

SC2 : Isolated Neutron Stars

- Objects

- RX J1856.5-3754

- Empirical Models

- No NS Atmosphere Models fit the entire Spectrum from X-ray to optical
- Best description of the full X-ray spectrum is given by a
 - 2 component blackbody model
- A single blackbody model provides a good description X-ray spectra above 0.2 keV
- Parameters (nH, eff. T, absolute Flux, abundance)
 - nH is possibly an issue. Not all instruments can be used to constrain it.

- Instruments

- ROSAT, XMM, Chandra, SWIFT, SUZAKU
- Chandra LETGS needed to constrain nH and low T component

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- Status of Models / Parameters for RXJ1856
 - Early fits to LETGS and EPIC-pn with a single and two component blackbody model have been published:
 - Burwitz et al. 2002, 2004
 - Drake et al. 2002
 - Beuermann, Burwitz, Rauch A&A, 2006 (BBR06)
 - Fits to data from all listed instruments have started by Frank Haberl
- To Do
 - Investigate independent measurement of nH
 - Compare BBR06 model to all instruments to see where improvements are need
 - Implement corrections for all relevant effective areas .
 - discuss next step
 - find a physical model

Parameters obtained from fit

| Parameter | Value±Error |
|--|---------------------|
| (a) HZ43 A ($\lambda = 45 - 160 \text{ \AA}$) | |
| T_{eff} (K) | 51126 ± 660 |
| $\log g$ | 7.90 ± 0.08 |
| R^2/d^2 (10^{-23}) | 3.011 ± 0.010 |
| N_{HI} (10^{17} cm^{-2}) | 8.91 ± 0.37 |
| (b) Sirius B ($\lambda = 74 - 160 \text{ \AA}$) | |
| T_{eff} (K) | 24923 ± 115 |
| $\log g$ | $8.6 f^1$ |
| R^2/d^2 (10^{-21}) | 4.877 ± 0.010 |
| N_{HI} (10^{17} cm^{-2}) | 6.5 ± 2.0^2 |
| (c) RX J1856 ($\lambda = 15 - 74 \text{ \AA}$) | |
| kT_{spot} (eV) | 62.83 ± 0.41 |
| kT_{star} (eV) | 32.26 ± 0.72 |
| R_1/d (km/pc) | 0.0378 ± 0.0003 |
| R_2/d (km/pc) | 0.1371 ± 0.0010 |
| N_{HI} (10^{20} cm^{-2}) | 1.10 ± 0.03 |

Table 2. Parameters of HZ43 A, Sirius B, and RX J1856 based on the simultaneous fit of our model spectra to the LETG+HRC count rate spectra in the wavelength intervals given. The quoted 1- σ ($\Delta\chi^2 = +1$) errors are correlated and derived from fits with the other parameters for each object kept free. The letter *f* indicates: fixed.

¹ Based on Barstow et al. (2005); Holberg et al. (1998)

² Hébrard et al. (1999). Our fit is required to stay within the 1- σ error.

Simultaneous fit to RXJ1856 and the WDs

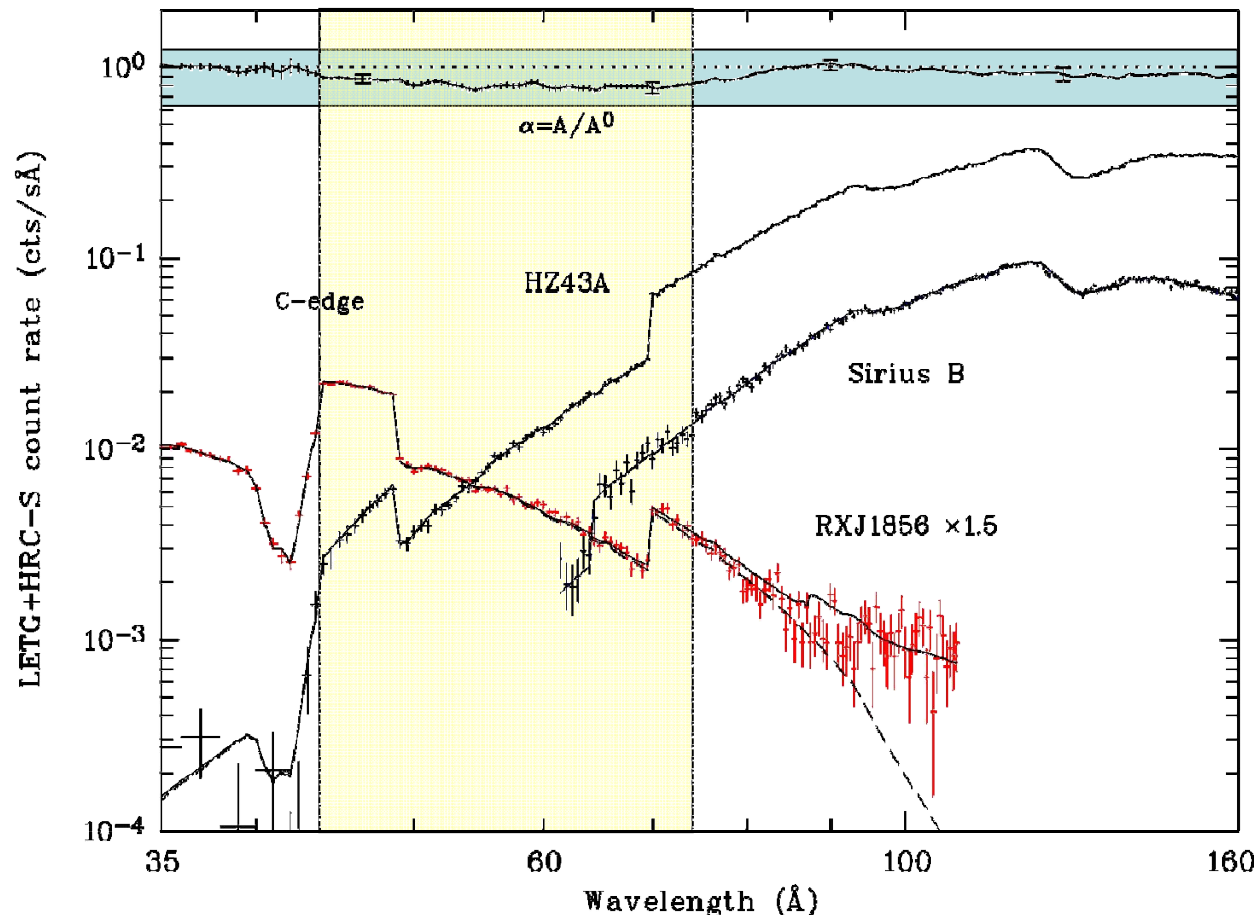


Fig. 5. Simultaneous fit of RXJ1856, HZ43 A, and Sirius B in the wavelength ranges marked by vertical dotted lines (see Sect. 4.4.2). The LETG spectra binned to 0.5\AA are shown as data points, the corresponding best-fit models as solid curves, and the first-order contributions as dashed curves. The area correction function α is shown at the top. It converts the nominal LETG+HRC-S first-order effective area A^0 of the November 2004 release into the adjusted area A used in this paper. Systematic uncertainties in α are indicated by error bars at 46, 70, 90, and 125\AA . The steps in the count rate spectra of HZ43 A and RXJ1856 at 49 and 69\AA result from the detector gaps. Sirius B was observed off axis and its gaps are located differently (see text).