AGN Baseline Science with ASTROSAT

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(for SXT and CZTI Science Team)

Primary Objective: Understanding the Central Engines

Several fundamental parameters : BH mass, accretion rate, radio-loudness, inclination, Intrinsic Absorption, etc.

Baseline Science (Short term)

Spectral energy distribution of AGNs at the extreme end of parameter space

I. Disk dominated AGNs

II. AGN with IMBH (Also fast variability)

II. Bare Nuclei – No intrinsic absorption

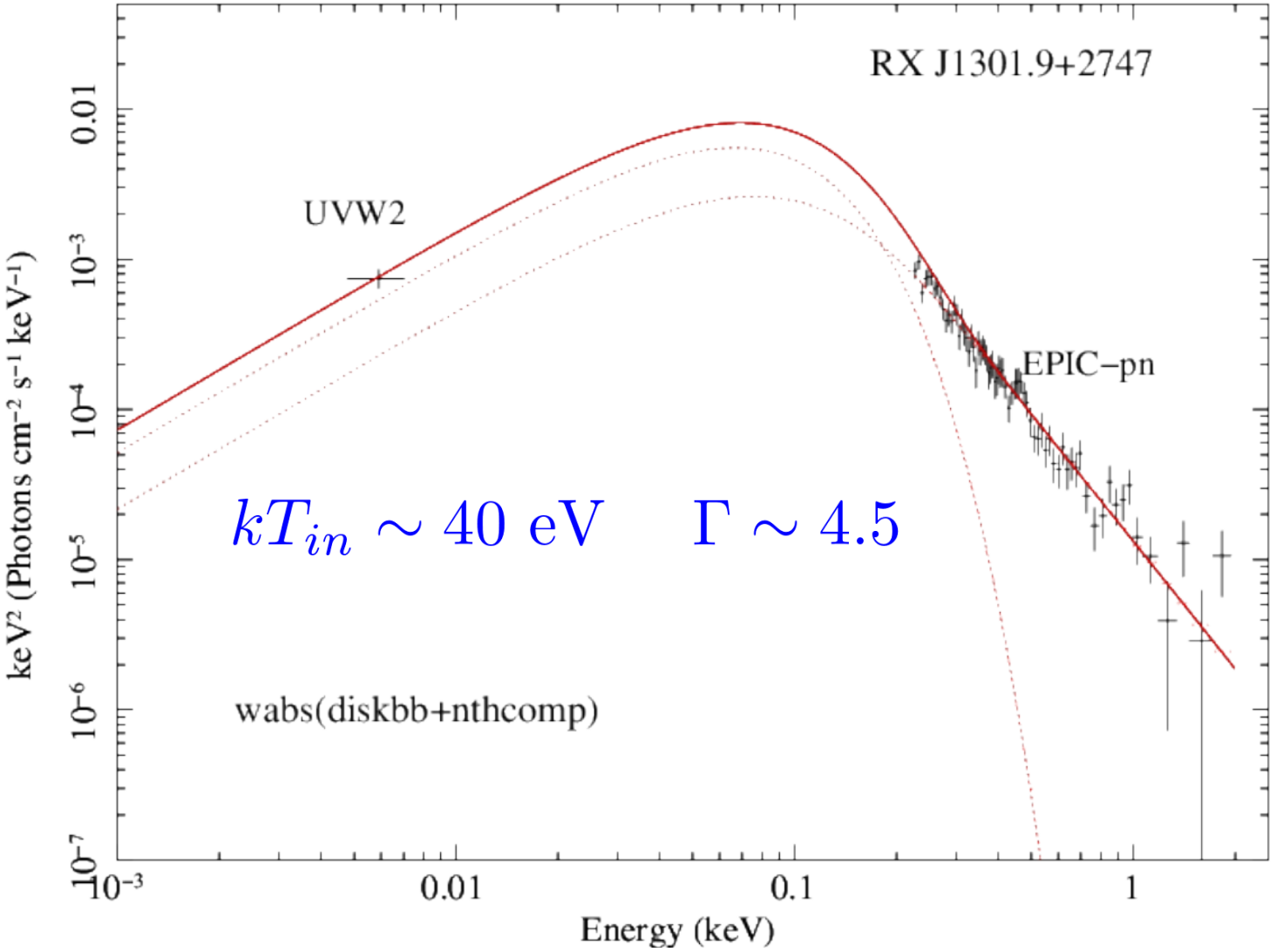
III. True Type 2 AGN

IV. Low luminosity AGN (truncate disks?)

V. Radio-loud narrow-line Seyfert 1 galaxies (disk/corona – jet modeling)

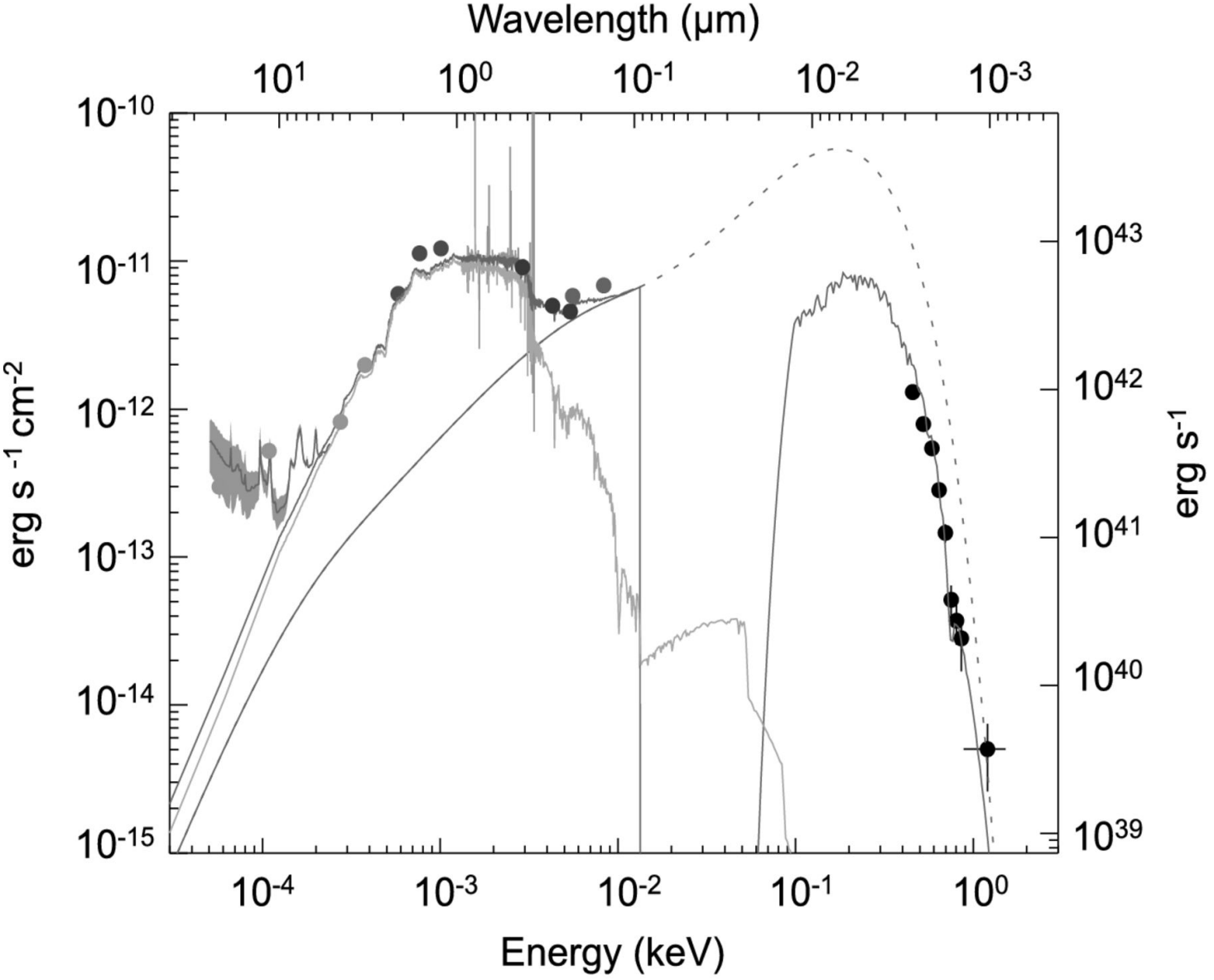
Supersoft AGN – Disk Dominated

Identified by GCD, KP, et al. 1999 using ROSAT & optical observations



GSN 069:

Supersoft AGN with no hard X-ray emission

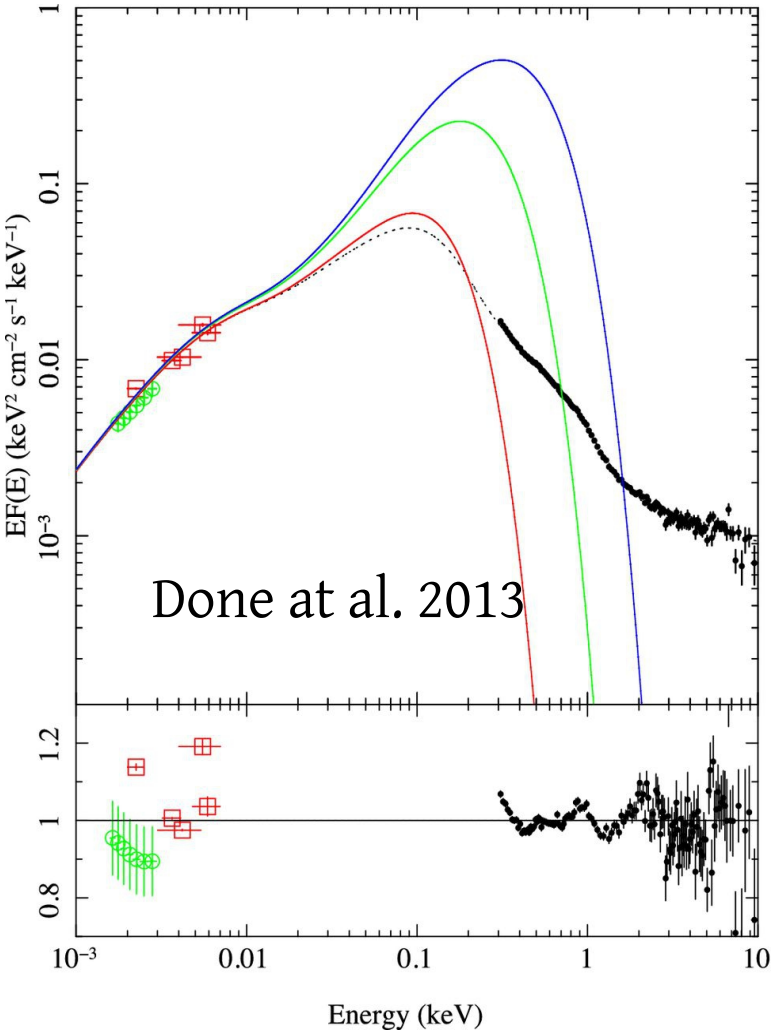


Discovered with XMM Slew Survey

I. Disk dominated AGN!

ASTROSAT study

- Discover Soft State AGNs (UV+X-ray)
- Do AGN disks behave like standard disks?
- Determine BH spin by continuum fitting



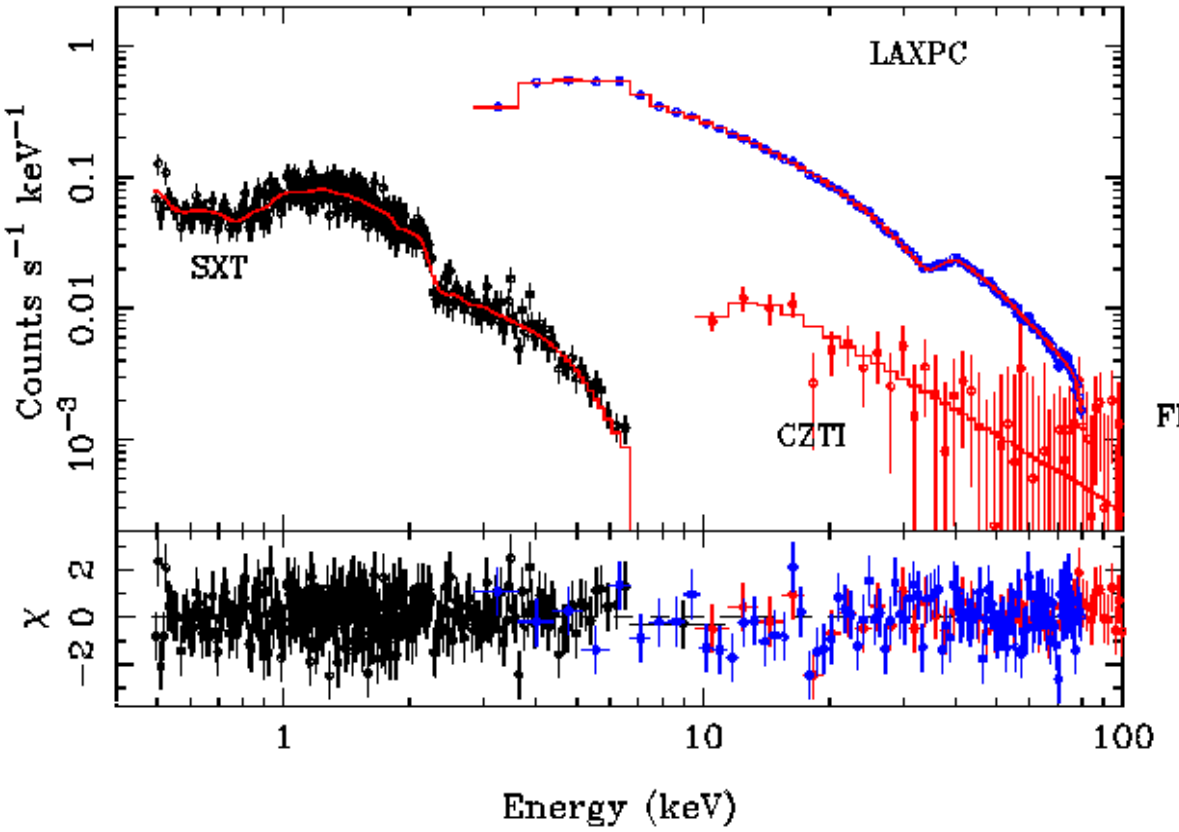
II. AGN with IMBHs

- SED & Multiwavelength Variability

ASTROSAT Simulation

Target : NGC 4395 (IMBH AGN)

wabs*zwabs*pcfabs(1)*zxipcf(1)*zxipcf(2)*zxipcf(3)*(powerlaw+gaussian)



Exposure: 50.0ks

Count Rates

SXT: 0.15 count/s

CZTI: 0.23 count/s

LAXPC: 5.76 count/s

Flux:

SXT(0.5−2 keV): 2.1e−12 erg/cm**2,

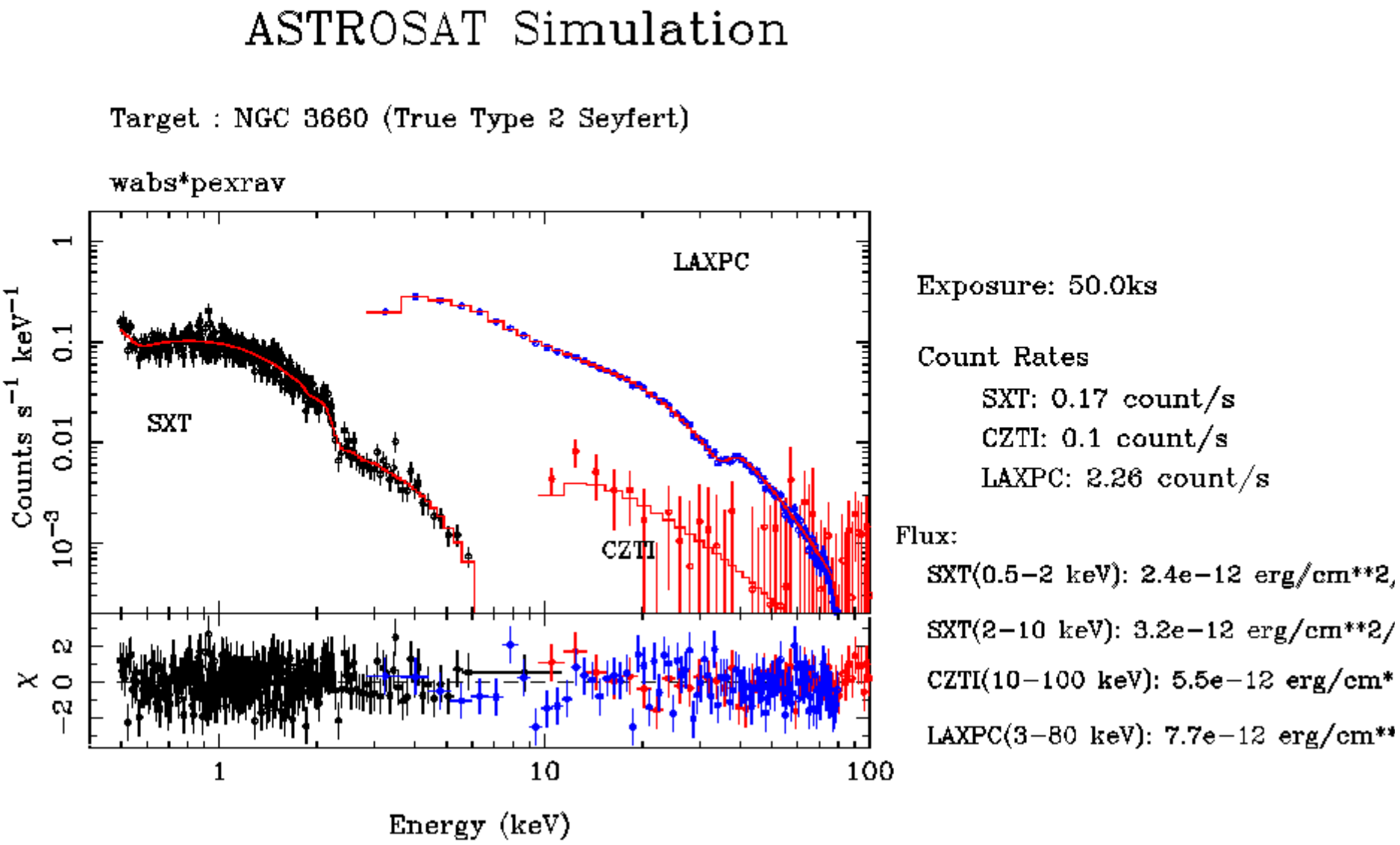
SXT(2−10 keV): 6.6e−12 erg/cm**2/

CZTI(10−100 keV): 1.91e−11 erg/cm

LAXPC(3−80 keV): 2.24e−11 erg/cm

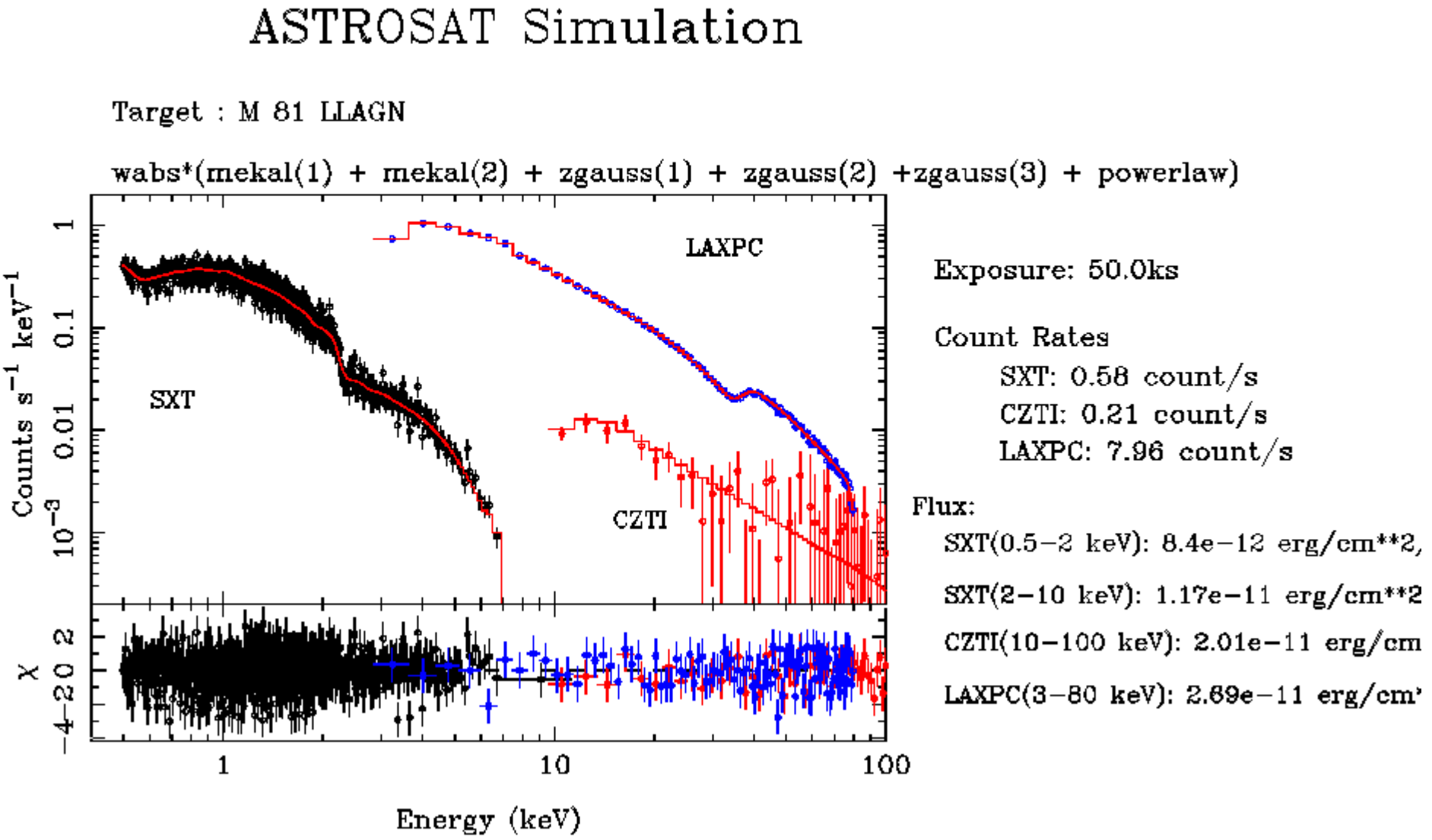
III. Bare Nuclei – No intrinsic absorption

- Direct view of central engine SED



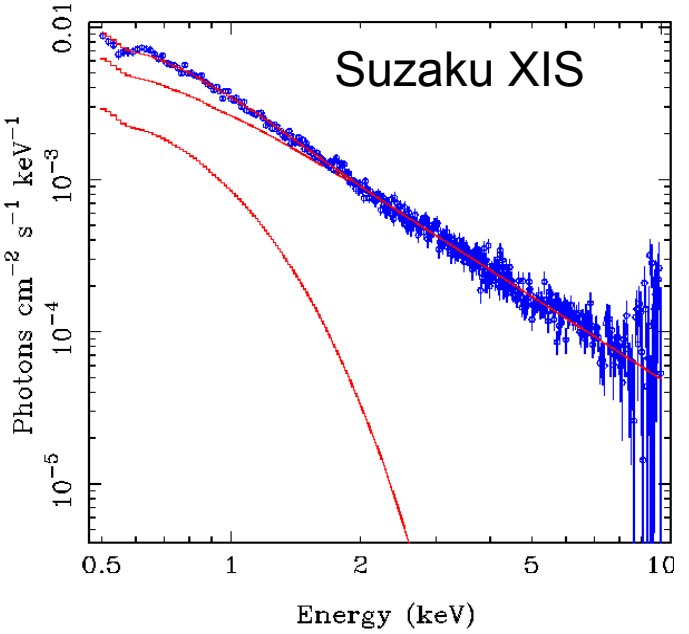
IV. LLAGN

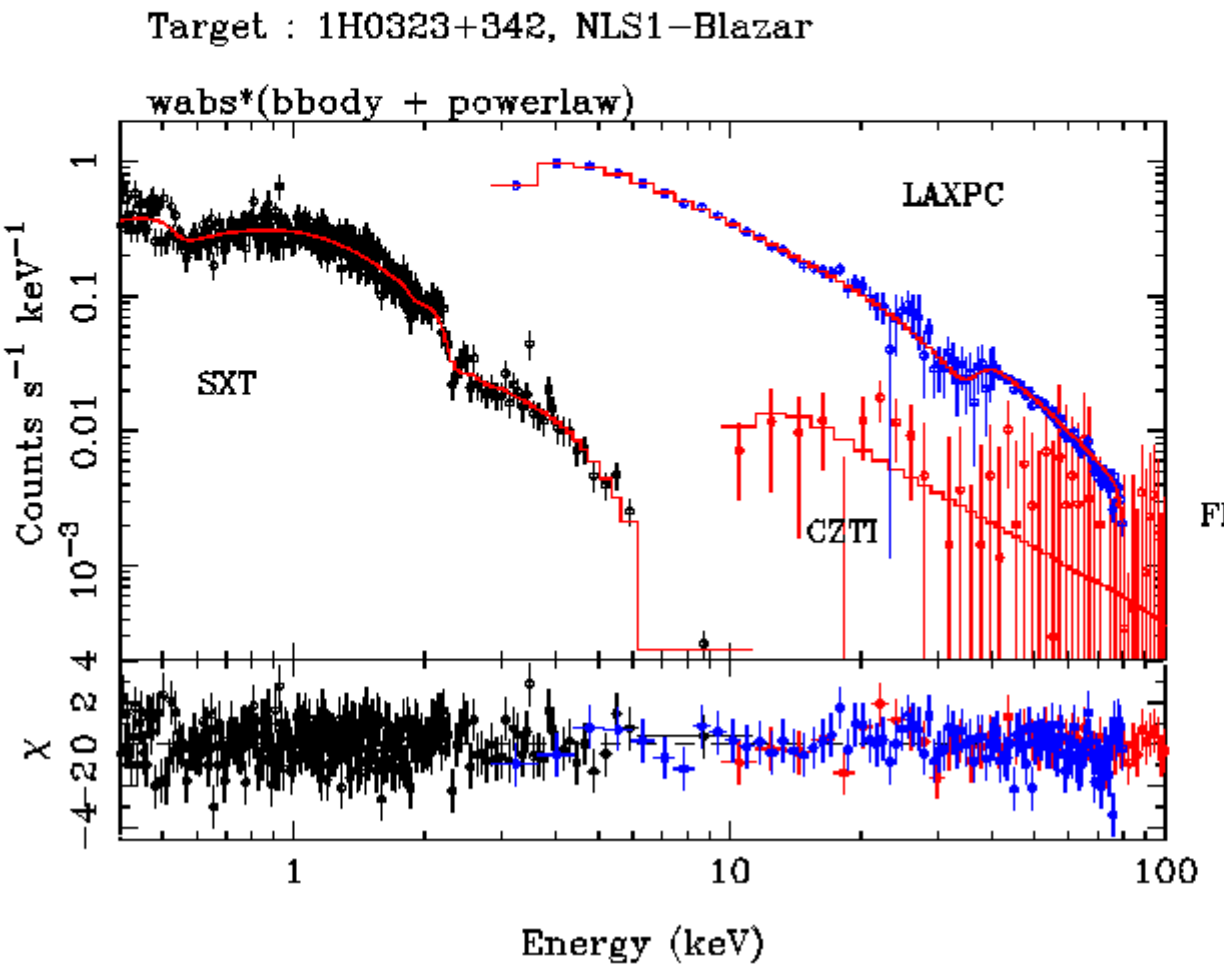
- SED, Truncated disks, Low/Hard States



NLS1-Blazars

(Disk-Jet connection)





Exposure: 15.0ks

Count Rates

SXT: 0.52 count/s

CZTI: 0.33 count/s

LAXPC: 70.93 count/s

Flux:

SXT(0.5−2 keV): 7.3e−12 erg/cm**2,

SXT(2−10 keV): 1.09e−11 erg/cm**2

CZTI(10−100 keV): 2.37e−11 erg/cm

LAXPC(3−80 keV): 2.93e−11 erg/cm'

Blurred Reflection Vs Complex Absorption

- Testing reflection Vs absorption models
  - **Compton thick type 1 AGNs (SXT + CZTI/LAXPC)**
  - Relationship between soft excess and reflection hump with broadband spectral variability (SXT + CZTI/LAXPC)
  - Probing variations in absorption by broadband spectral variability (SXT + CZTI/LAXPC)
    - Below 10 keV may be affected by absorption, models degenerate, data above 10 keV will break the degeneracy.
- Multiwavelength Variability (low mass AGN e.g., NLS1s, AGN with IMBH

Thank You