Timing and Spectral study of Neutron Star X-ray binary source GX 340+0

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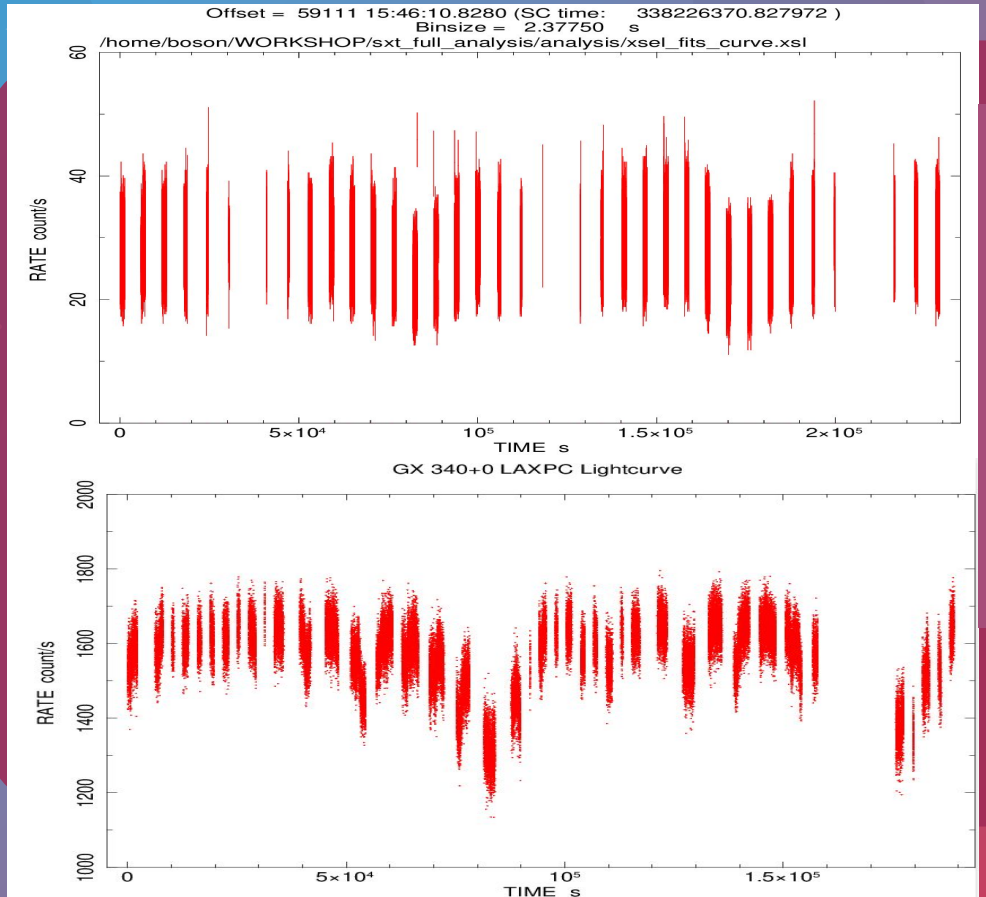
Neutron star X-ray binary : GX 340+0

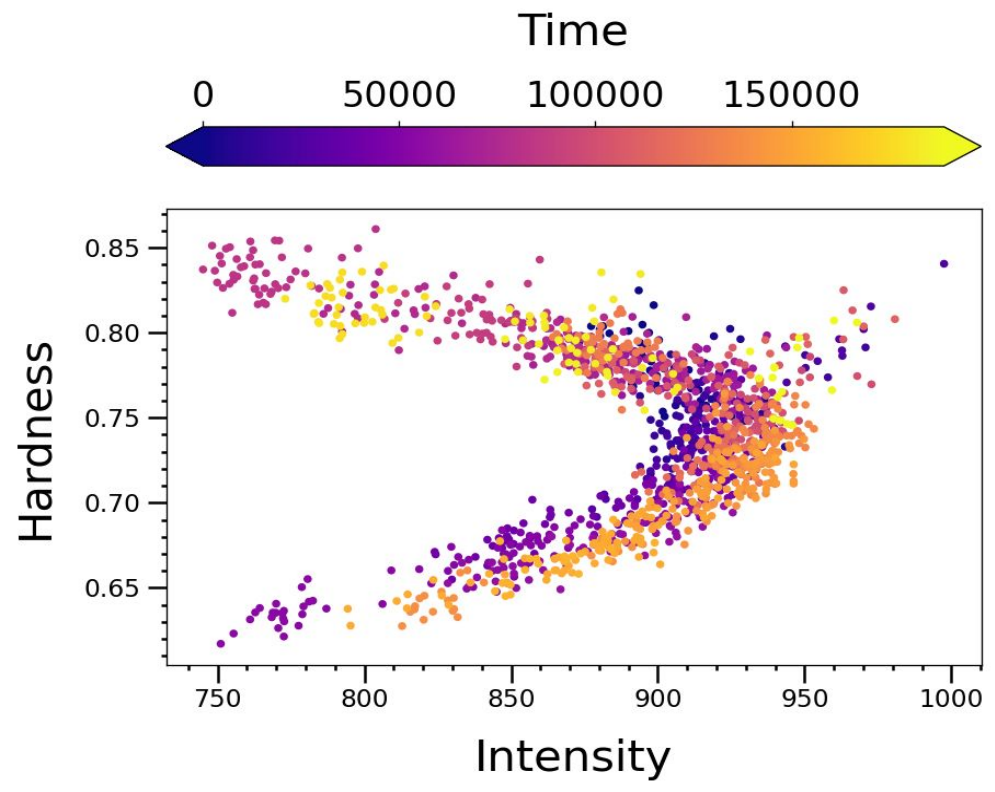
- GX 340+0 is a Neutron star low mass X-ray binary source.
- This source was first detected in 1967.
- Based on its spectral and timing properties neutron star can be categorized as Z source or atoll sources. This source is a Z source.
- We analyze AstroSat observation of 19th-21st September 2020.
- For Spectral and Timing analysis we have used the simultaneous observation of SXT and LAXPC.

Lightcurve of SXT and LAXPC of GX 340+0



- SXT lightcurve with 2.3775s binning.
- LAXPC lightcurve with 1.0 s binning in 5-25 keV.

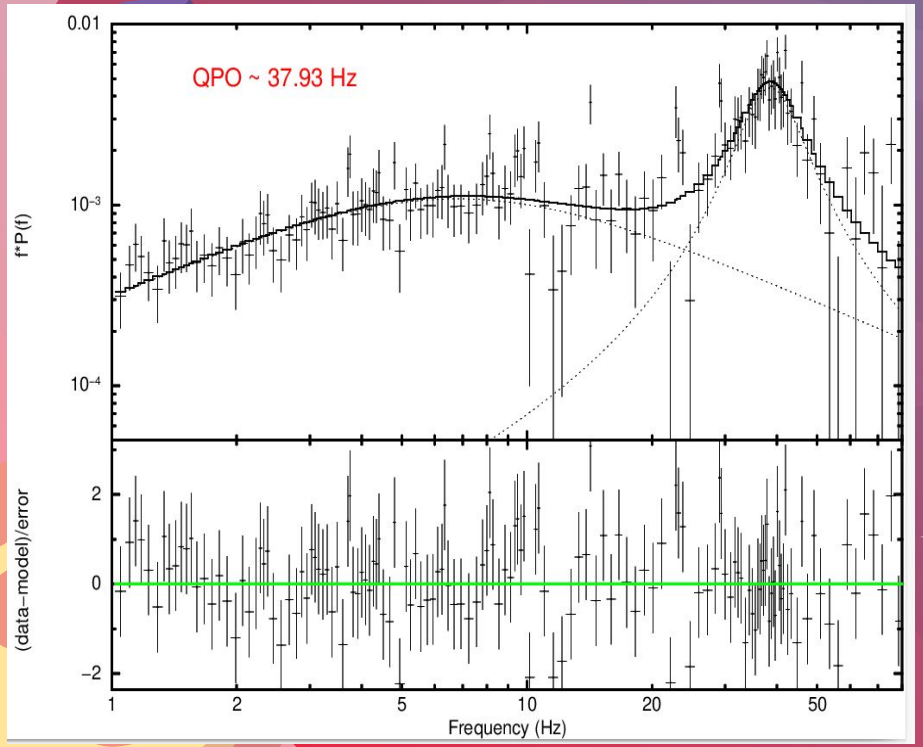
Hardness Intensity Diagram

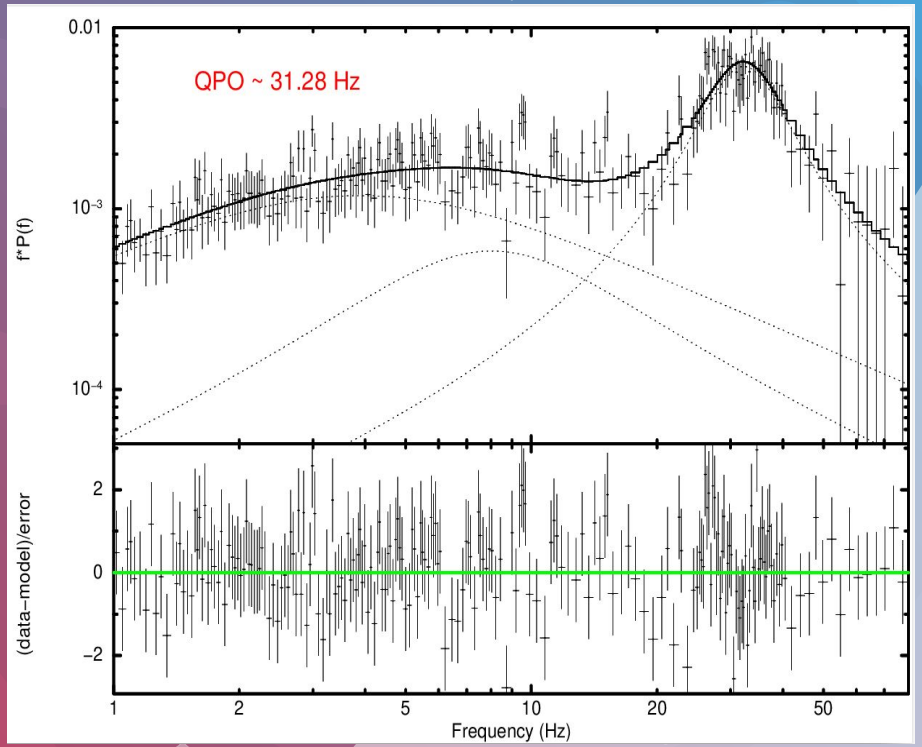


- To plot the hardness we lightcurve in the energy band 5-8 keV and 8-25 keV
- Hardness is the ratio of 8-25 keV counts and 5-8 keV counts.
- For our considered obs only the horizontal branch and upper normal branch is present.

Power Density Spectrum

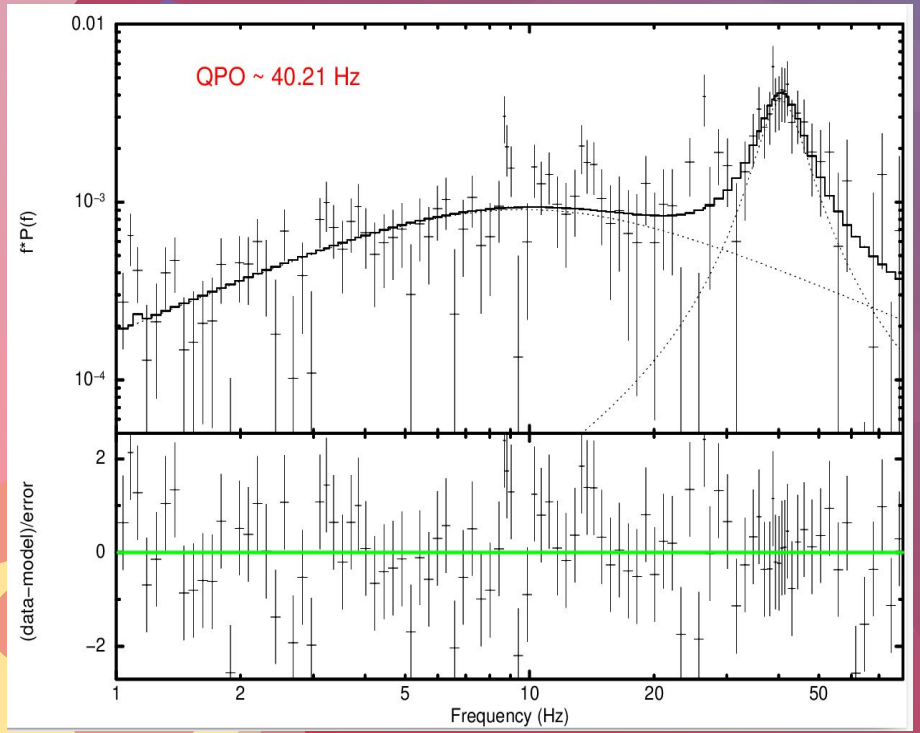
(Significance ~ 5-8.5)

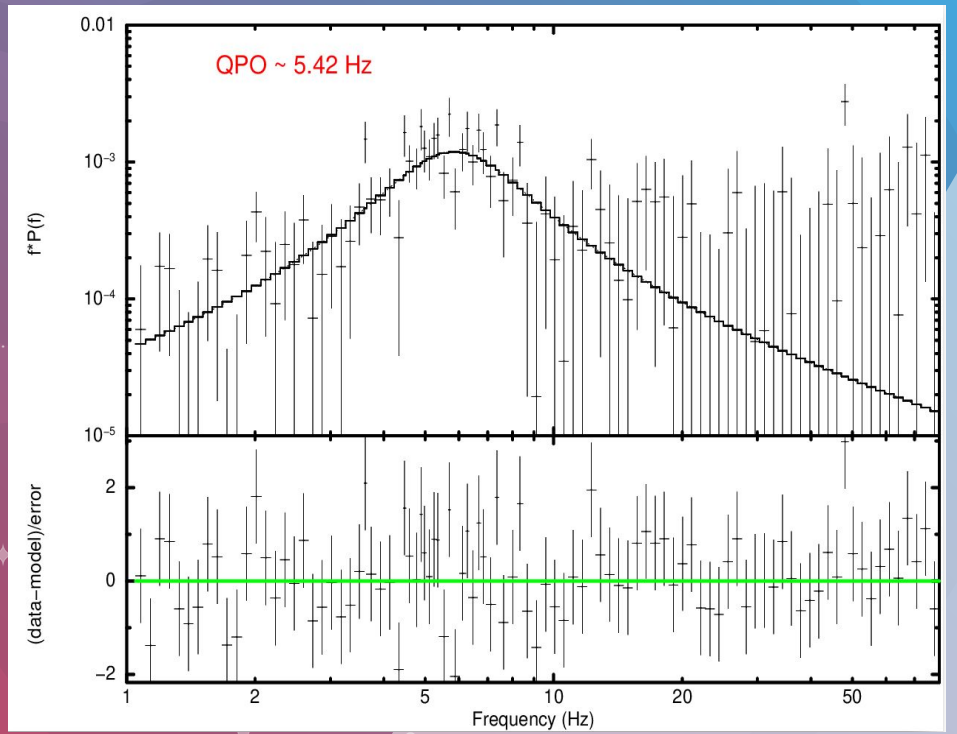




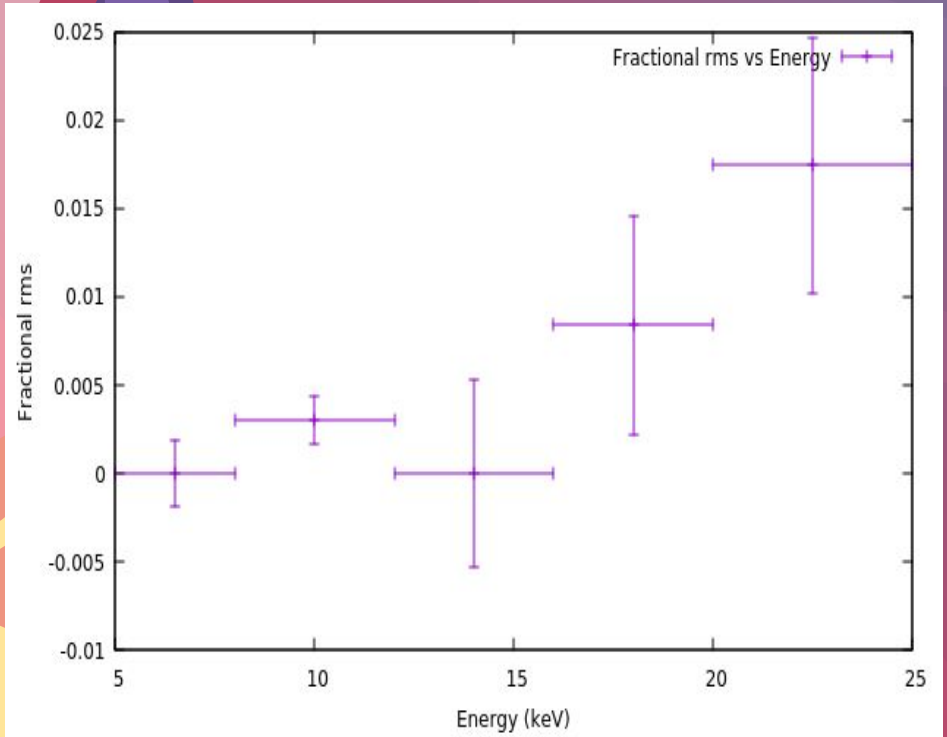
Power Density Spectrum

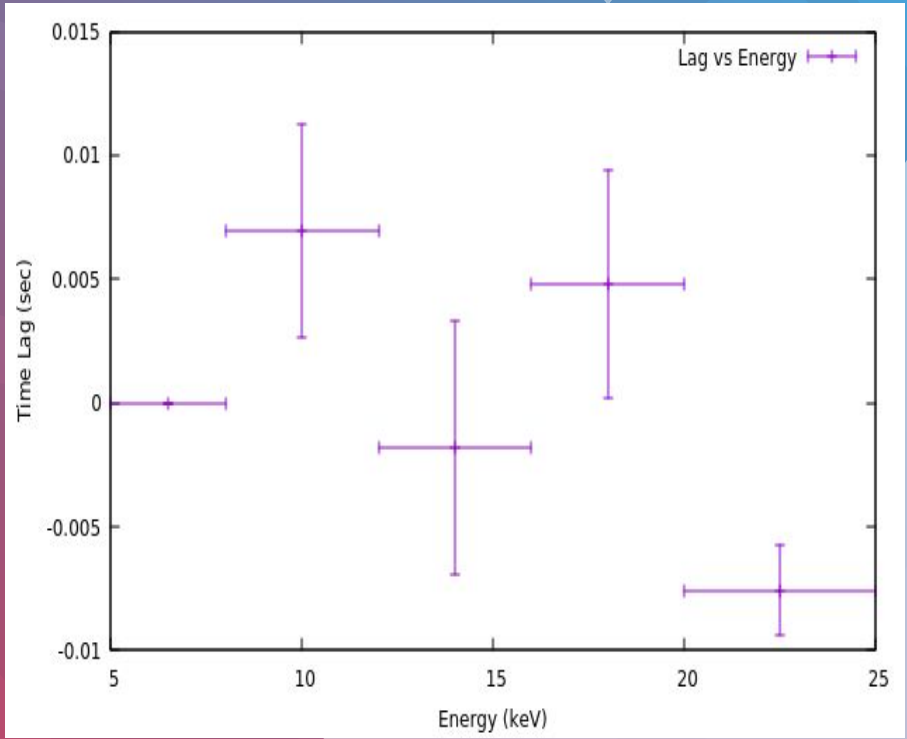
(Significance ~ 5-8.5)



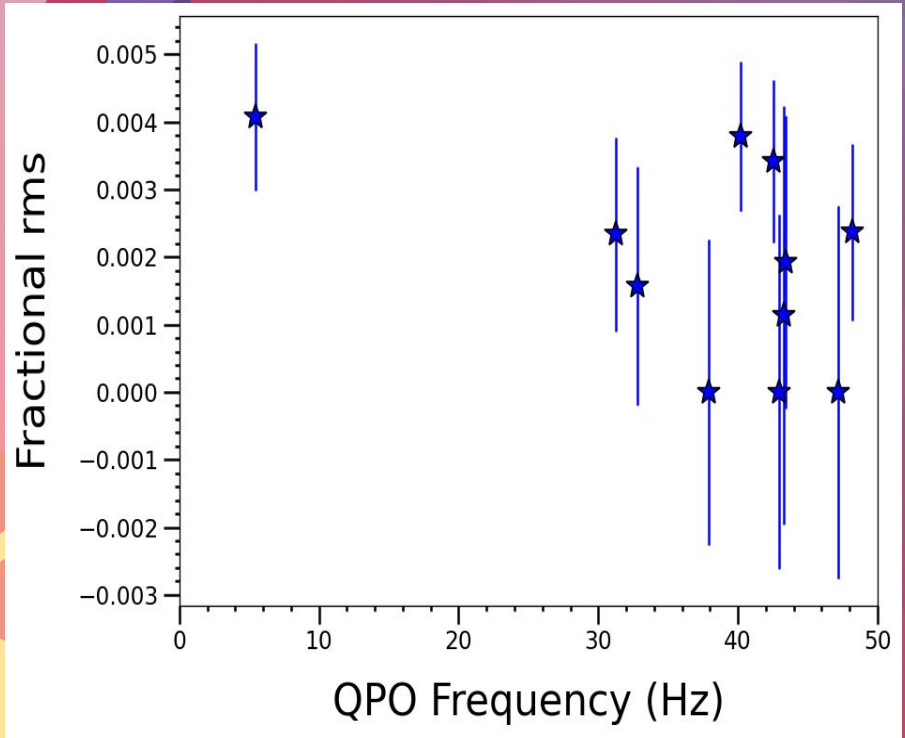


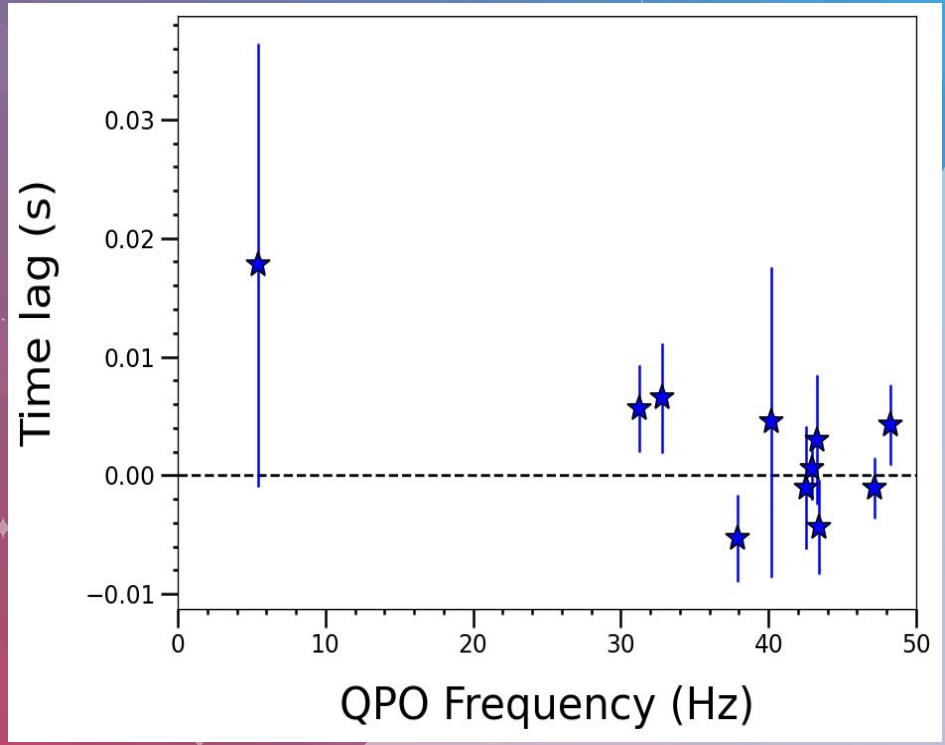
Time Lag and Fractional rms Spectra At QPO Freq. ~ 32.8 Hz



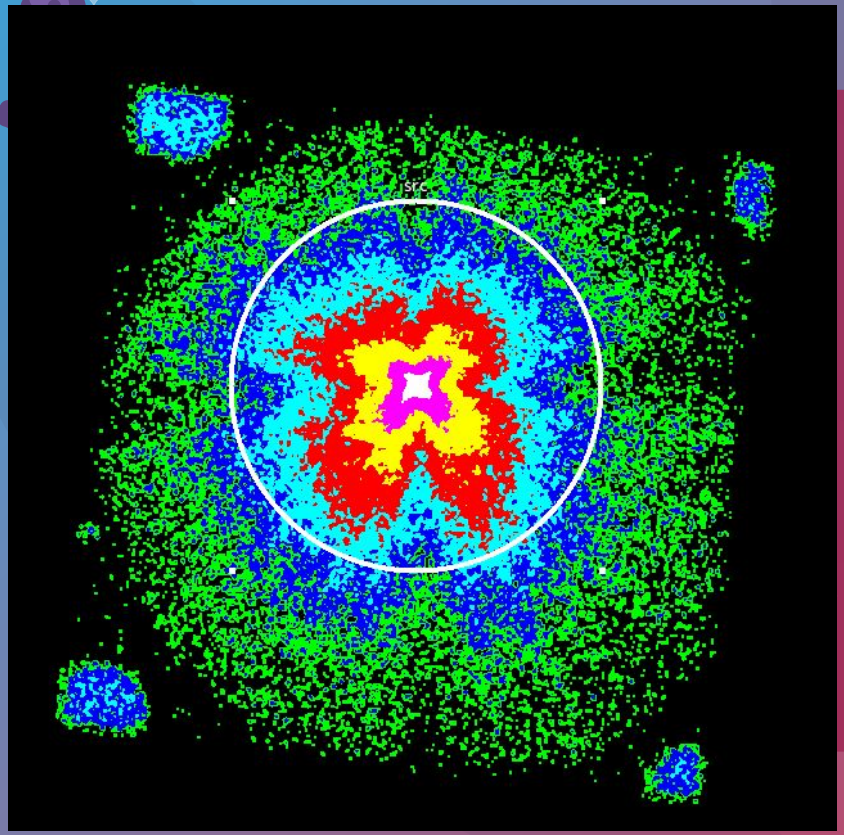


Time Lag and Fractional rms variation with QPO Freq.



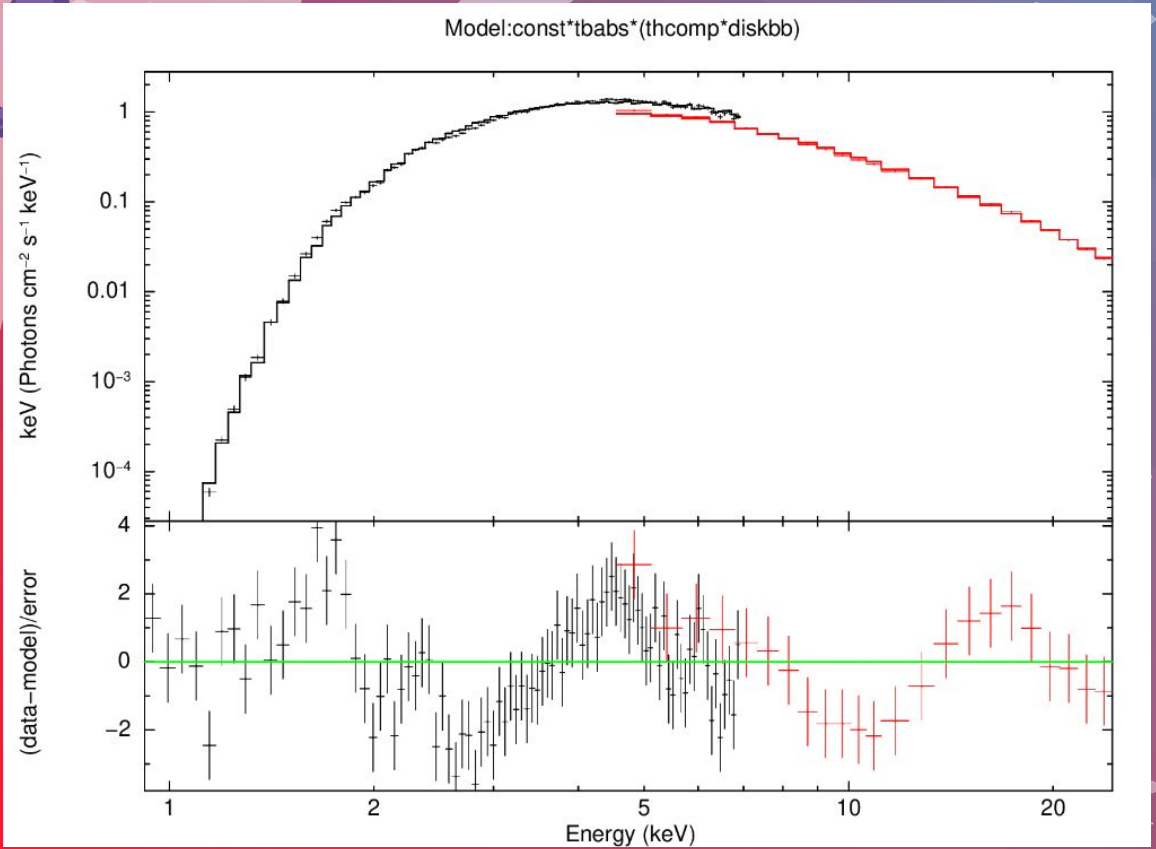


SXT DATA REDUCTION



- SXTEVTMergerjl : To Merge the all clean event
- ds9 :Source region selection with 12 arcmin with centroid region.
- Count Rate : 27 counts/sec ~ no need pile up correction
- Xselect : Extracting Light Curve and spectrum.
- SXTARFModule: making vig. Corrected arf file
- Ftgrppha: for grouping the spectrum file

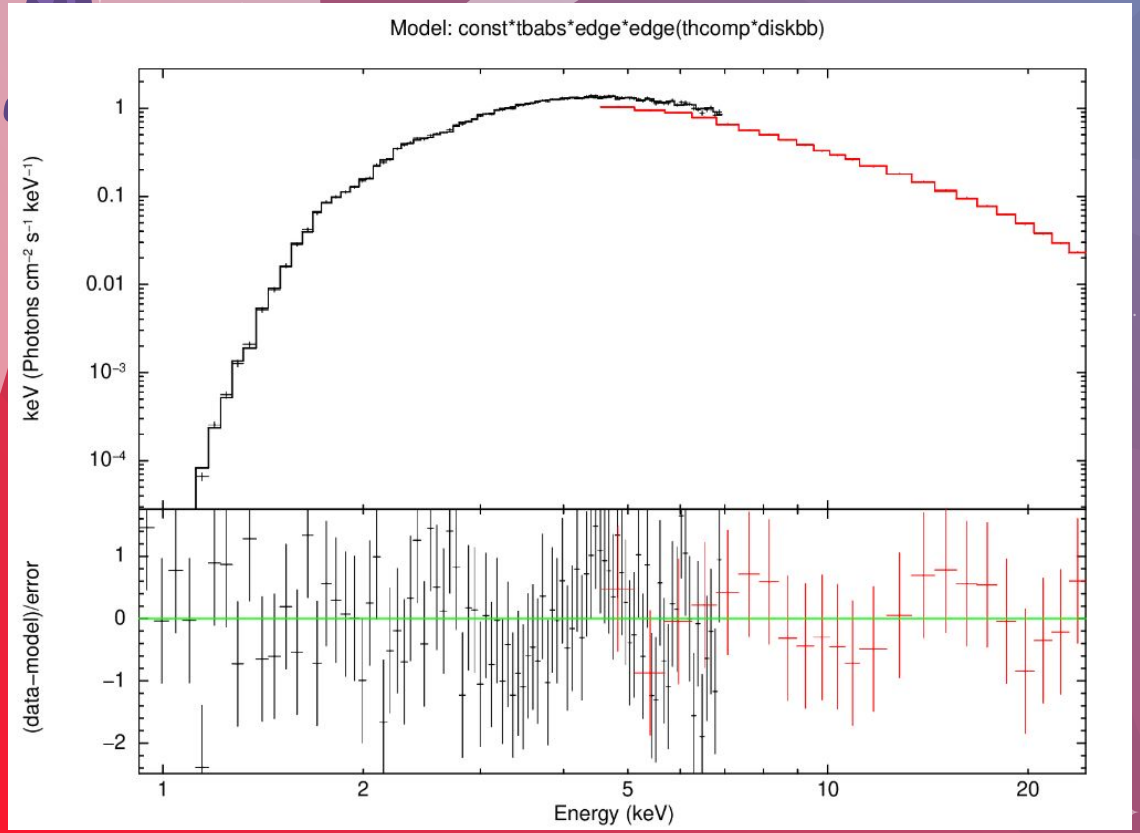
Spectral analysis



Model:cons*tbabs(th
comp*diskbb)

Reduced chisquare
= 248.9 / 106 = 2.3482

Spectral Analysis



Model:cons*tbabs*edge*
edge(thcomp*diskbb)

nH: 5.87 to 6.35 * 10^22

kT_in: 1.61 to 1.72 keV

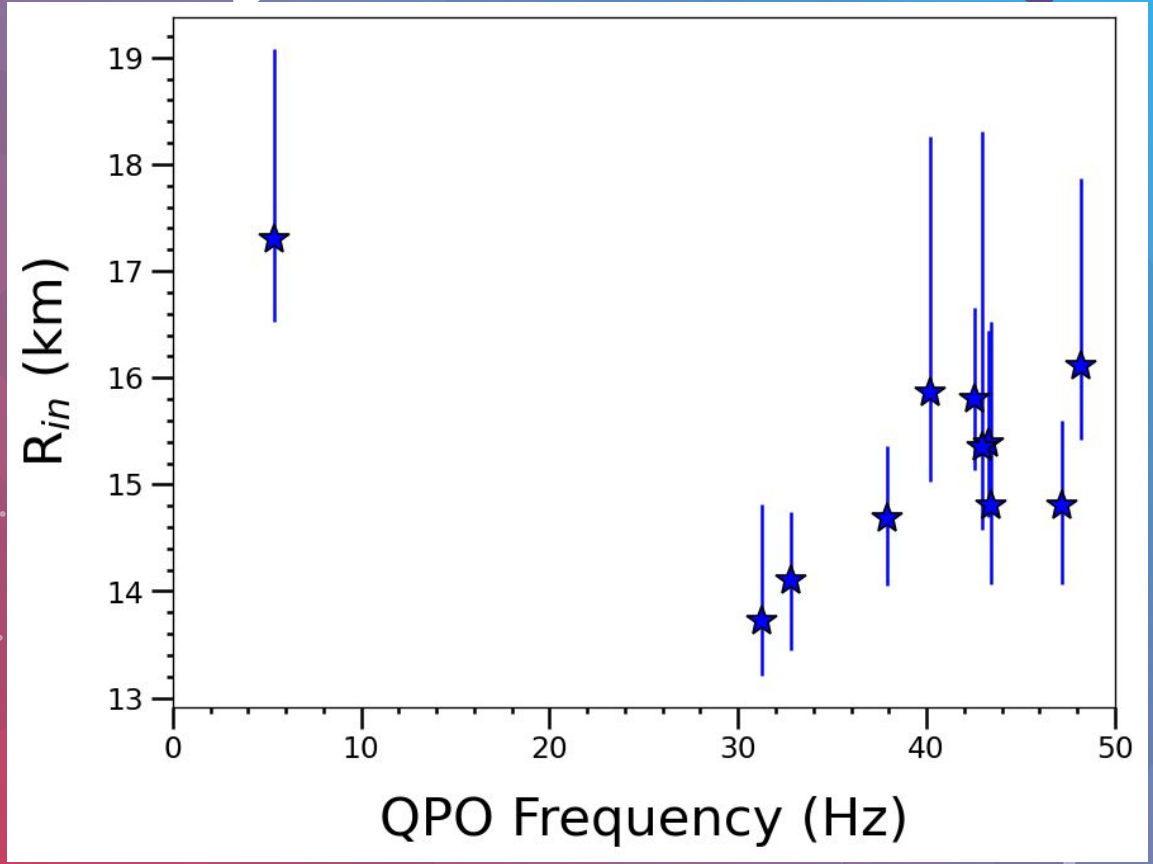
kT_e: 3.0 to 3.14 keV

Reduced chisquare
= 75.4 / 106 = 0.7113

Spectral-temporal analysis

Inner radius correlated with QPO frequency.
Theta=35 degree
Distance = 11 kpc

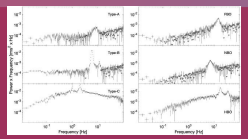
Origin of QPO is different.



Conclusions
GX 340+0

Z-type source

HID indicates that it is a Z-type source. HID toggle between HB and NB.



Timing Analysis

QPO ~ 32-48 HZ.
QPO ~ 6 Hz.
Soft photons lagging hard photons

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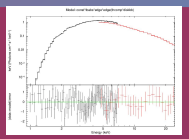

Spectral Analysis

We fitted the spectra with disk emission and power law.

In future, We will study the origin of different QPO we observed.


Thank You
We acknowledge Dr. Divya Rawat.