Summary WD/iNS Working Group IACHEC #11, Pune, India

2016-02-29

Attendees:

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Vadim Burwitz

Observations with ASTROSAT

- Instrument Contraints
  - SXT
    - FoV 40‘ diameter (jitter ~6‘)
    - PSF 2‘-4‘ diameter (with Jitter)
  - UVIT
    - FoV 28‘ diameter (40‘ with drift and Jitter)
    - no bright sources in <20‘ radius

WD Observations with ASTROSAT

- HZ43A (HZ43B M3.5 star 13mag, check if flaring)
  - SXT (observed, check high energy cut-off)
  - UVIT (check if observable)
- GD153
  - SXT (observed but undetected → too faint)
  - UVIT (check if observable, check if grating possible)
- Models
  - Physical models
    - Rauch, Barstow (Hubeny) NLTE Models
    - Best Fits
      - Papers Beuermann; Paper Kaastrarake
      - Thesis Menz
    - HST – absolute flux calibration

iNS Observations with ASTROSAT

- RXJ1856
  - SXT (not observed yet important for low E calibration)
  - UVIT (optically very faint: 26 mag in HAST)
- Models
  - Blackbody (well contrained from existing missions)
    - Sufficient for calibrating response shape
    - Relative calibration
  - Physical models
    - Different approaches : strongly magnetized atmospheres → same shape as bb model

WG Actions

- Provide KP with Rauch models for fitting ASAP (March 2016), as tables for XSPEC ✔
  → see 1st fit to ASTROSAT HZ43A data on subsequent pages

- SXT definitely requires RXJ1856 observation
  → to help improve the low energy response

- iNS provide blackbody model parameters from Drake and Burwitz papers + IACHEC efforts

- Add Models and LETGS spectra to IACHEC wiki

- Check HZ43A and HZ43B co-added spectra for high energy tail in HRC-S + LETG (Vinay, Jeremy)

- HITOMI →

Calibration item	SXS/SXT-S	SXI/SXT-I	HXI/HXT	SGD
Contamination	RXJ1856-3754, 1E0102-72	RXJ1856-3754, Cygnus Loop	NA	NA

WD models from literature

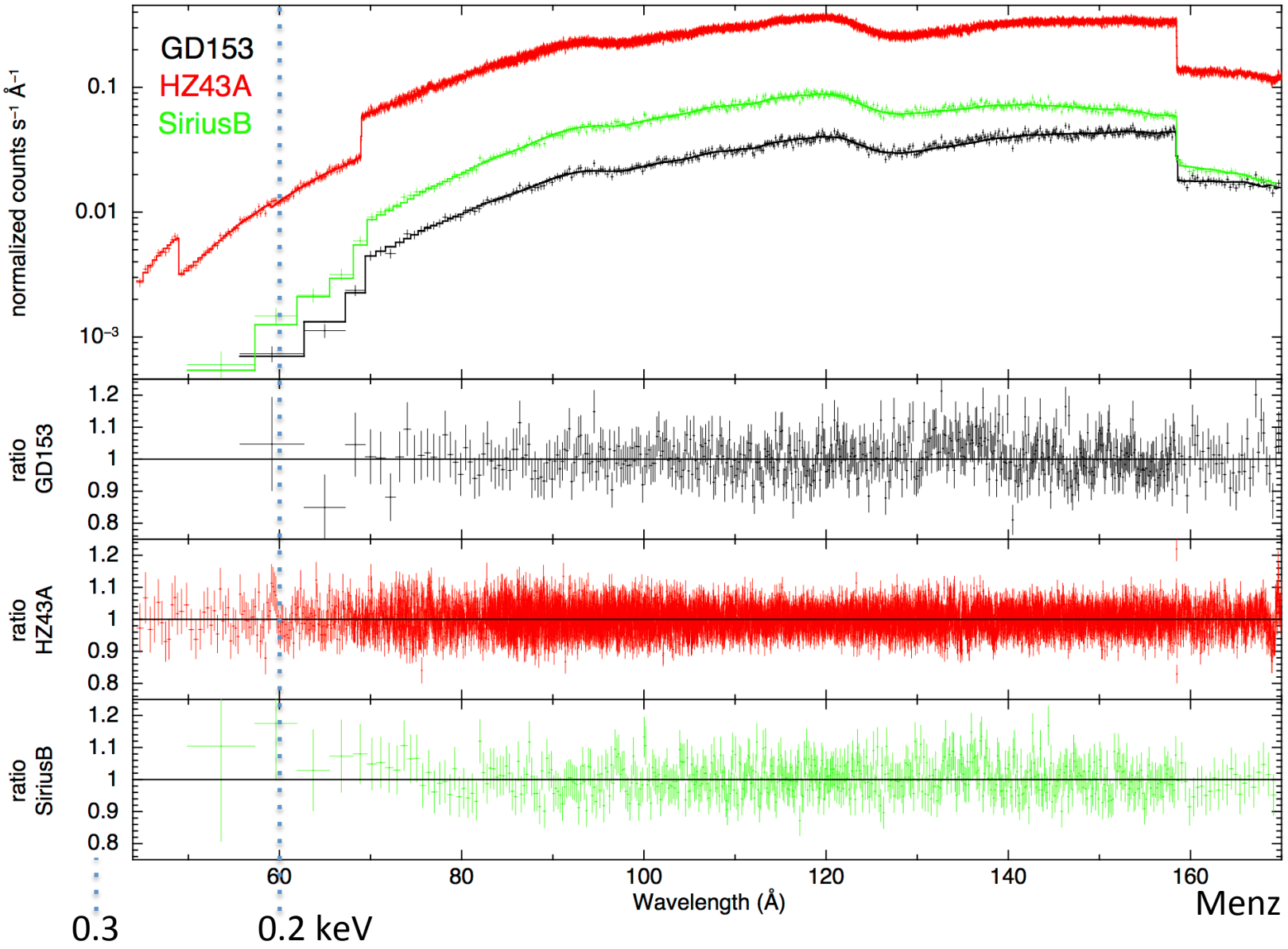
Table 5.3.: Literature values of $T_{\rm eff}$ and $\log g$

Target	$T_{\rm eff}$	$\log g$	$R^2/d^2(10^{-22})$	$N_{\rm H}$ $(10^{19} cm^{-2})$
GD153	38 205± 1 534[1]	7.9 ± 0.18[1]		
	38 487± 247[2]	7.870 ± 0.010[2]		
HZ43 A	49 435± 1 322[1]	7.95 ± 0.14[1]	0.3011 ± 0.018[4]	0.0891 ± 0.0037[4]
	50 377 ± 324[2]	7.970 ± 0.030[2]	0.3037 ± 0.013[5]	0.085 ± 0.004[5]
Sirius B	24 790± 100[3]	8.57 ± 0.06[3]	48.77 ± 0.36[4]	0.065 ± 0.02[4]
			49.1 ± 0.4[5]	0.058 ± 0.008[5]

[1] Balmer line (Barstow et al. 2003)
[2] Lyman line (Barstow et al. 2003)
[3] Balmer line (Barstow et al. 2005)
[4] Beuermann et al. (2006)
[5] Kaastra et al. (2009)

Menz 2011

H43A model from Chandra LETGS



Menz 2011

WD model values from combined Chandra LETGS

Parameter	literature values	*Chandra* effective area	combined fit	new effective area
GD153				
log g(cgs)	7.870 ± 0.010	$7.66^{+0.05}_{-0.05}$	7.87	$7.92^{+0.1}_{-0.1}$
$T_{\rm eff}$(kK)	38.487 ± 0.247	$42.15^{+2.1}_{-2.1}$	38.487	$38.15^{+3.9}_{-3.9}$
$R^2/d^2(10^{-22})$	0.25[1]	$0.48^{+0.16}_{-0.02}$	$0.95^{+0.69}_{-0.69}$	$1.0^{+0.1}_{-0.1}$
nH (10^{19} cm^{-2})		$0.14^{+0.04}_{-0.03}$	< 0.01	< 0.2
reduced χ^2		1.22		0.96
HZ43 A				
log g(cgs)	7.970 ± 0.030	$7.7^{+0.2}_{-0.2}$	7.97	$7.92^{+0.2}_{-0.2}$
$T_{\rm eff}$(kK)	50.377 ± 324	$50.98^{+2.7}_{-2.7}$	50.377	$51.25^{+3.5}_{-3.5}$
$R^2/d^2(10^{-22})$	0.3037 ± 0.013	$1.2^{+0.5}_{-0.5}$	$1.10^{+0.9}_{-0.9}$	$1.0^{+0.1}_{-0.1}$
nH (10^{19} cm^{-2})	0.085 ± 0.004	$0.27^{+0.07}_{-0.07}$	0.085	$0.082^{+0.03}_{-0.03}$
reduced χ^2		2.36		1.04
Sirius B				
log g(cgs)	8.57 ± 0.06	$8.40^{+0.05}_{-0.05}$	8.57	$8.49^{+0.2}_{-0.2}$
$T_{\rm eff}$(kK)	24.790 ± 0.100	$24.83^{+0.4}_{-0.2}$	24.79	$25.01^{+0.4}_{-0.4}$
$R^2/d^2(10^{-22})$	48.77 ± 0.36	170^{+10}_{-24}	179^{+129}_{-129}	152^{+5}_{-11}
nH (10^{19} cm^{-2})	0.065 ± 0.02	$0.02^{+0.1}_{-0.02}$	0.065	< 0.09
reduced χ^2	0.96		0.76	
reduced χ^2 combined fit			1.05	

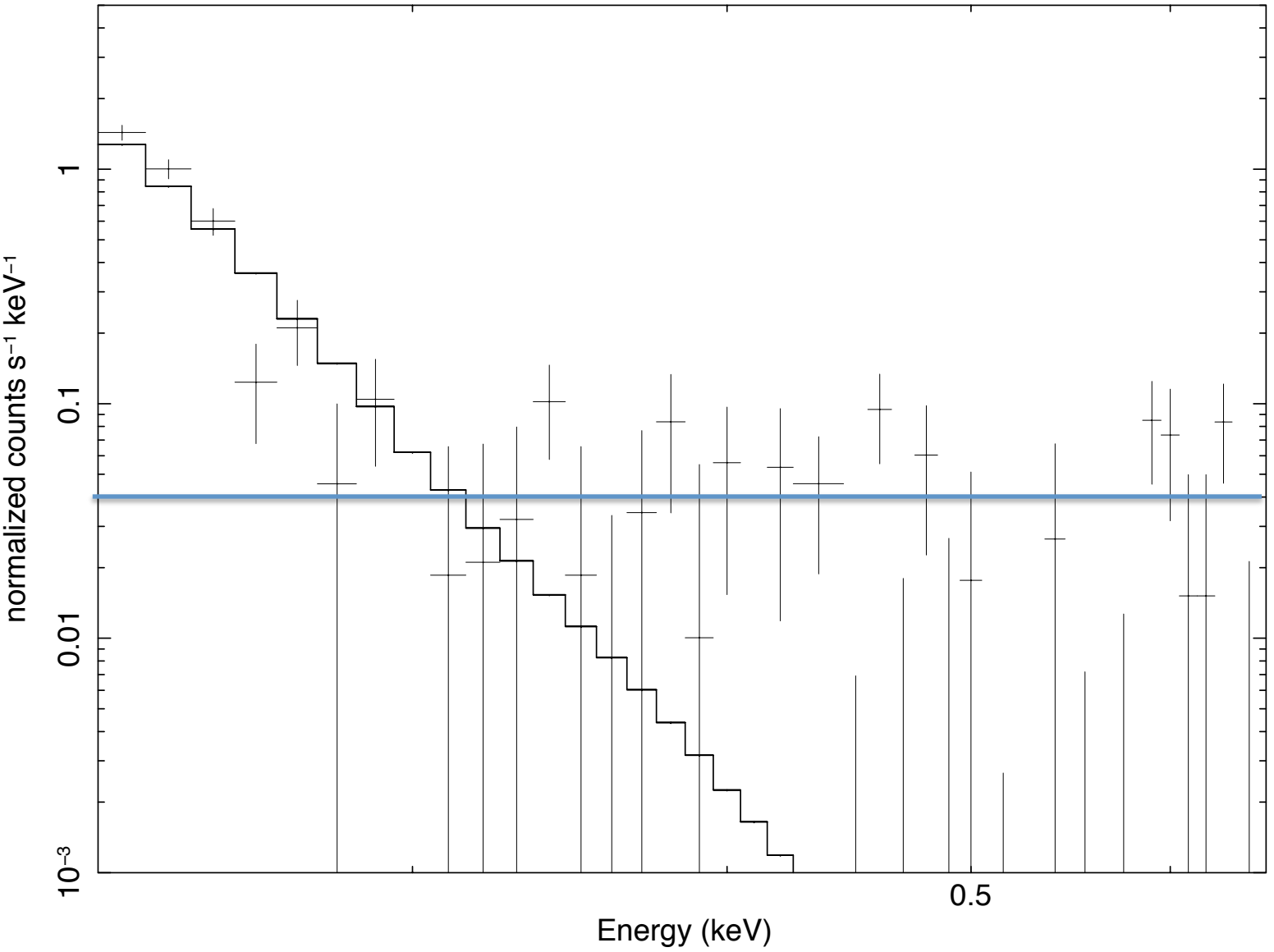
[1] R^2/d^2 value calculated with $M = 0.60 M_\odot$, $d = 67.9pc$, and $\log g = 7.86$ and $g = GM/R^2$. Values are taken from Lajoie & Bergeron (2007). An error cannot be calculated since all values are tabulated without errors.

ASTROSAT
SXT
Rauch NLTE
7.9
51.25
1.4 (free)
0.0

Note: there is a factor of 3 difference between the Rauch and literature normalization constants

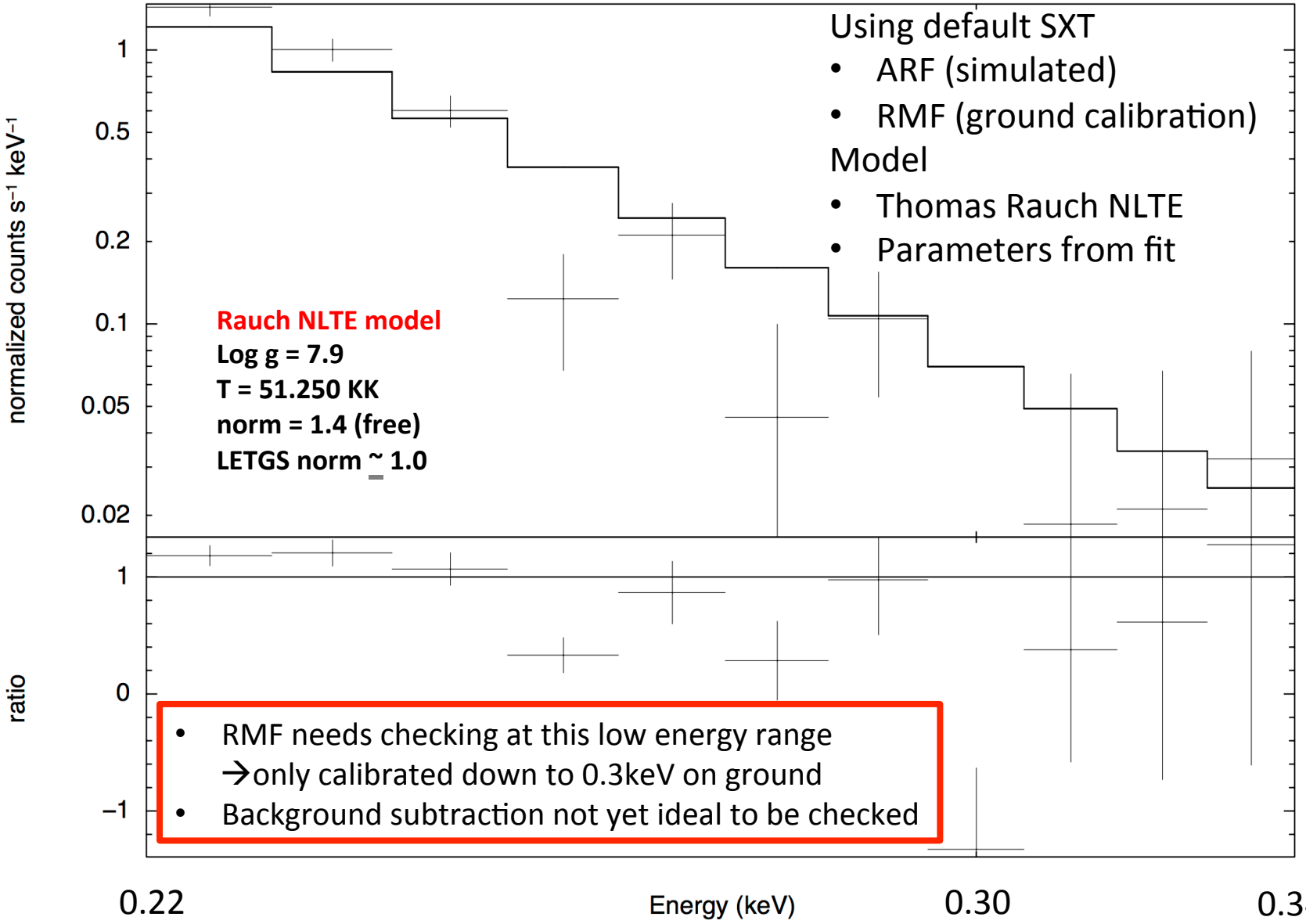
Menz 2011

HZ43A ASTROSAT SXT 14ksec: Overview



Background level to be determined more precisely

HZ43A ASTROSAT SXT 14ksec Detail



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