Summary WD/iNS Working Group
IACHEC #12, Lake Arrowhead, USA

2017-02-29

Attendees:

Kristin Madsen
Jeremy Drake
Nick Durham
Brian Grefenstette
Vinay Kashyap

Craig Markwardt
Shu Koyama
Hiromitsu Takahashi
Kenya Oshimizu
Yukikatsu Terada
Vadim Burwitz
WD Observations with ASTROSAT

• HZ43A (HZ43BM3.5 star 13mag, check if flaring)
  – SXT (observed, check high energy cut-off)
  – UVIT (check if observable)
HZ43A ASTROSAT SXT 14ksec Detail

Using default SXT
• ARF (simulated)
• RMF (ground calibration)

Model
• Thomas Rauch NLTE
• Parameters from fit

Rauch NLTE model
Log g = 7.9
T = 51.250 KK
norm = 1.4 (free)
LETGS norm ~ 1.0

• RMF needs checking at this low energy range
  → only calibrated down to 0.3keV on ground
• Background subtraction not yet ideal to be checked

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iNS Observations with ASTROSAT

- RXJ1856 (ask KP)
  - SXT (not observed yet important for low E calibration)
  - UVIT (optically very faint: 26 mag in HAST)
- RXJ0720 (ask KP)
  - SXT (58ksec) has been observed
  - UVIT (??)
- 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
RXJ1856 Fit Results

- **Model TBabs<1>*bbodyrad<2>**

  Source No.: 1  Active/On

  | Model | Component | Parameter | Unit  | Value          |
  |-------|-----------|-----------|-------|----------------|
  |       |           | par comp  |       |                |
  |       | 1 1 TBabs | nH 10^22  |       | 7.24535E-03 +/- 3.43494E-04 |
  |       | 2 2 bbodyrad | kT keV  |       | 6.23787E-02 +/- 3.79046E-04 |
  |       | 3 2 bbodyrad | norm    |       | 1.58155E+05 +/- 6513.96 |

  # Using energies from responses.

  # Fit statistic : Chi-Squared = 693.13 using 1254 PHA bins.

  # Test statistic : Chi-Squared = 693.13 using 1254 PHA bins.

  # Reduced chi-squared = 0.55406 for 1251 degrees of freedom

  # Null hypothesis probability = 1.000000e+00

  # Weighting method: standard

  # !XSPEC12> error 1 2 3

  # Parameter  Confidence Range (2.706)

  |       | 1 | 0.00668153 | 0.00781739 | (-0.000563825,0.000572039) |
  |       | 2 | 0.0617595  | 0.063001   | (-0.000619178,0.000622327) |
  |       | 3 | 147885     | 169271     | (-10270.4,11116.1) |
RXJ1856 and NICER

Peak Effective Area

• At 0.5 keV 1000 cm²
• at 1.5 keV 1900 cm²

Model (VB)

– Model predicted countrate
  → 13 cts/s 0.1 - 1.0 keV all detectors (FPMs)
  0.24 cts/s per FPM
RXJ1856 and NICER

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→ 13cts/s 0.1 -1.0 keV all detectors (FPMs)
 0.24 cts/s per FPM
RX J1856 High Energy Excess \(>1\text{keV}\)

- Discovery of a keV-X-ray Excess in RX J1856.5–3754
- Tomokage YONEYAMA\(^1,2\), Kiyoshi HAYASHIDA\(^1,2\), Hiroshi NAKAJIMA\(^1,2\), Shota INOUE\(^1,2\) and Hiroshi TSUNEMI\(^1,2\)

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RX J1856 High Energy Excess >1keV

Discovery of a keV-X-ray Excess in RX J1856.5–3754
Tomokage YONEYAMA1,2, Kiyoshi HAYASHIDA1,2, Hiroshi NAKAJIMA1,2, Shota INOUE1,2 and Hiroshi TSUNEMI1,2

Fig. 3. Spectra of XIS FI CCDs with the contamination-corrected 2T blackbody model. The fit provides $\chi^2 = 1.40$ for 187 dof, but the keV-excess is visible in > 0.8 keV energy range.
RXJ1856 and NuSTAR

• Simulation with powerlaw model
  → predicts 2e-5 cts/sec in 3 – 10 keV band
• Unlikely to be detected in a reasonable exposure time <150ks
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
  observation not scheduled yet due to bright source constraints for UVIT (if GALEX has
  observed field it should be OK) Status to be checked

- What is the current status of the SXT observations- A. Beardmore and SXT team

- iNS provide blackbody model parameters from Drake and Burwitz + IACHEC 2017 efforts

- Add Models and LETGS spectra to IACHEC wiki (2017)

- Check HZ43A and HZ43B co-added spectra for high energy tail in HRC-S + LETG (Vinay,
  Jeremy)
  → no sign of HZ43B is seen in the recent Chandra LETG data ✔

- HITOMI → get info from Contamination group