ASTROSAT/LAXPC: Observation of Cygnus X-1 in the Hard State

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THE LAXPC SCIENCE TEAM:
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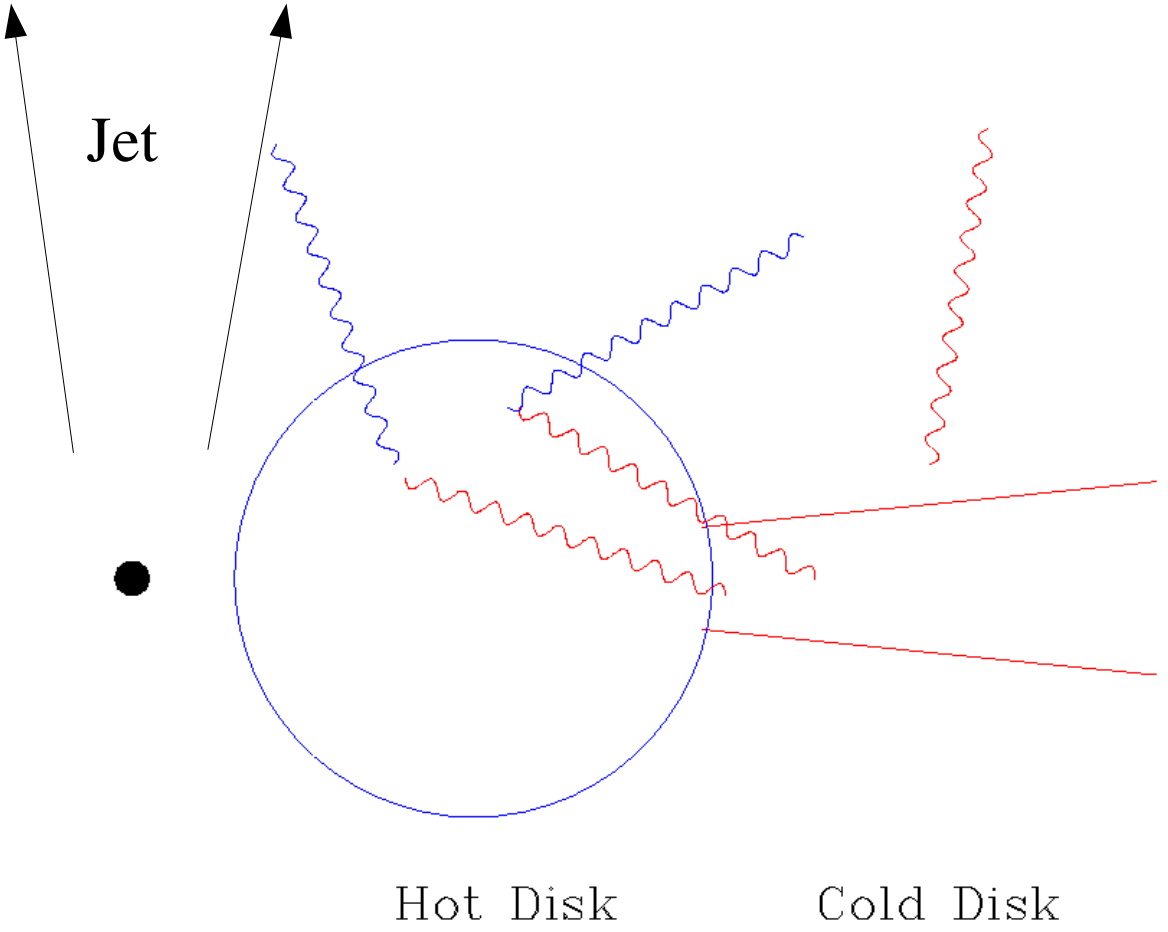
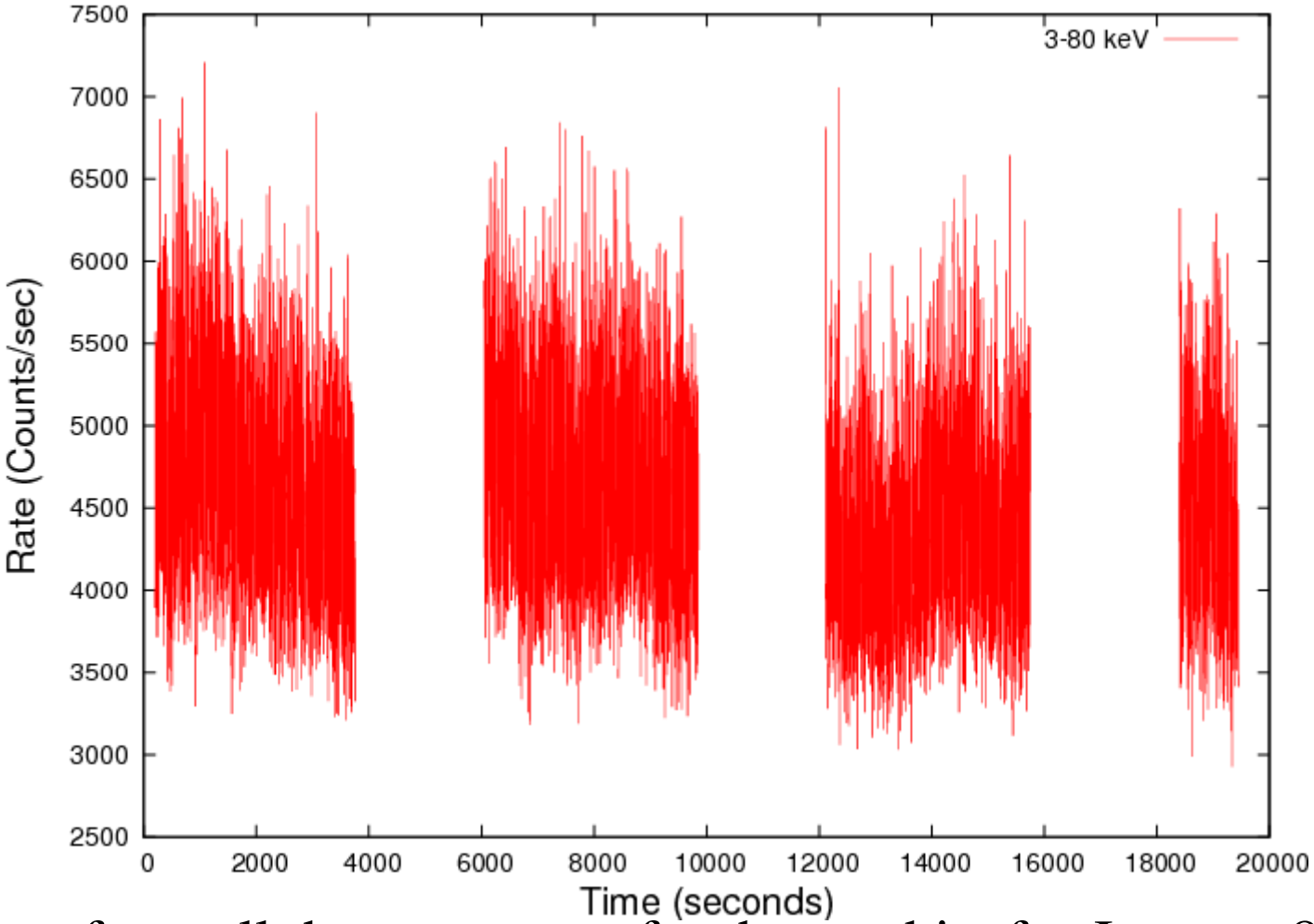
ALSO TALKS BY:
Mayukh Pahari --> BH binaries in different spectral states
Sharada Jogdand --> Spectral Analysis of Cyg X-1 hard state
Anjali Rao --> Timing Analysis of Cyg X-1 hard state

Cyg X-1 Hard State: The Story so far....

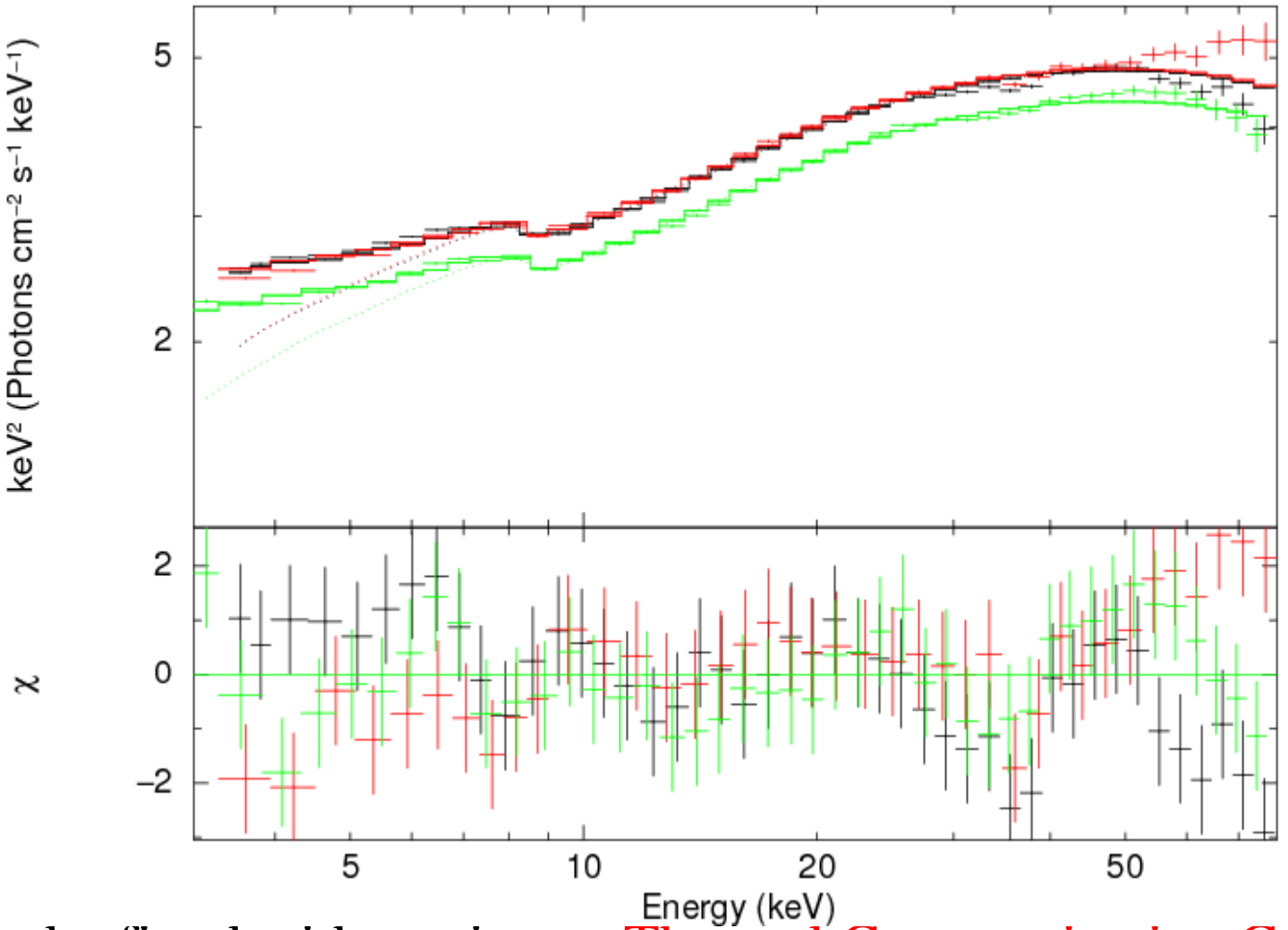


AstroSat/LAXPC: Cygnus X-1 Lightcurve



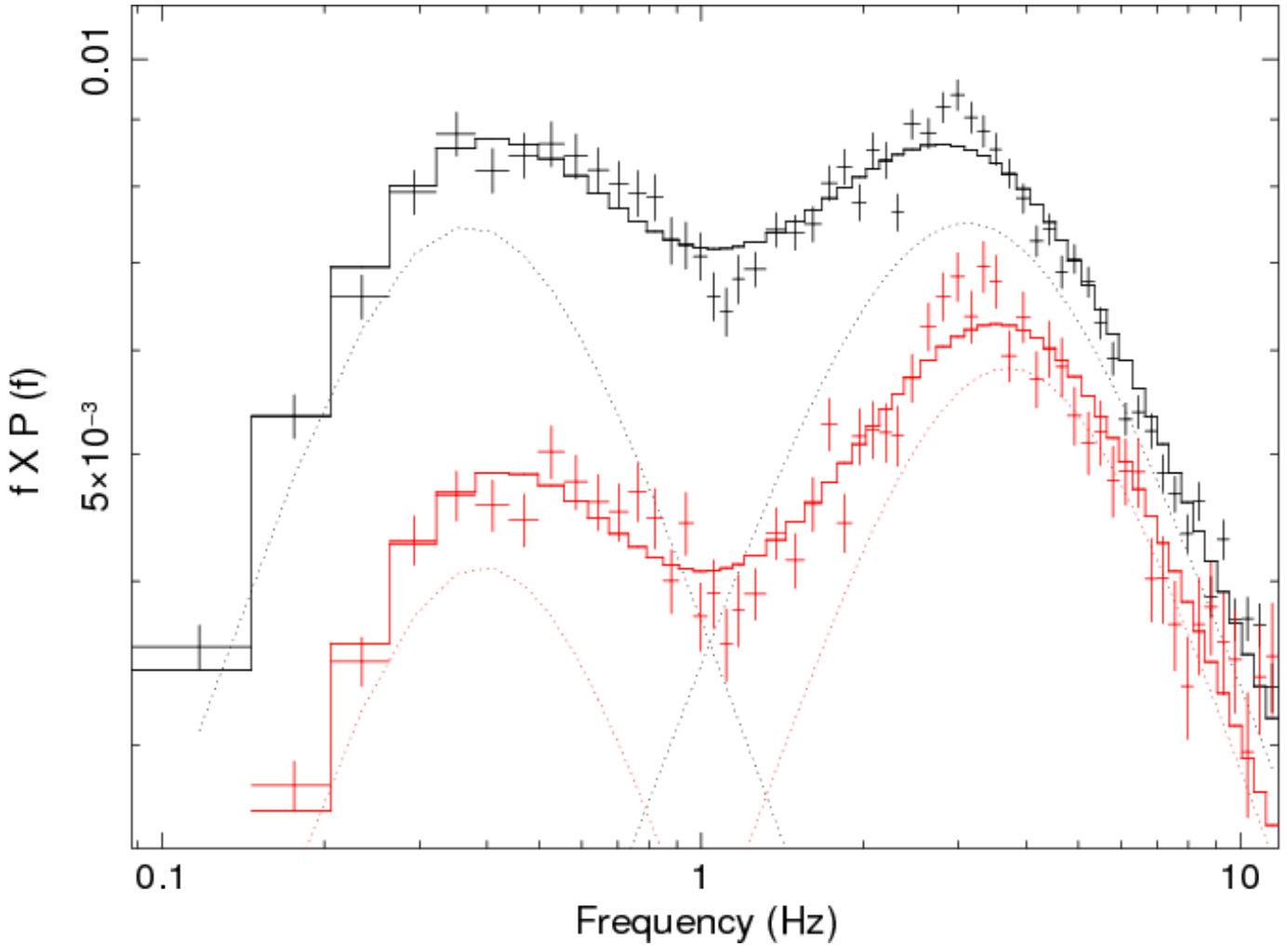
Lightcurve from all three counters for three orbits for January 8th 2016

AstroSAT/LAXPC: Cygnus X-1 Spectrum



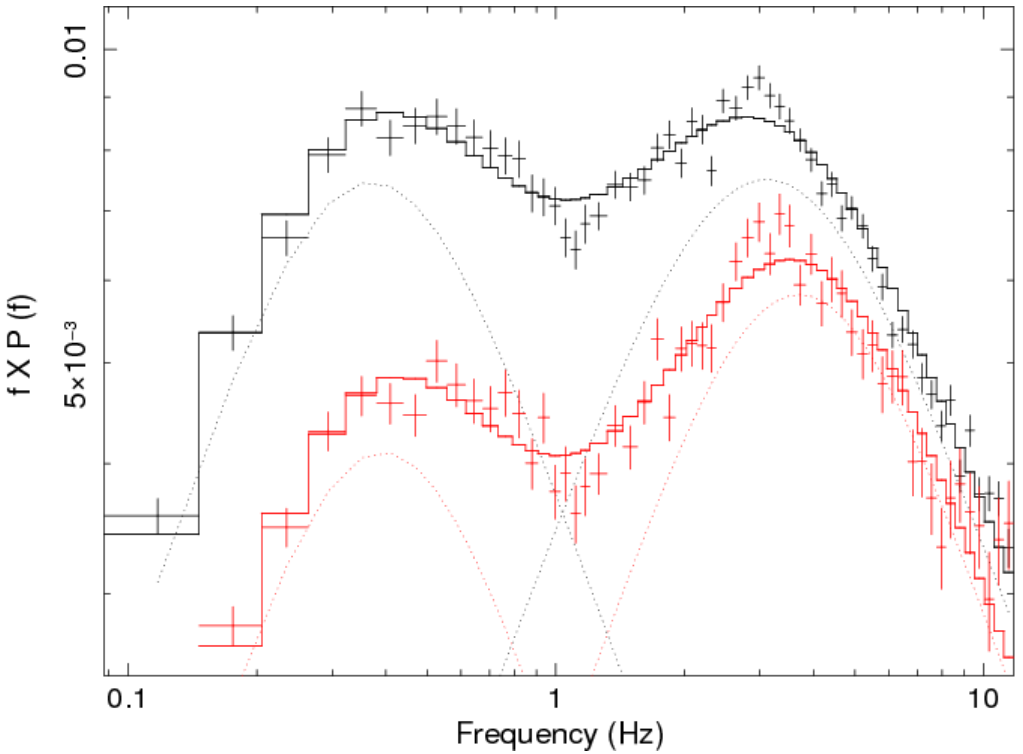
Spectrum can be fitted with a primary Thermal Comptonization Component with weak disk and reflection.

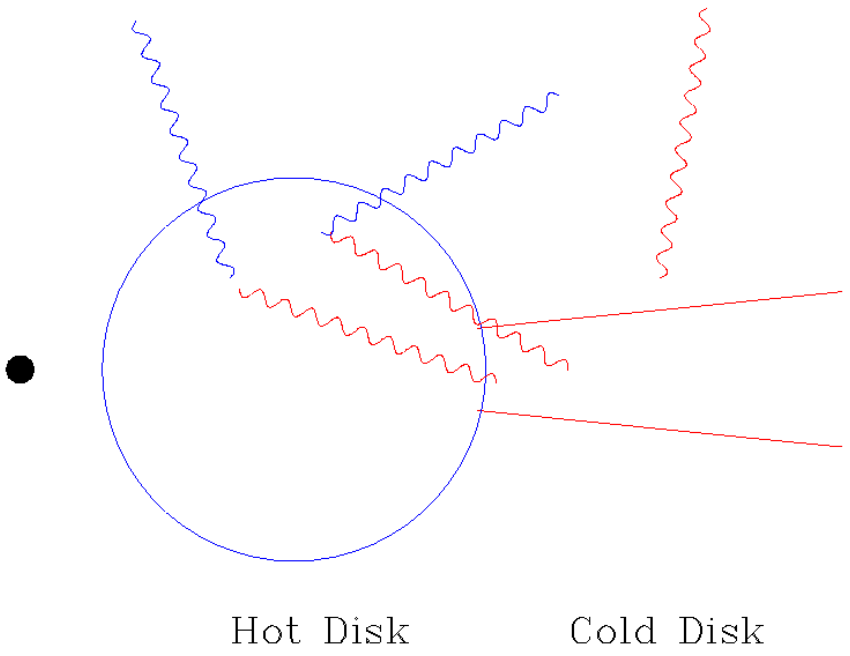
AstroSAT/LAXPC: Cygnus X-1 Power Spectrum



Double Lorentzian power spectral fit. Black: 3 – 10 keV, Red: 20--40 keV

AstroSAT/LAXPC: Cygnus X-1 Power Spectrum





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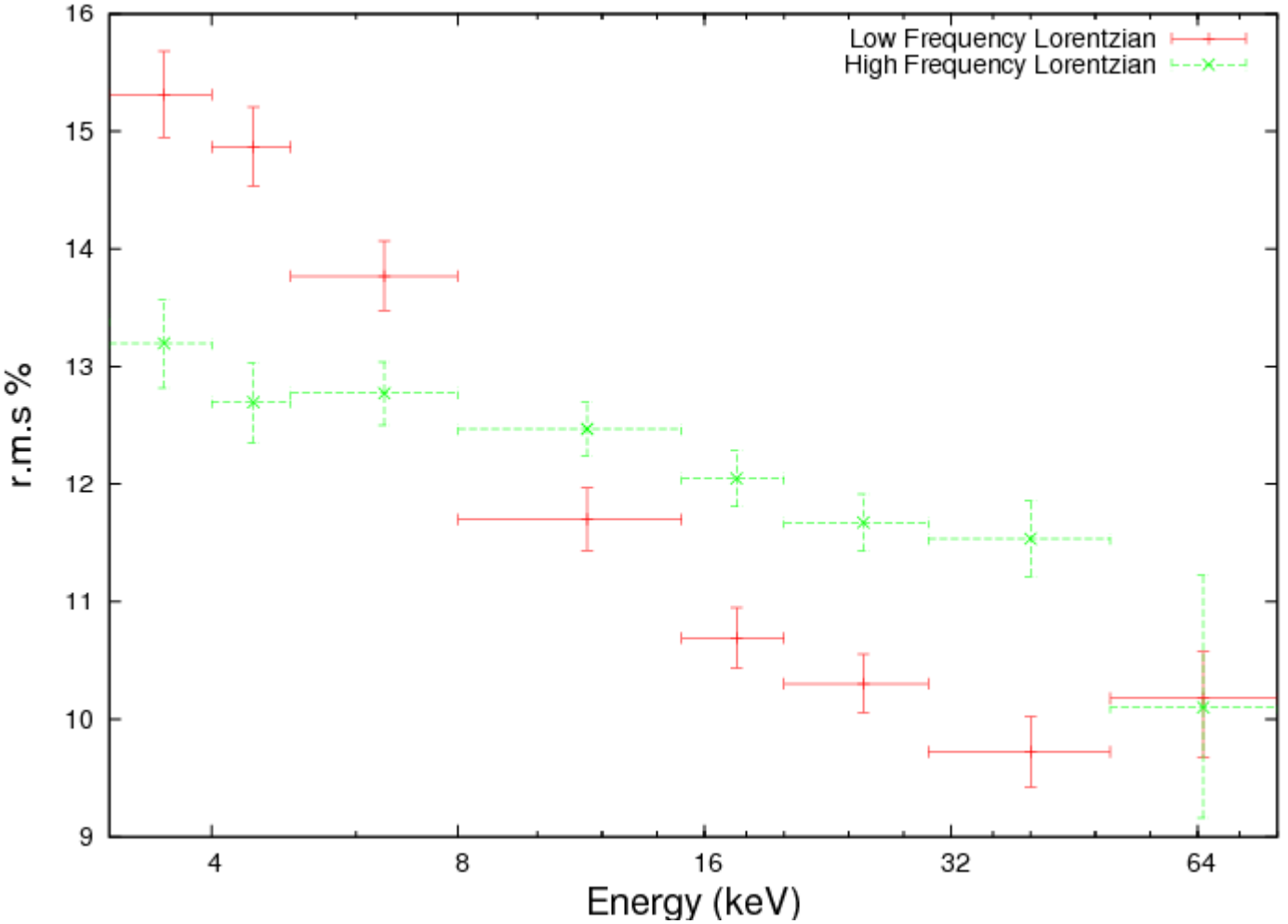
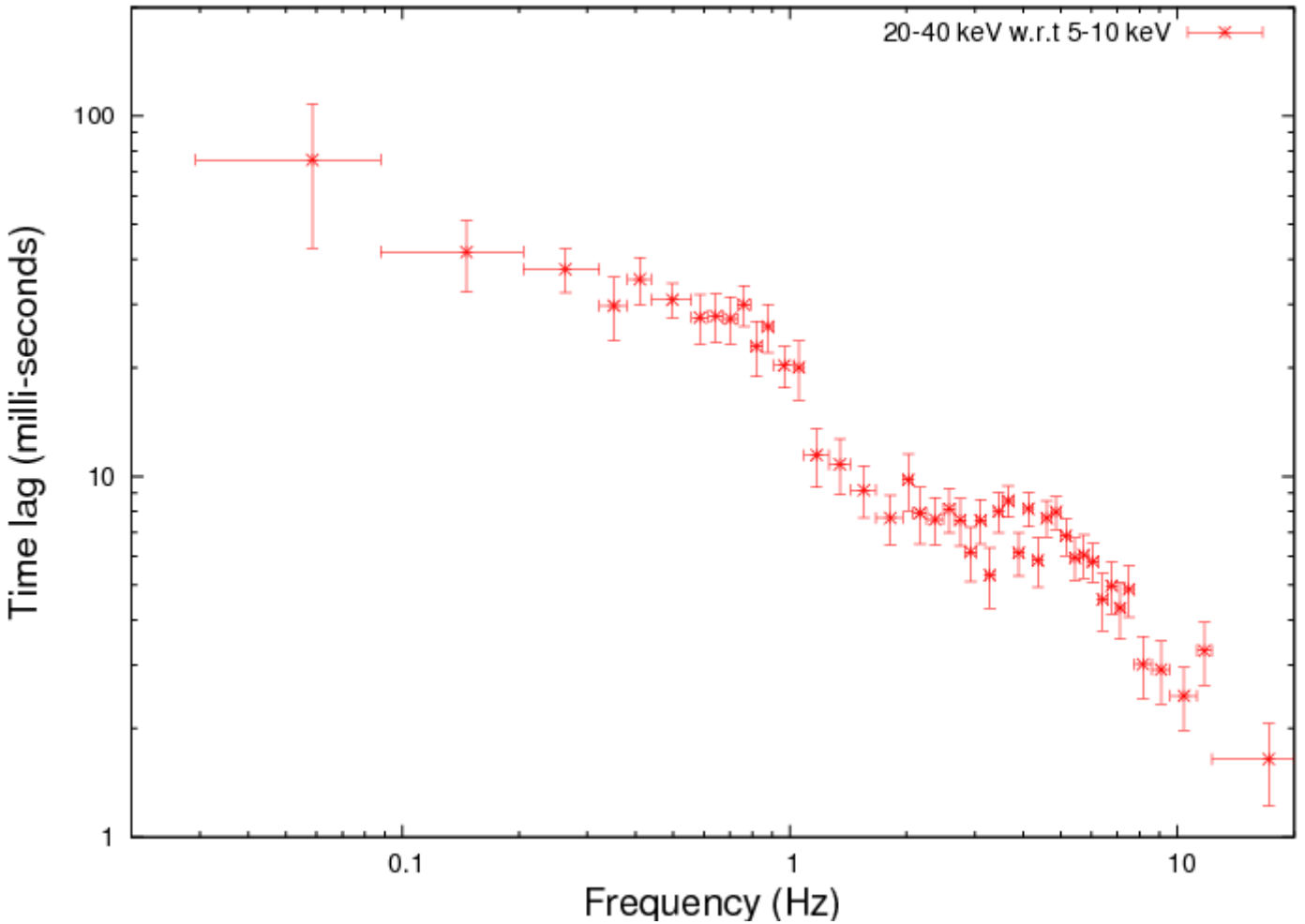
AstroSAT/LAXPC: Cygnus X-1



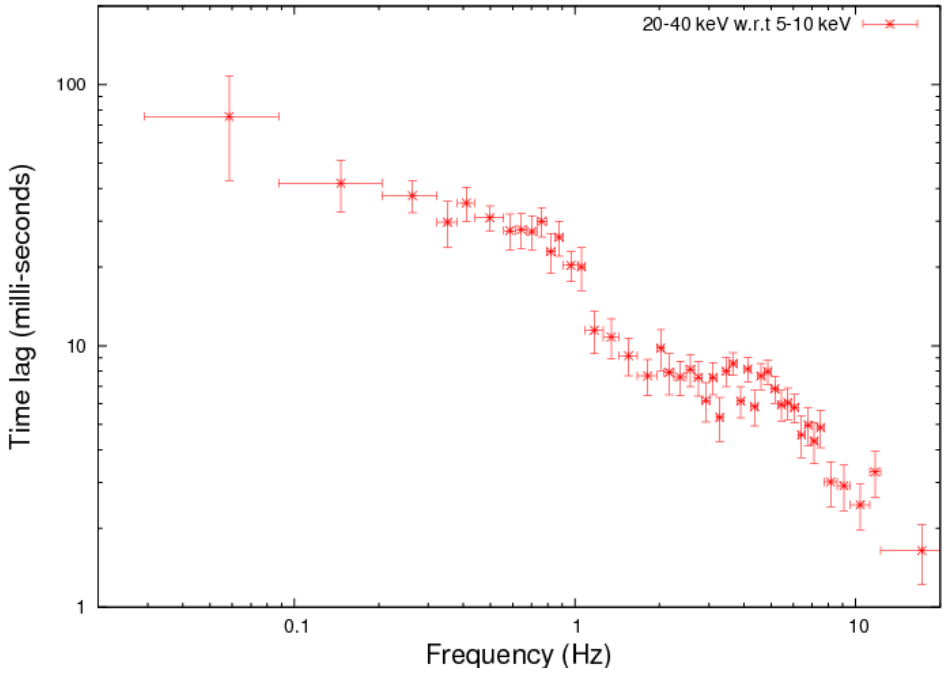
The r.m.s of the low frequency component decreases with energy, while the high frequency one is relatively constant.

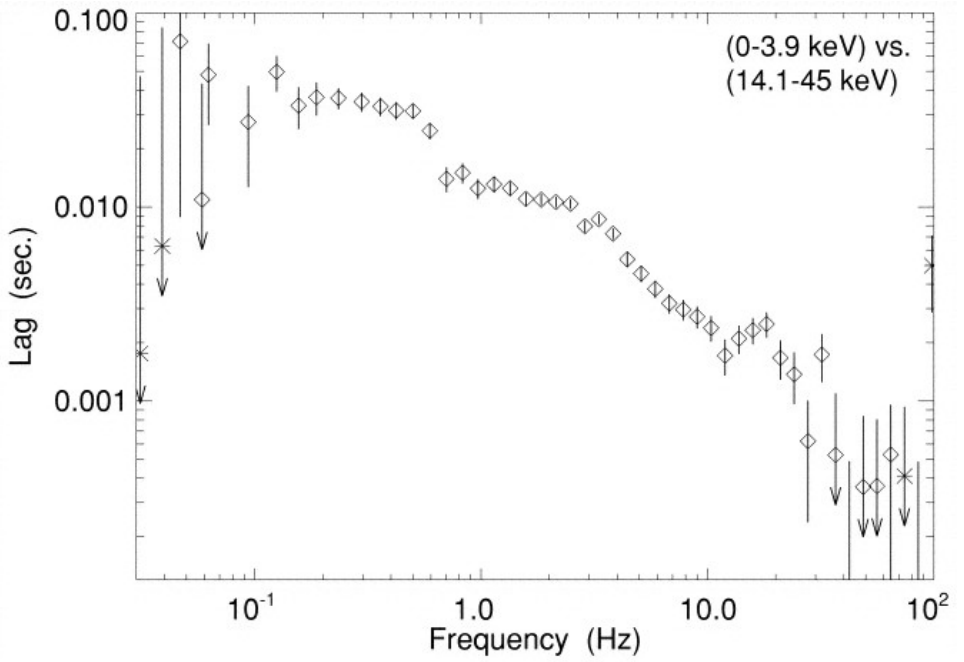
AstroSAT/LAXPC: Cygnus X-1



Time lag as a function of frequency between 5--10 keV and 20--40 keV

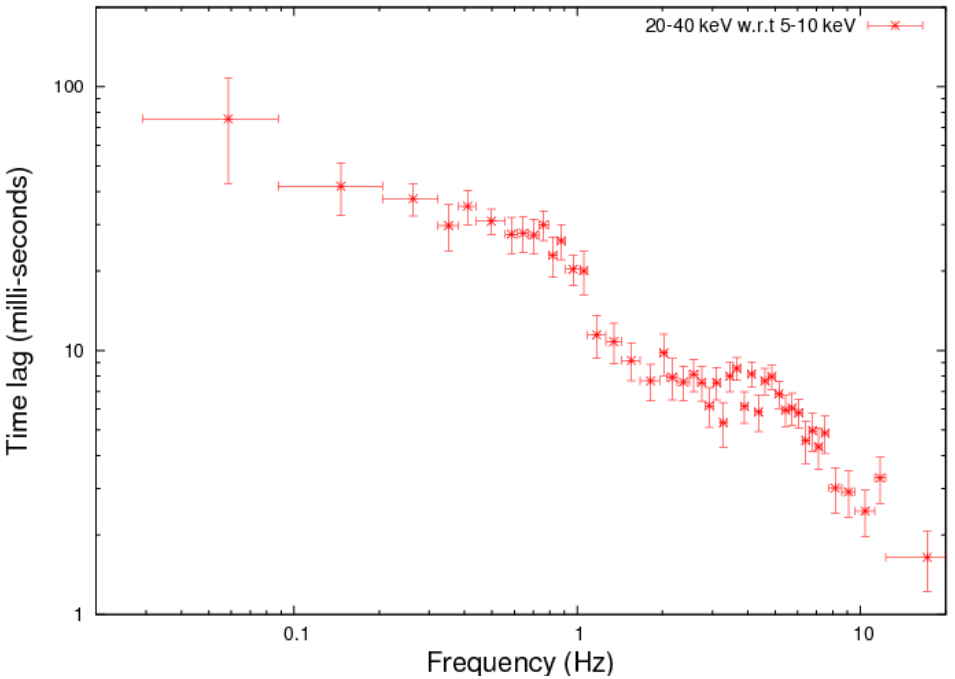
AstroSAT/LAXPC: Cygnus X-1

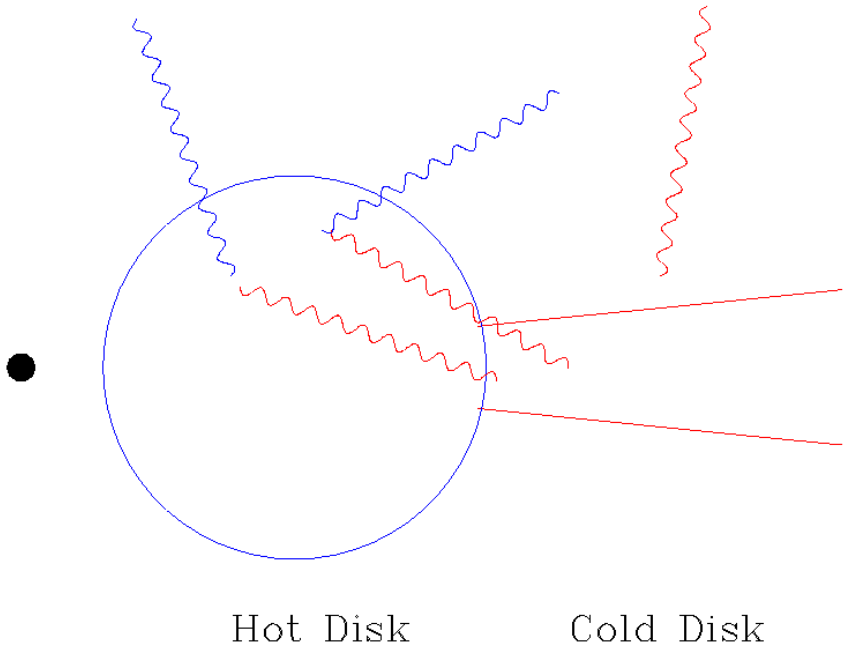




From Nowak et al. 1999

AstroSAT/LAXPC: Cygnus X-1





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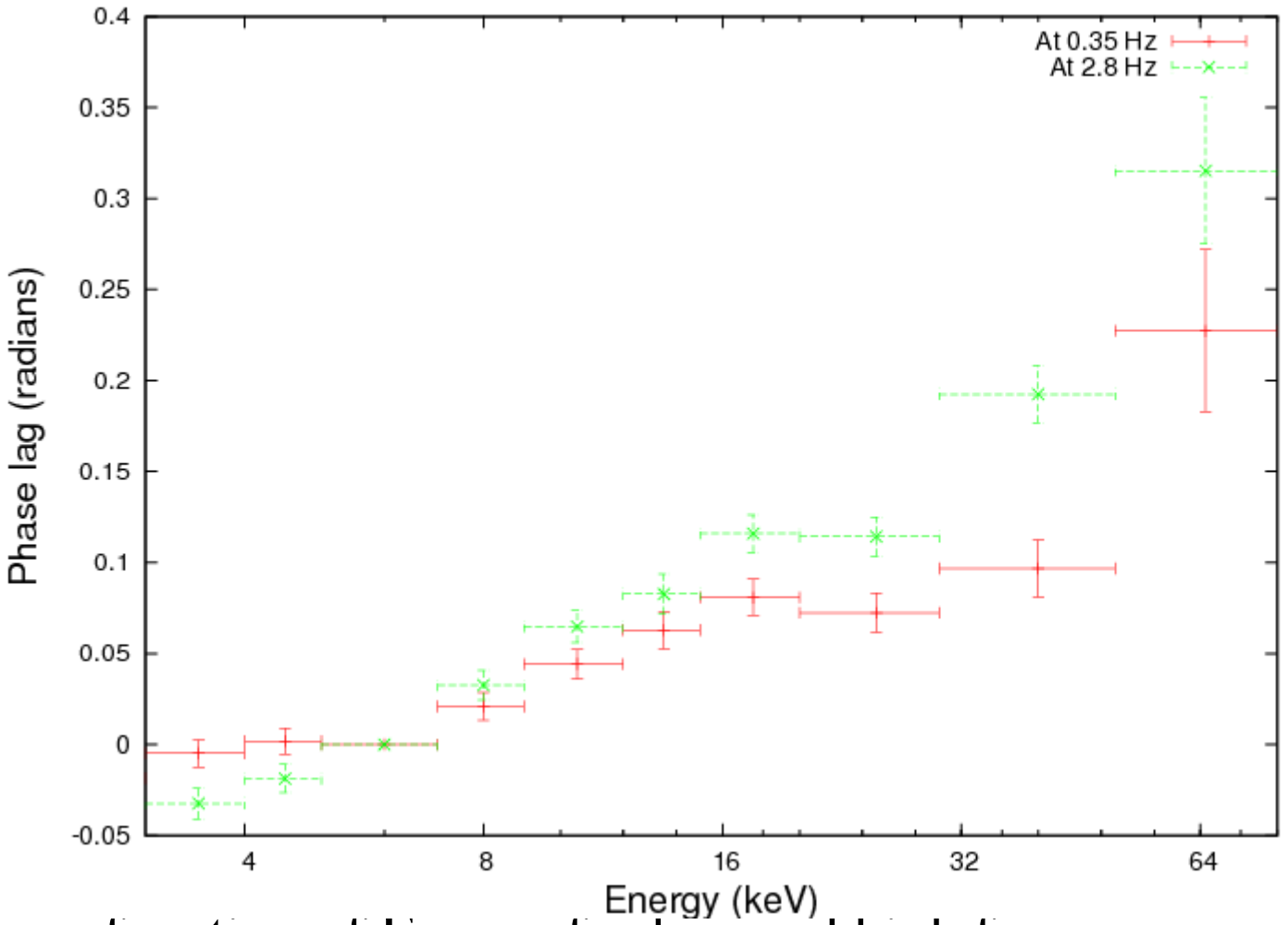
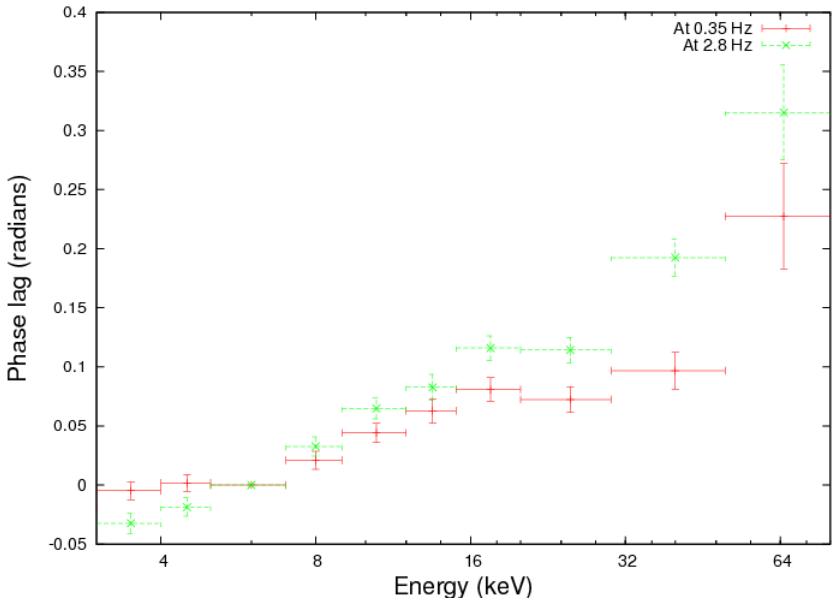
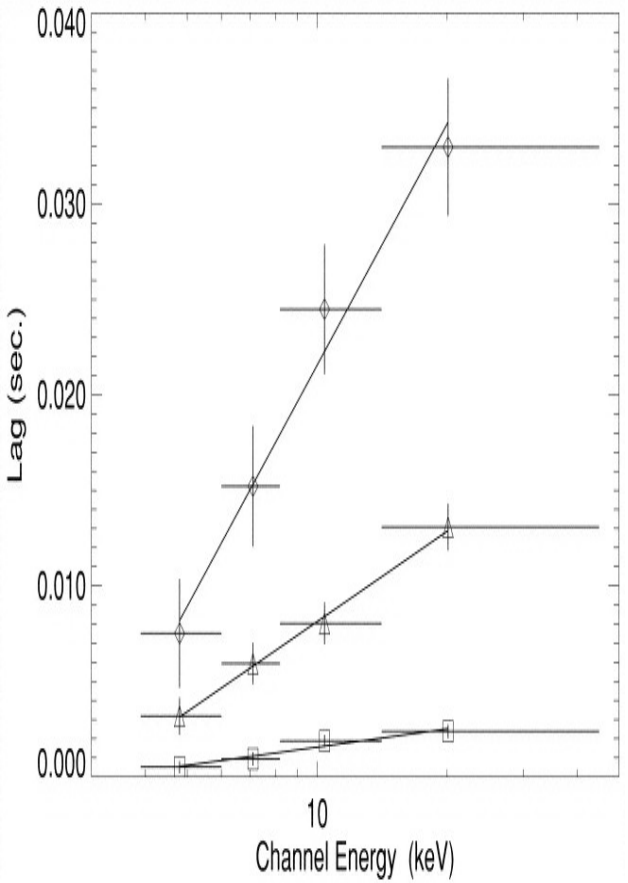


Time lag as a function of Energy for low and high frequency components

AstroSAT/LAXPC: Cygnus X-1





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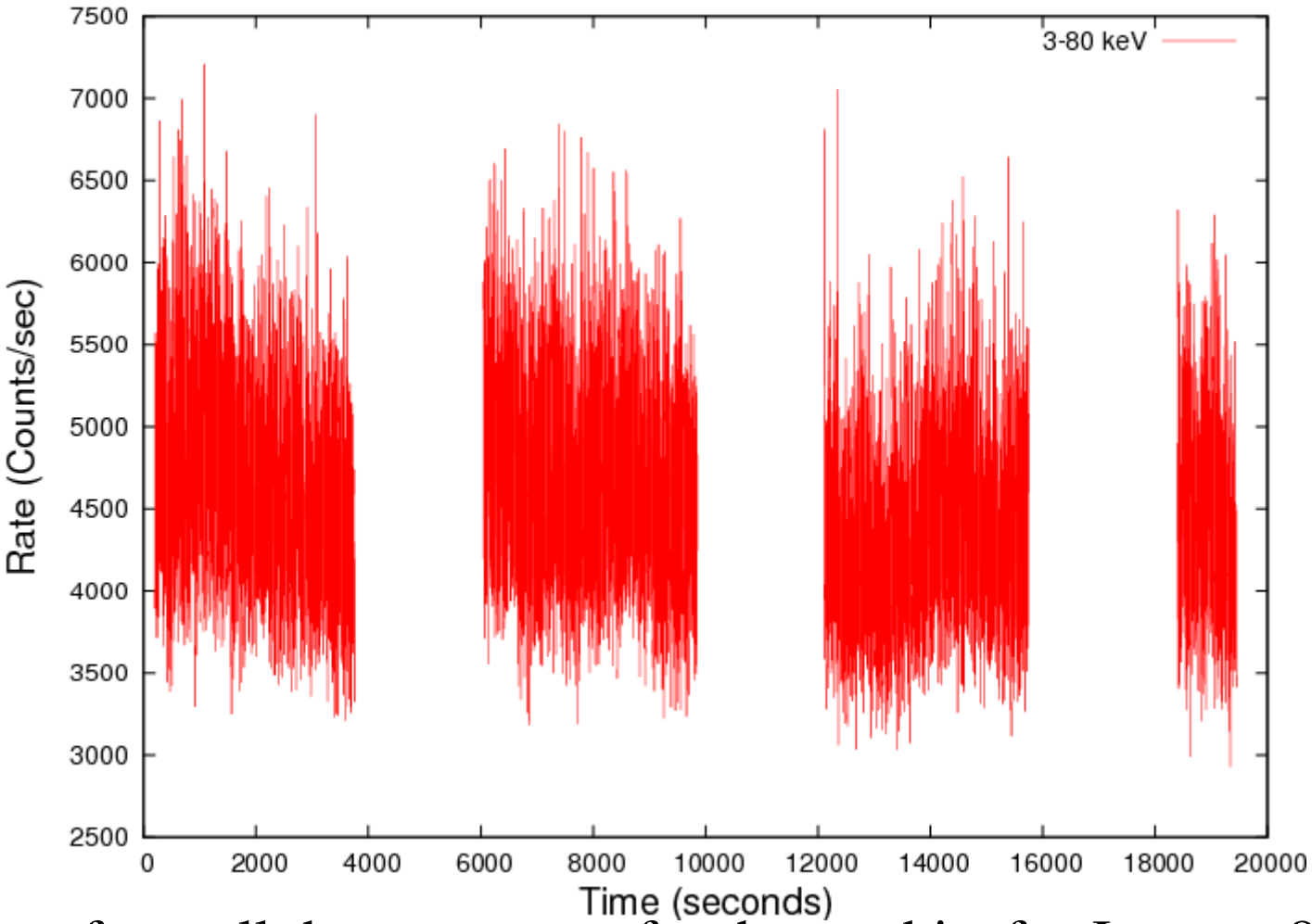
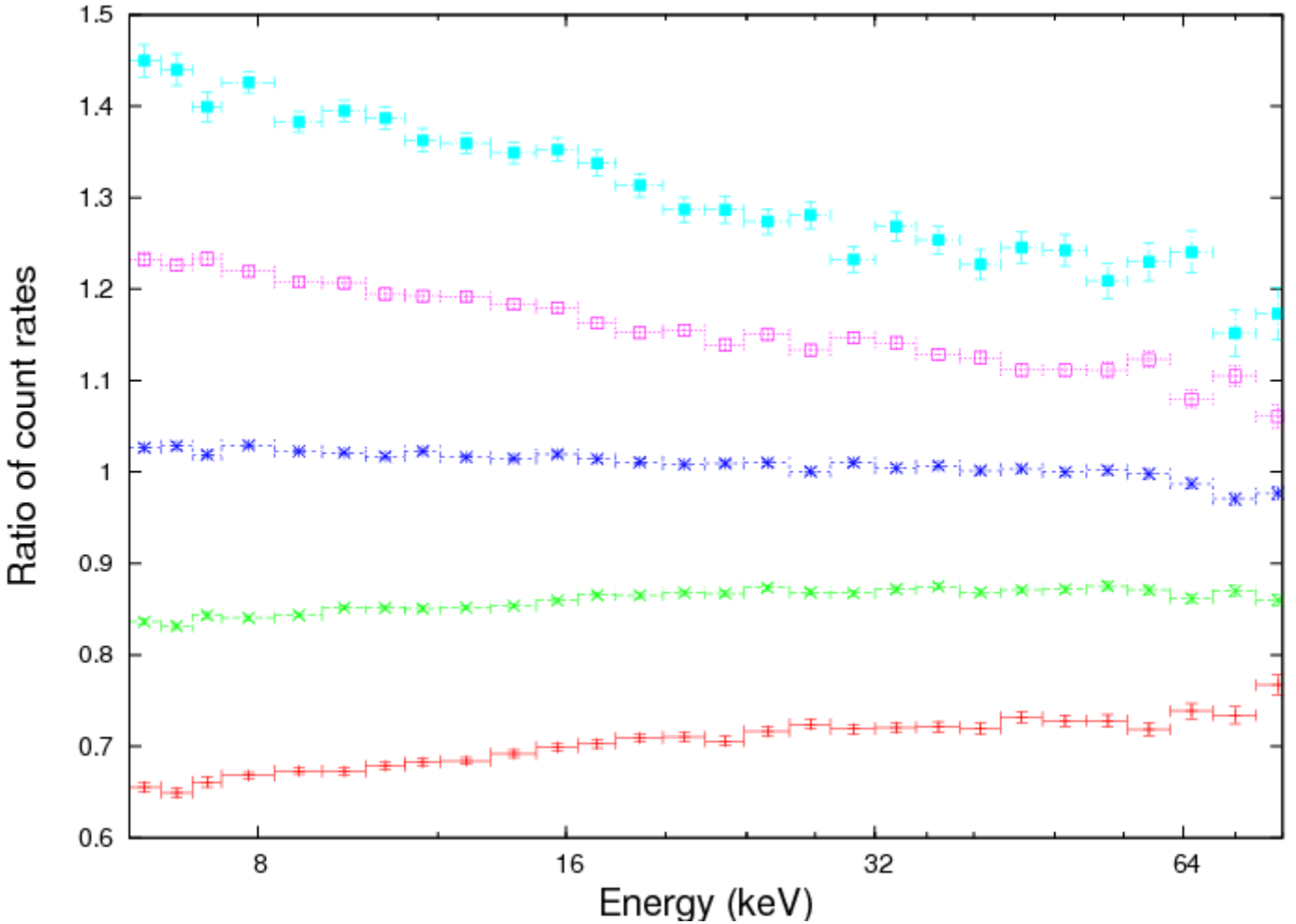
AstroSat/LAXPC: Cygnus X-1 Lightcurve



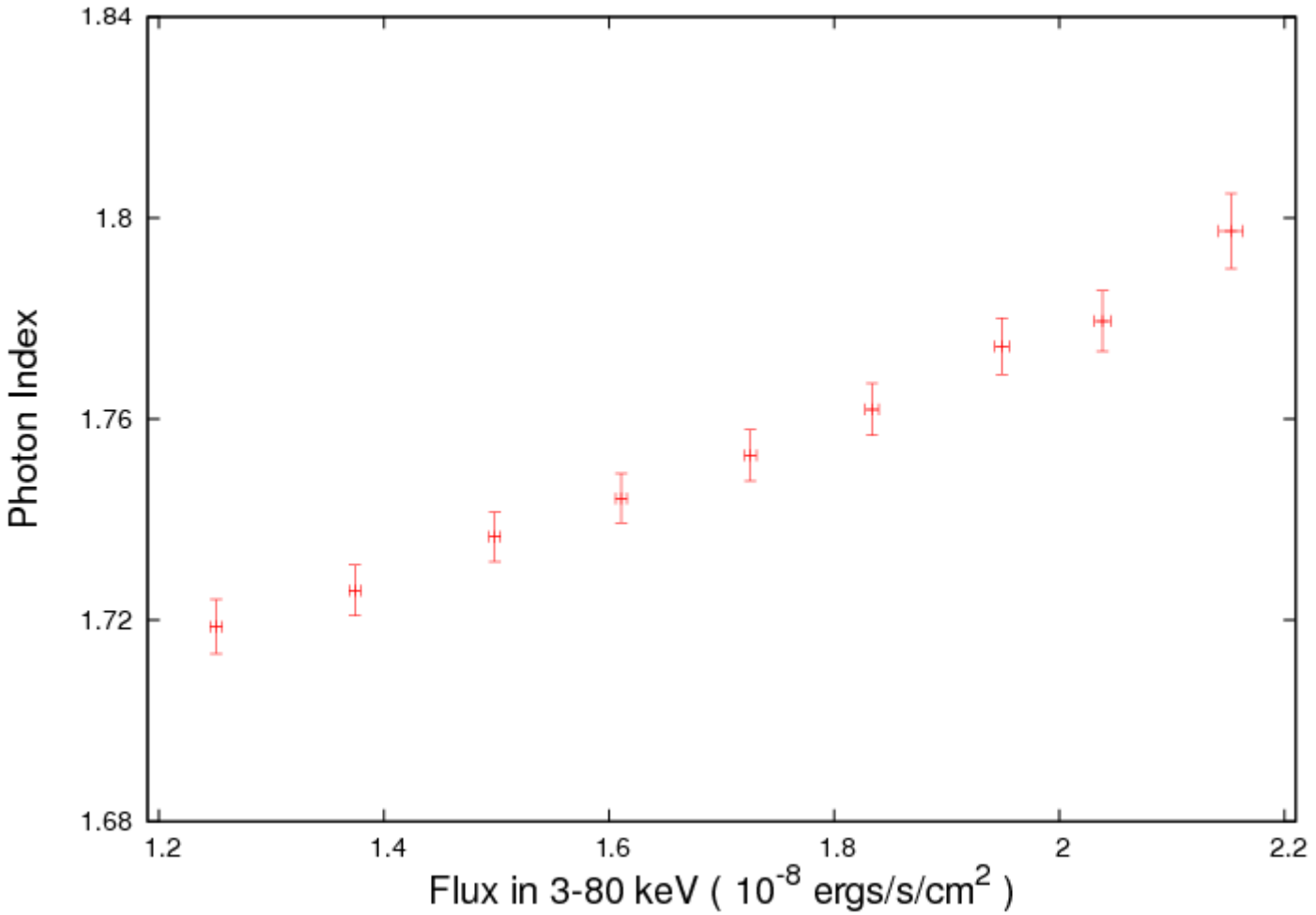
Lightcurve from all three counters for three orbits for January 8th 2016

AstroSAT/LAXPC: Cygnus X-1 Spectrum



Ratio of count rates for flux resolved spectroscopy in 1 second time bin.

AstroSAT/LAXPC: Cygnus X-1 Spectrum



Variation of Photon index versus flux for 1 second flux resolved spectroscopy—Spectra softens as source gets brighter

Summary

- AstroSat/LAXPC is providing unprecedented timing information for X-ray binaries
- Broad band data using other instruments of AstroSat...
- Frequency resolved spectroscopy...
- Much more results to follow.....

THANK YOU