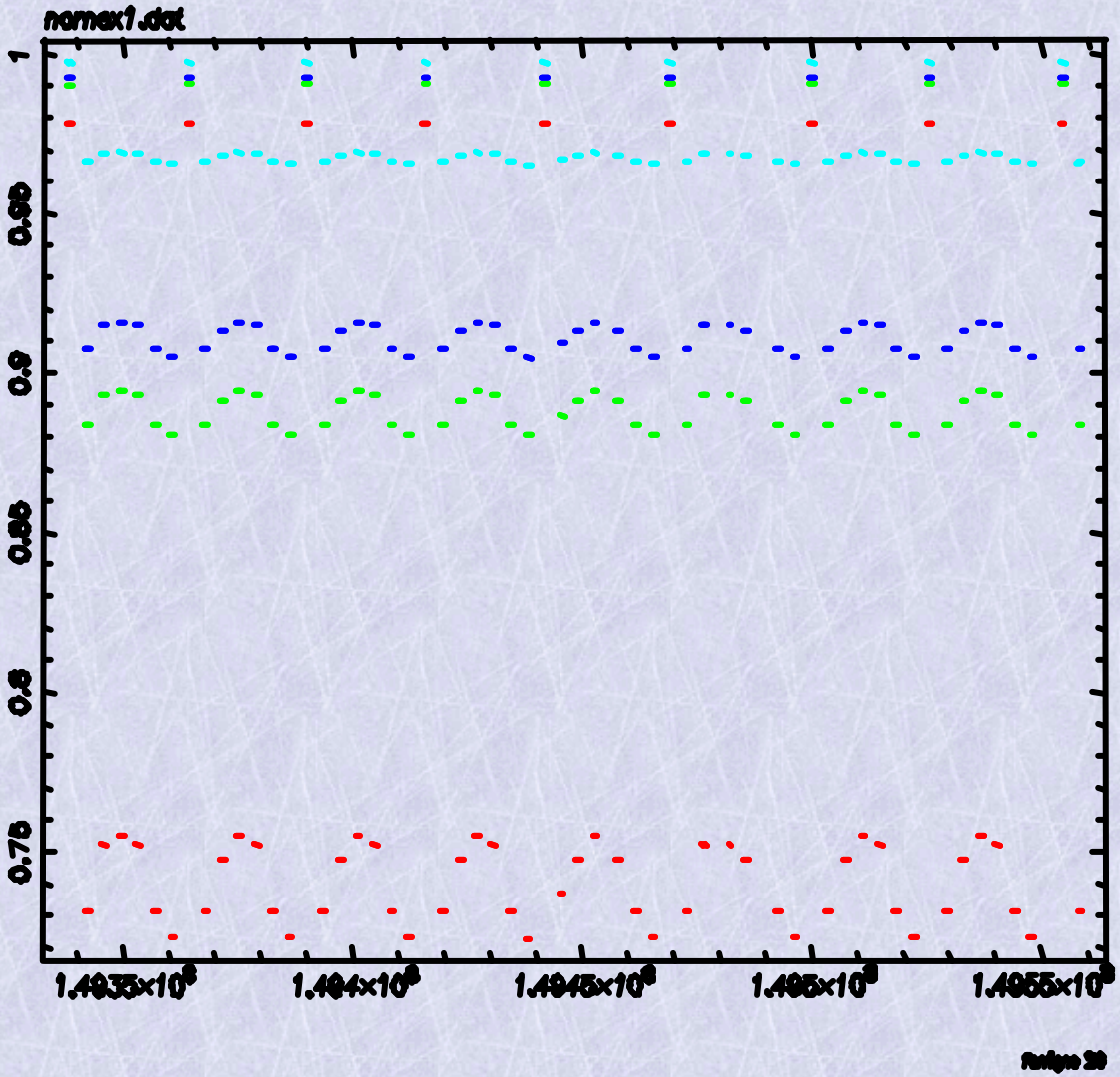


25 – 30 keV



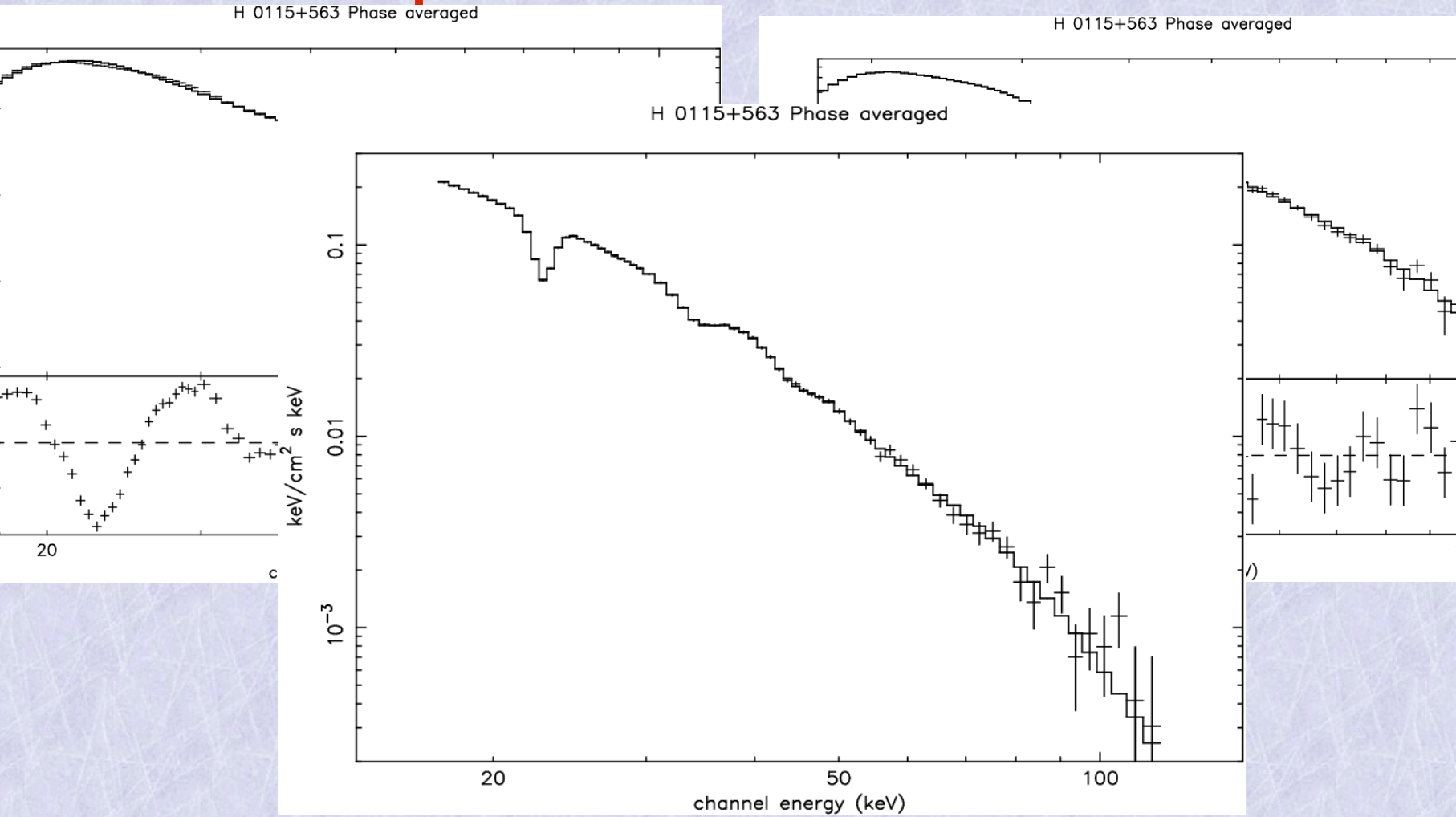
30 – 40 keV



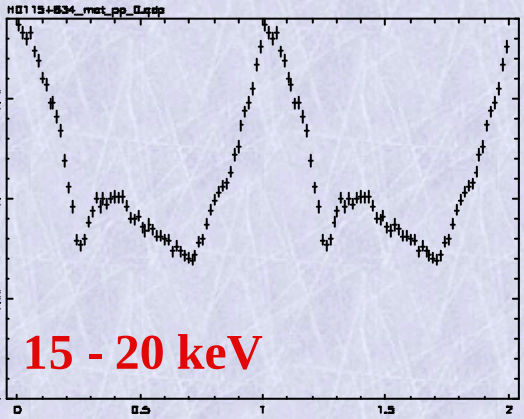


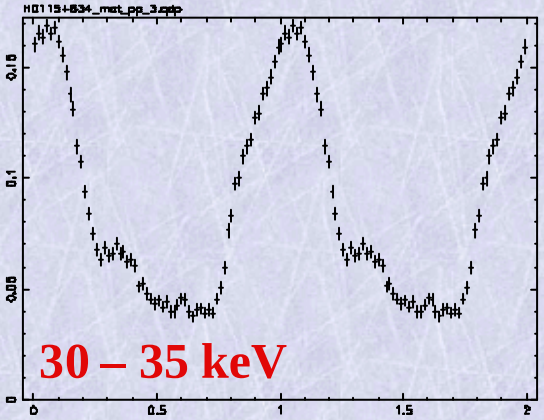
Light curves are affected by NOMEX incomplete correction

ISGRI spectrum

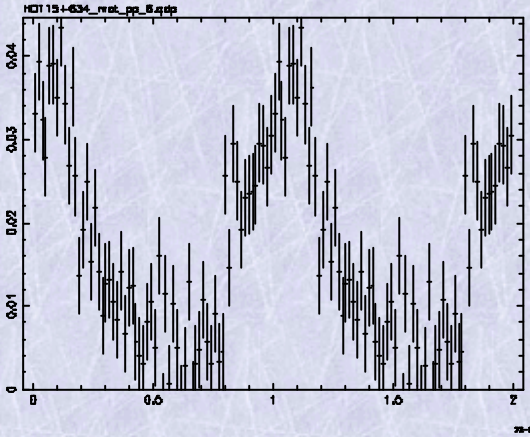


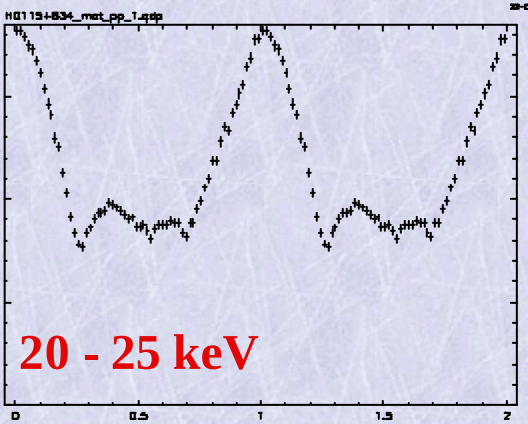
4 CRSF harmonics at ~23 34 44 56 keV

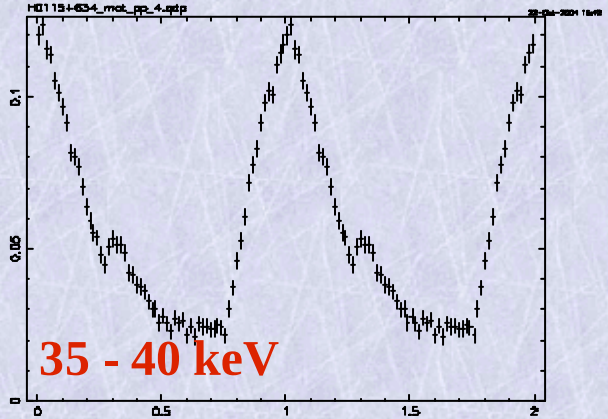


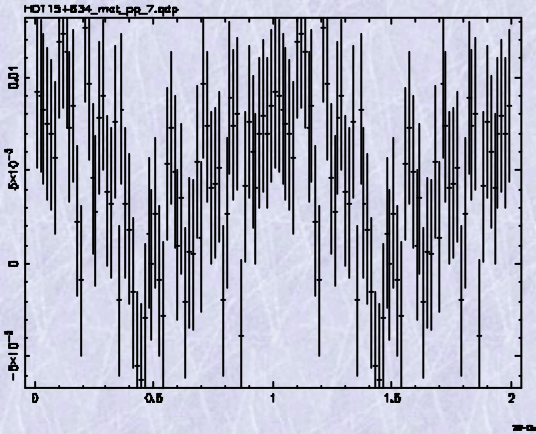


60 – 80 keV

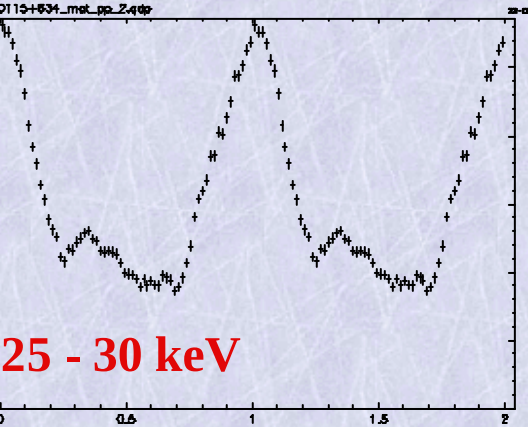


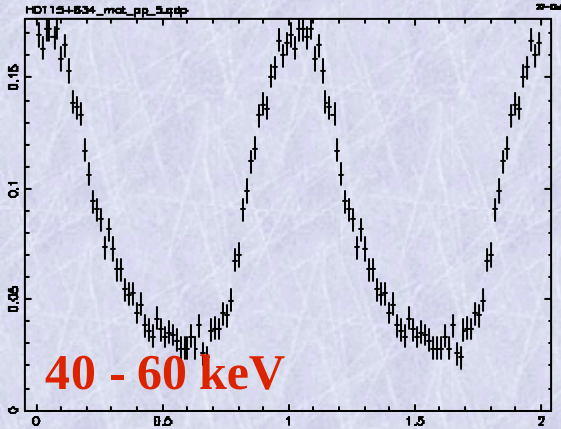


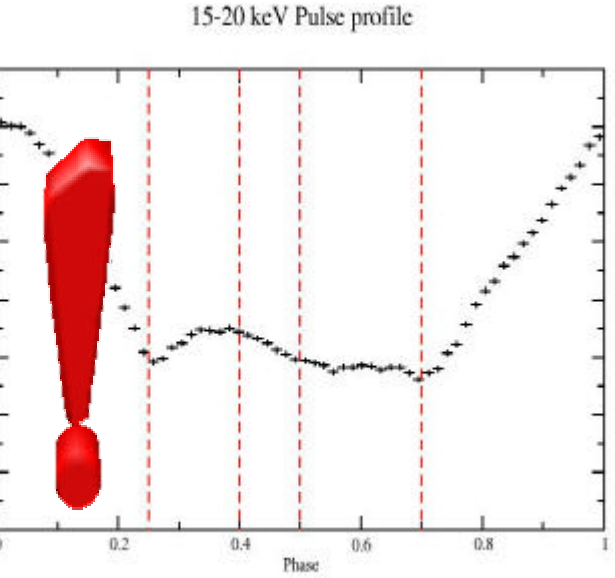




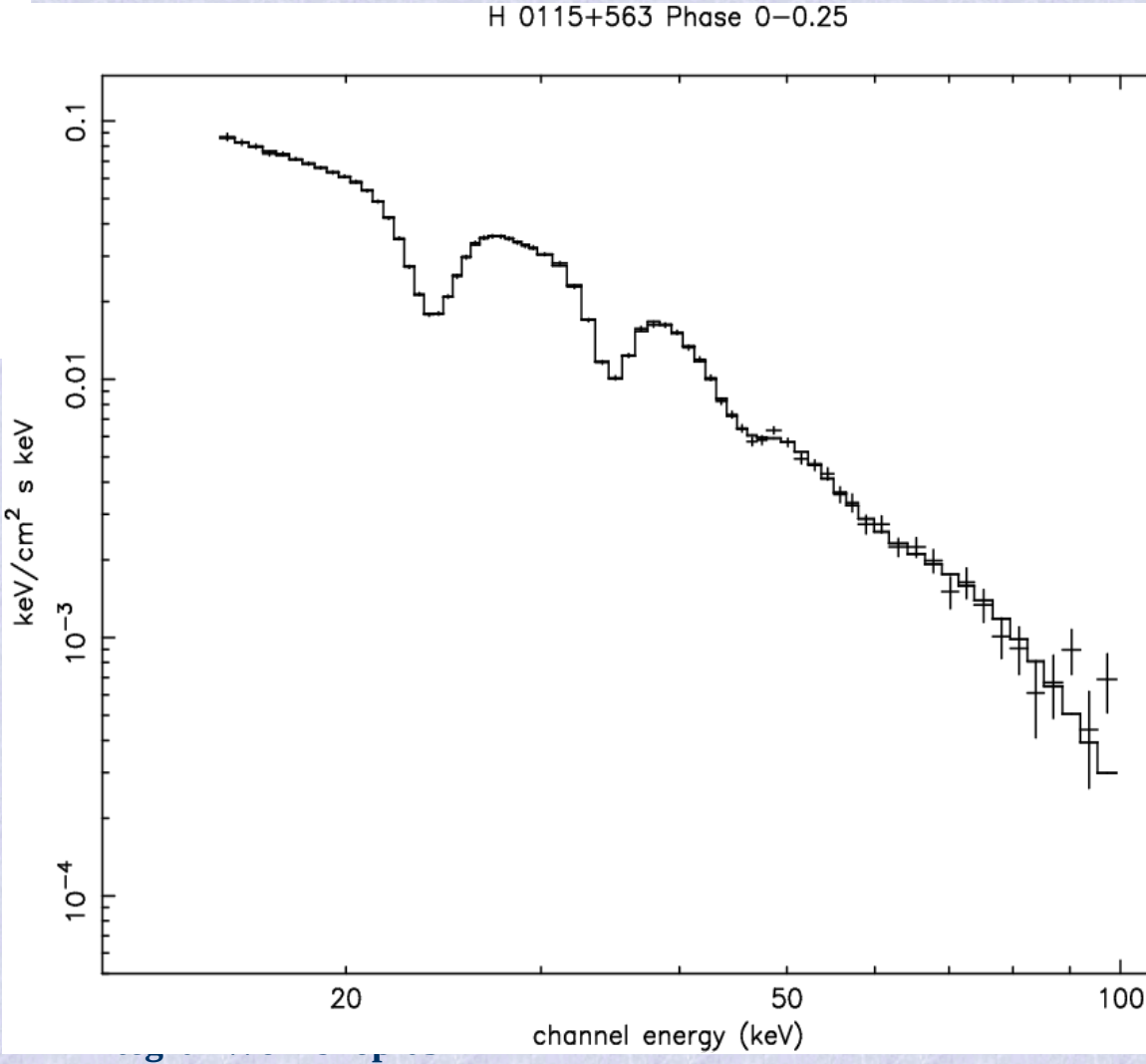
80 – 120 keV







Phase 0 - 0.25
i.e. descending edge



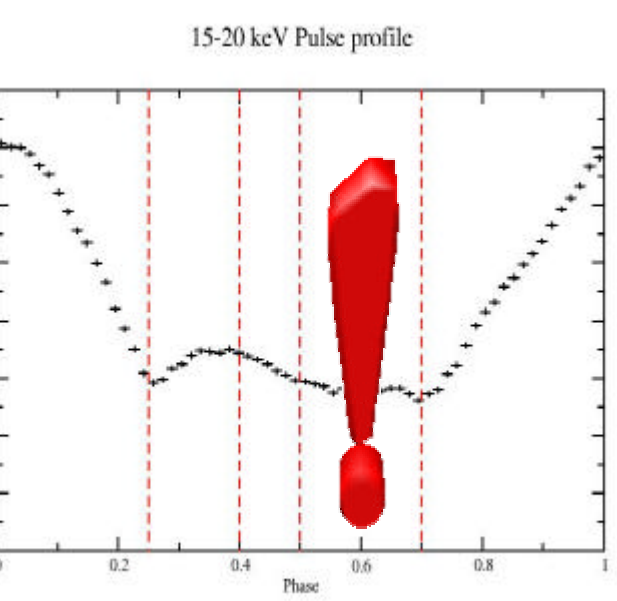
4

CRSF harmonics

cut off powerlaw

slope 1.1±0.2

cutoff 15±1 kev



Phase 0.5 – 0.7
off-pulse

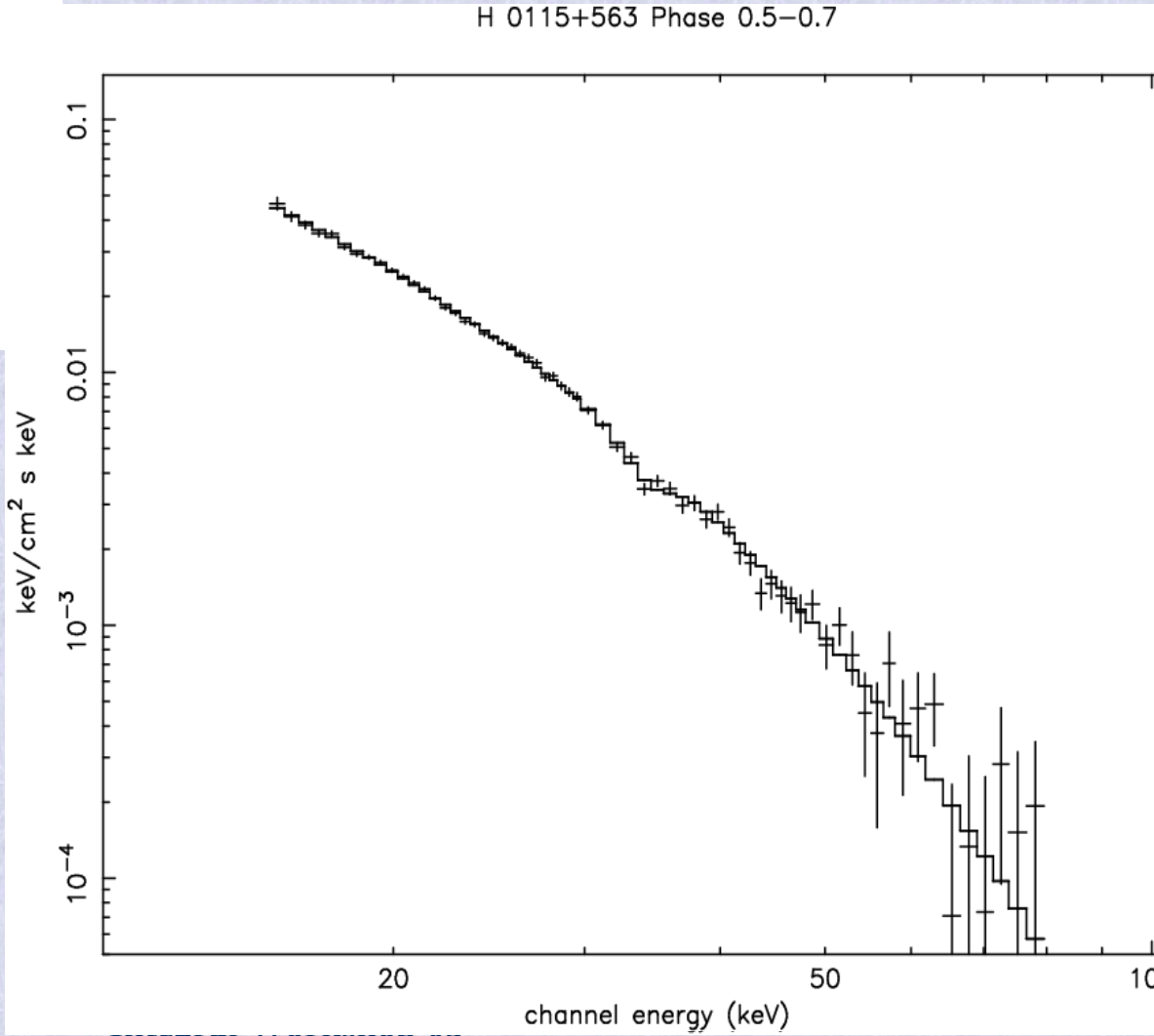
Just 1 Harmonics

Steeper continuum

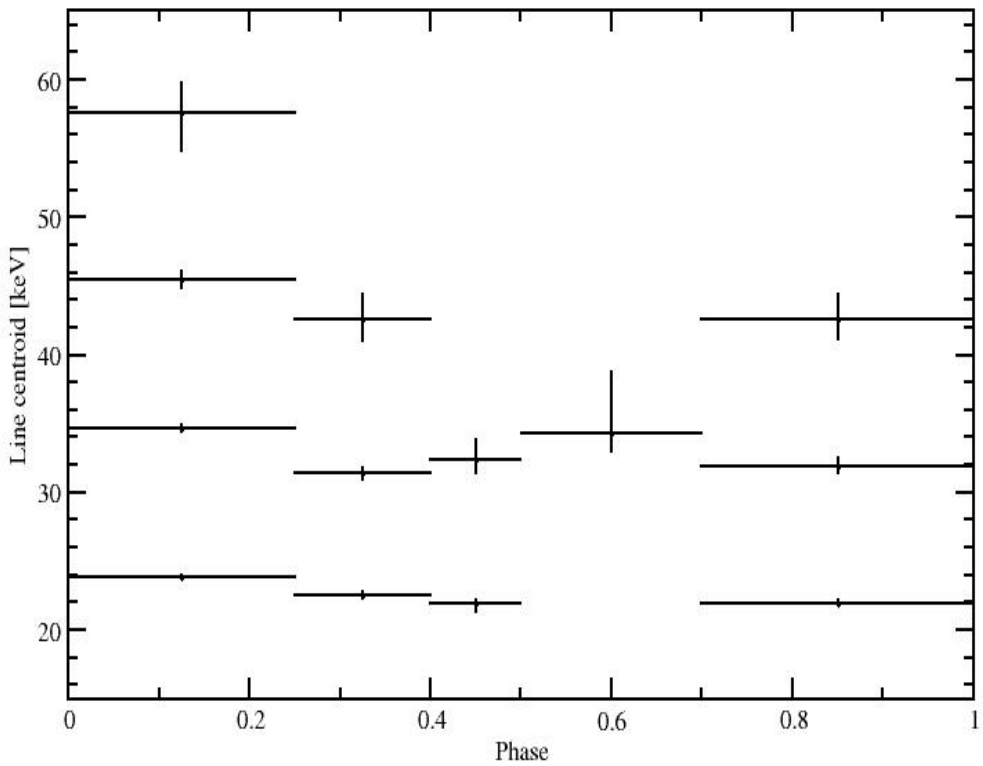
cut off powerlaw

slope 1.9±0.3

cutoff 12±2 kev

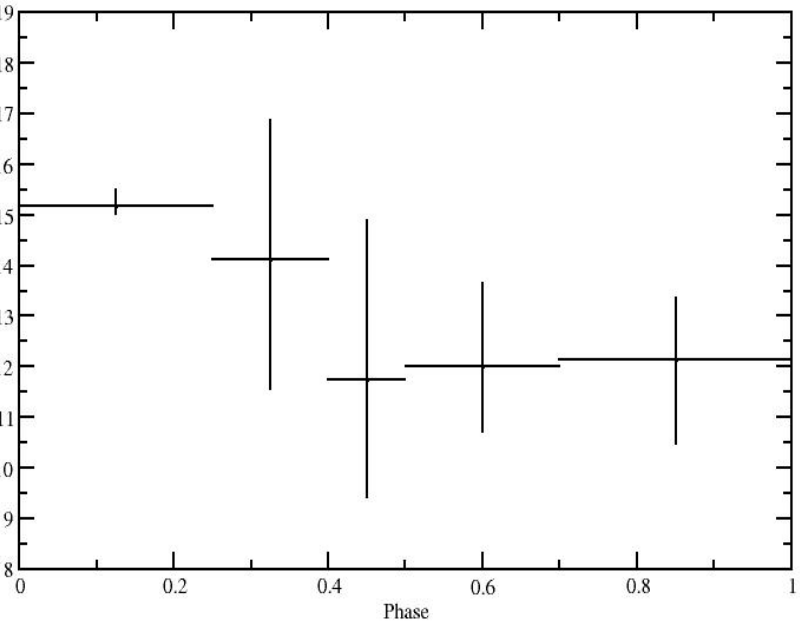


Fit results on lines

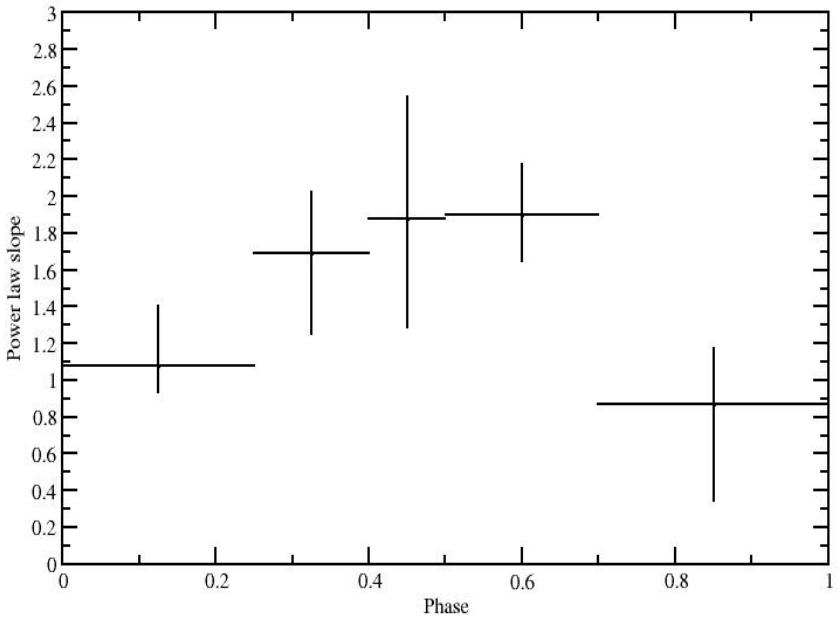


- Line position changes during the phase
- It suggests a different magneti field in the emission regions

Fit results on continuum



- Cutoff and slope variations suggest a different emission environment



Cutoff

Power law slope

Santangelo, Ferrigno, Segreto et al., in preparation

Summary

- It is necessary to go to phase resolved spectroscopy because line position and continuum parameters change
- With the method proposed it is possible to perform phase resolved spectroscopy with IBIS

- Perform Phase Resolved Spectroscopy with SPI and look at the shape of the line(s)
- Perform Phase Resolved Spectroscopy with Jem-X and eventually make use of the “wide band” capability of Integral
- This analysis is on the way.