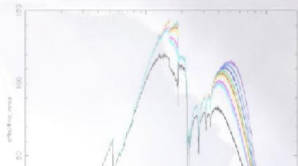
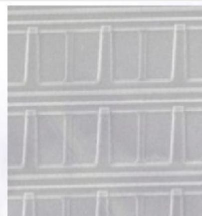
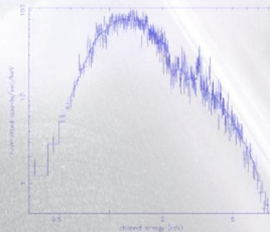






The *Swift*-XRT contamination investigation

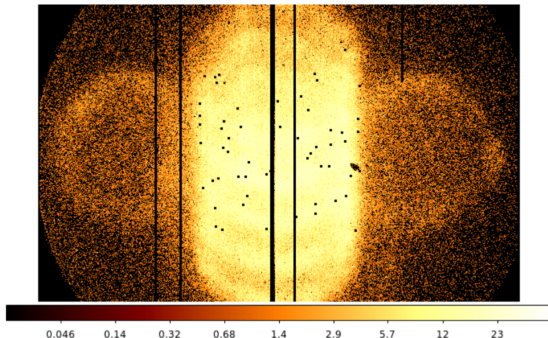
Andy Beardmore

University of Leicester

IACHEC, 2014

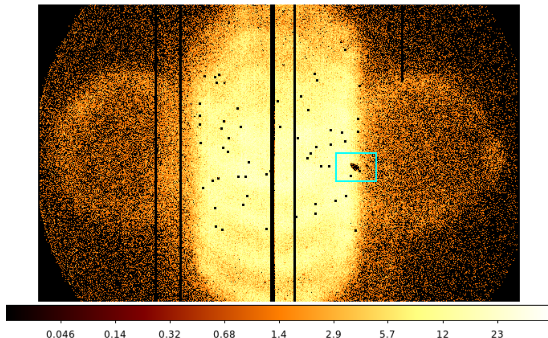
The ‘Debris’

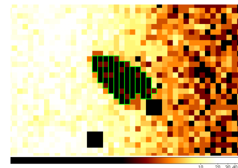
- Pre-launch vibration testing caused a small patch of ‘debris’ to appear on CCD – e.g. visible in Tycho trap-mapping observations



The 'Debris'

- Pre-launch vibration testing caused a small patch of 'debris' to appear on CCD – e.g. visible in Tycho trap-mapping observations
  - $\sim 12 \times 5$ pixels or $\sim 28 \times 12$ microns in size





The ‘Debris’

Tycho SNR

black: non–debris, red: debris (extra 4.5e23 cm^{-2} of C)

normalized counts s^{-1} keV^{-1}

0.01

10^{-3}

10^{-4}

10^{-5}

0.5

1

2

5

Energy (keV)

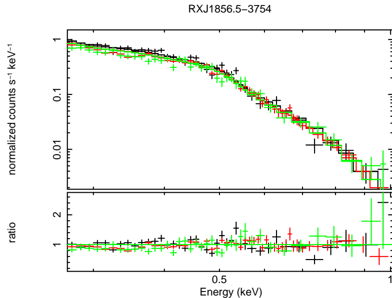
The ‘Debris’

Tycho SNR
black: non–debris, red: debris (extra 4.5e23 cm^{-2} of C)

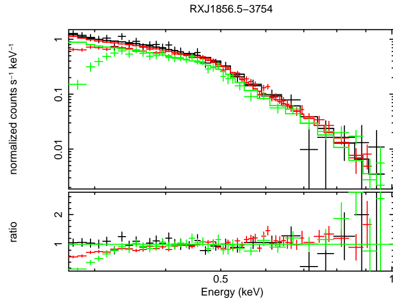
normalized counts s^{-1} keV^{-1}
0.01
10^{-3}
10^{-4}
10^{-5}
0.5
1
2
5
Energy (keV)

- Debris area is flagged as bad-pixels by the the ground-processing s/w and not used (since 2010-).

- PC Mode :



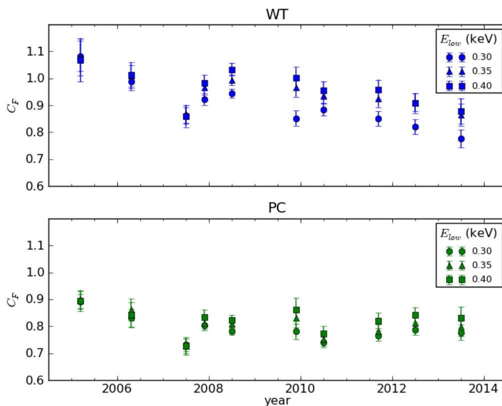
- WT Mode :



2005 2008 2013

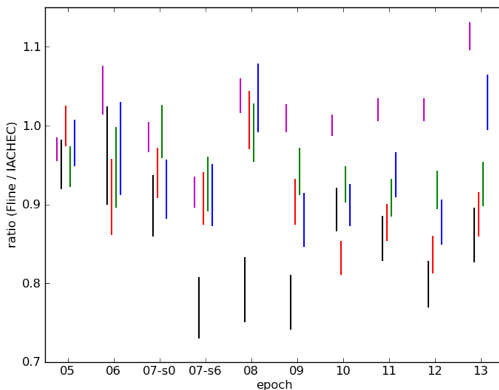
- Low-E losses more apparent in WT spectra.
  - Traps are deeper in WT → effective event threshold has increased
  - Suggests origin of this effect might be trap/threshold related

- 63eV blackbody × overall constant factor
  - Fit with different low-E limits



- CF evolution steeper in WT mode
  - Not expected if contamination is the cause
  - Though $\sim 5 - 10\%$ drop in CF for PC

- WT g0 spectra



- Unresolved questions — can observed effects be caused by
  - slight gain variations
  - position of remnant w.r.t. bad-columns

- XMM MOS pre-contamination correction (SAS 12.0)