

RX J1856.5-3754 **as standard calibration target for soft X-rays**

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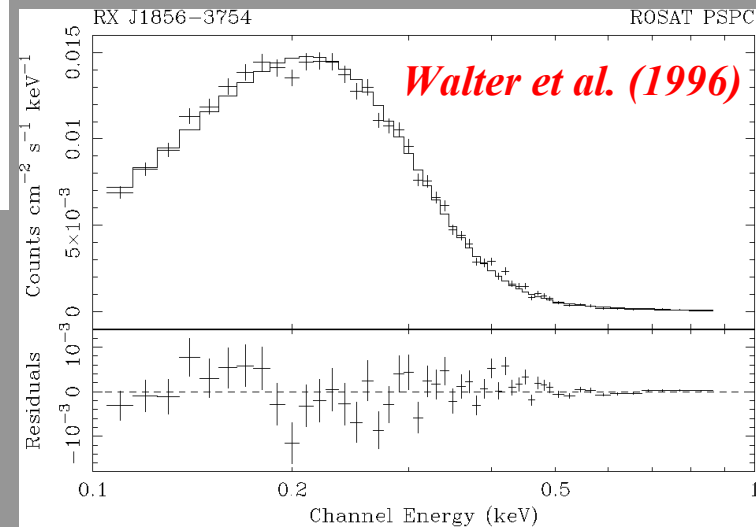
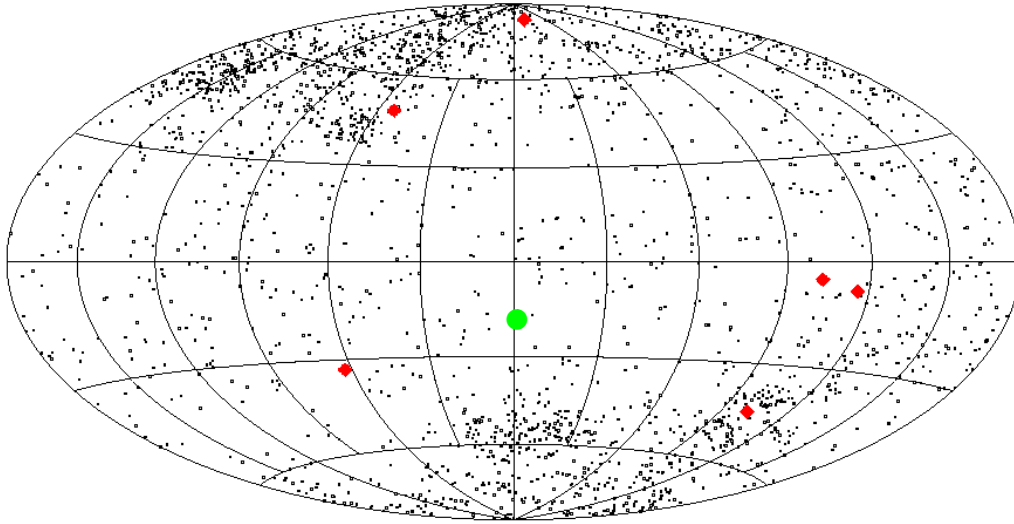


ICWG meeting, Iceland, 14-16 June 2006



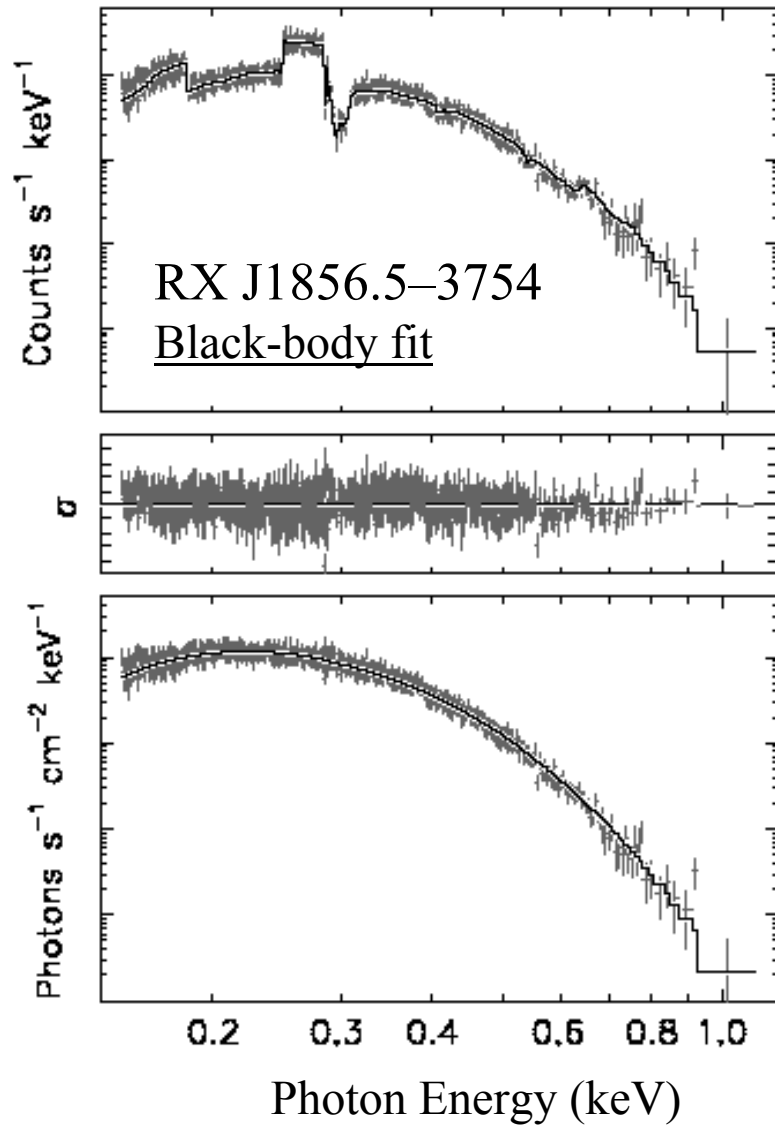
The Magnificent Seven: Thermal, radio-quiet neutron stars

Soft X-ray spectrum + faint in optical



PSPC cts/s	HR1	HR2	Name
0.15 ± 0.01	-0.96 ± 0.03	-0.45 ± 0.73	RX J0420.0-5022
0.23 ± 0.03	-0.06 ± 0.12	-0.60 ± 0.17	RBS1774 = 1RXS J214303.7+065419
0.29 ± 0.02	-0.20 ± 0.08	-0.51 ± 0.11	RBS1223 = 1RXS J130848.6+212708
0.38 ± 0.03	-0.74 ± 0.02	-0.66 ± 0.08	RX J0806.4-4123
0.78 ± 0.02	-0.67 ± 0.02	-0.68 ± 0.04	RBS1556 = RX J1605.3+3249
1.82 ± 0.02	-0.82 ± 0.01	-0.77 ± 0.03	RX J0720.4-3125
3.08 ± 0.02	-0.96 ± 0.01	-0.94 ± 0.02	RX J1856.5-3754

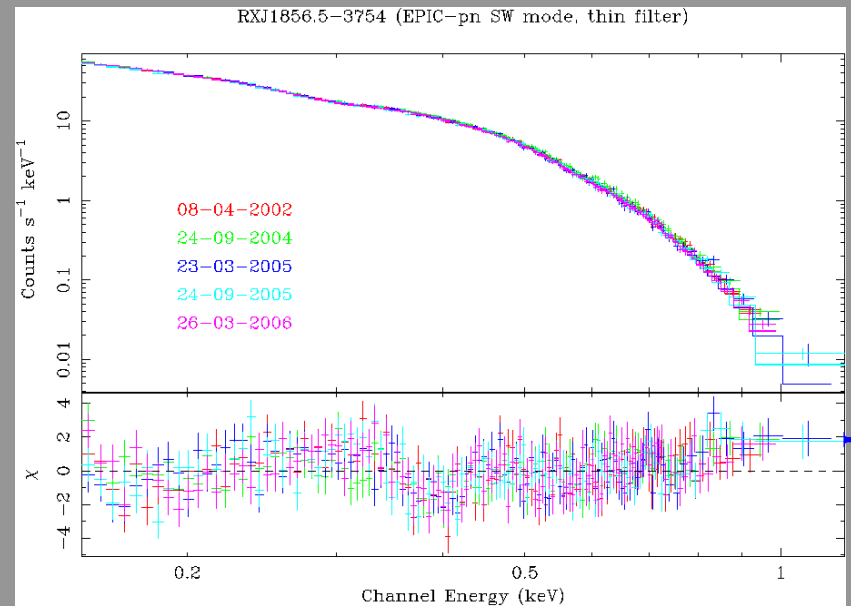
Chandra and XMM spectra



$$n_{\text{H}} = (9.5 \pm 0.03) \cdot 10^{19} \text{ cm}^{-2}$$
$$kT_{\infty} = 63.5 \pm 0.2 \text{ eV}$$
$$R_{\infty} = 4.4 \pm 0.1 \text{ km (120pc)}$$
$$L_{\text{bol}} = 4.1 \cdot 10^{31} \text{ erg s}^{-1}$$

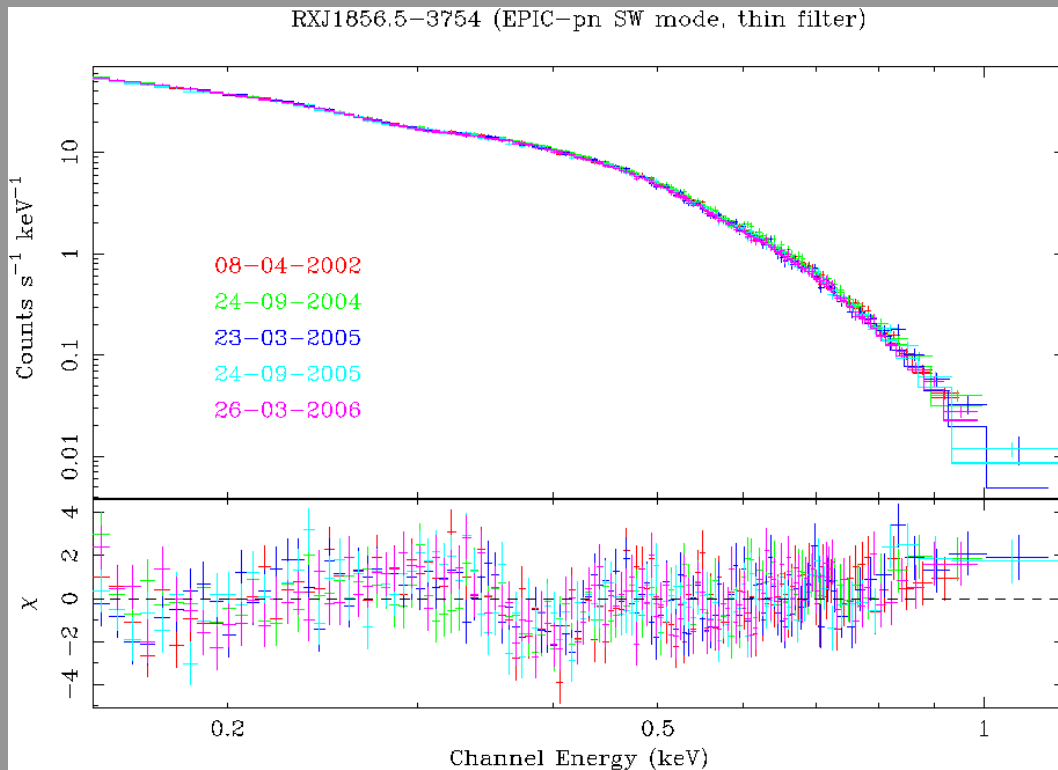
No narrow absorption features !

Burwitz et al. (2003)



Spectrum constant over time scales of years
Haberl (2006)

A 'stable' neutron star



- 5 observations in FF mode + thin1 filter
- 1 observation in timing mode + thin1 filter

Model: tbabs*body

**Simultaneous fit with
all parameters linked
except norm:**

1.000

1.008 ± 0.005

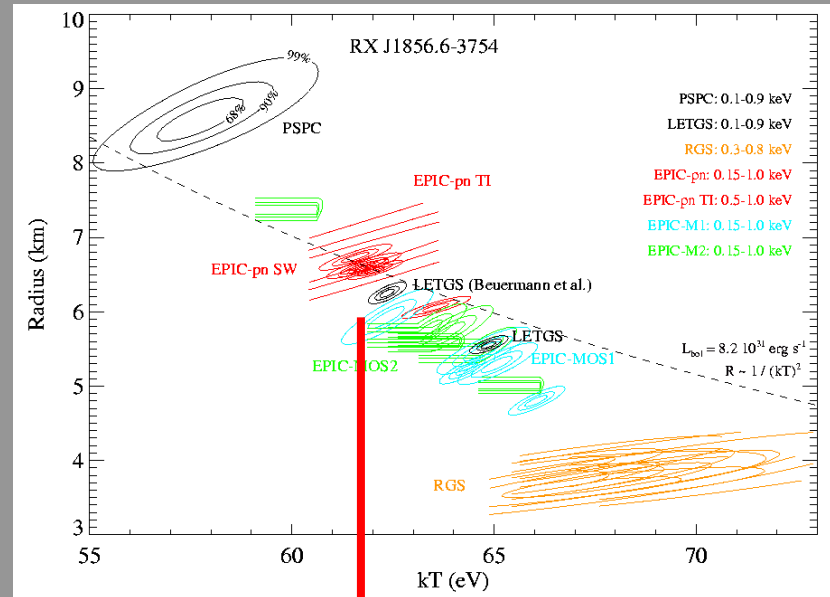
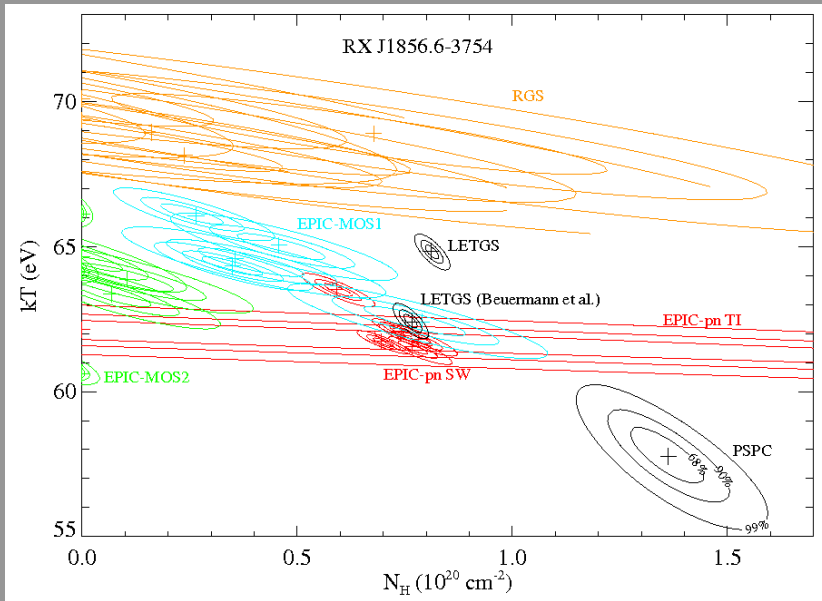
0.995 ± 0.005

0.983 ± 0.005 (*)

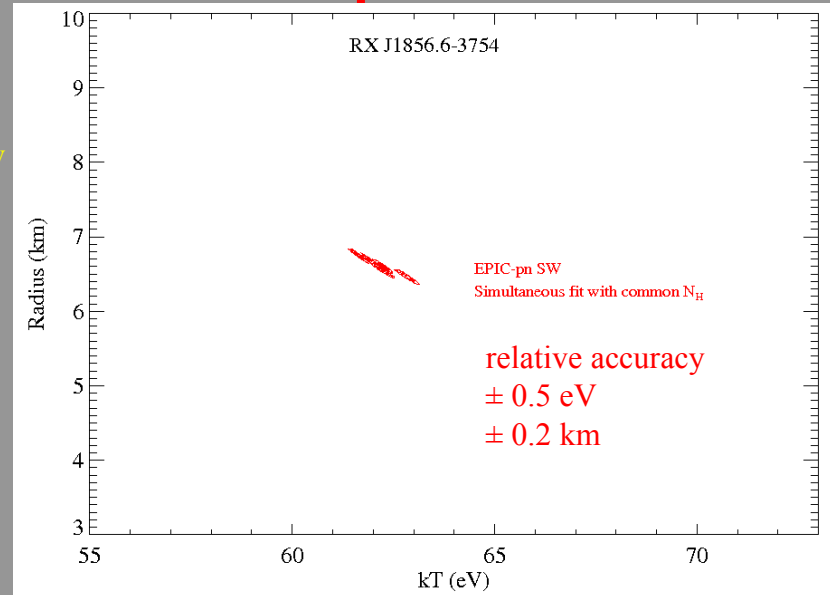
0.989 ± 0.004

**(*) 69 intervals in STDGTI
extension**

Cross calibration



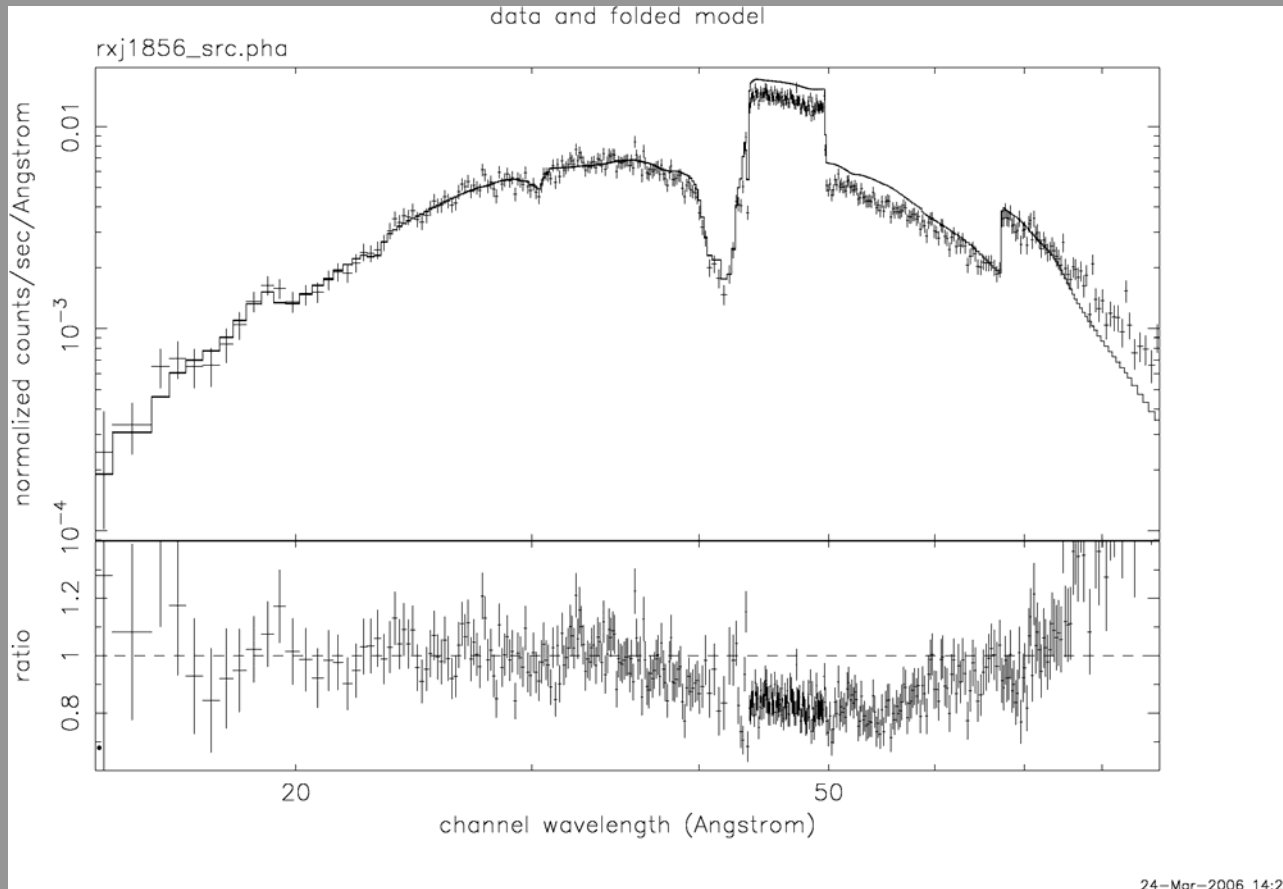
- Model: $tbabs * bbody$
- Low column density requires energies down to 0.1-0.15 keV
- No full agreement between different instruments yet
- For broad band spectroscopy EPIC-pn has largest sensitivity and is the most stable instrument



Individual fits with
all parameters free:

Simultaneous fits with
 N_H linked:

LETG spectrum with best fit EPIC-pn model



Summary

Source properties:

- Simple continuum spectrum below ~ 1 keV
- Constant source (spectrum, intensity)
- Low absorption
- Not too bright/faint
- Point source

Calibration aims:

- Stability of detector at soft X-rays
- Contamination
- Re-distribution (CCDs)

Standard source + standard model