

April 9, 2003

To: XIS Team  
 From: Mark Bautz  
 Subject: Performance summary for XIS flight candidate w1.7c5 (Lot 1, Wafer 7, chip 5)

## 1 Quantum Efficiency

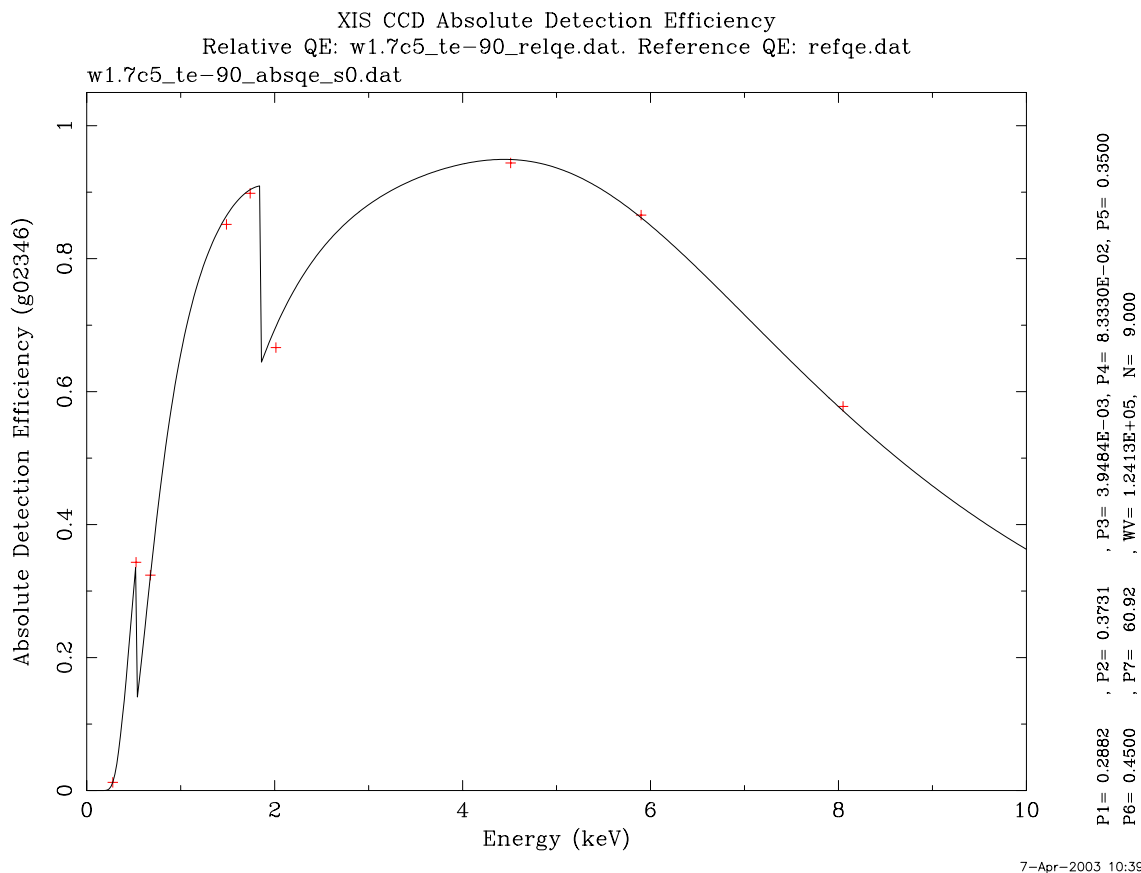
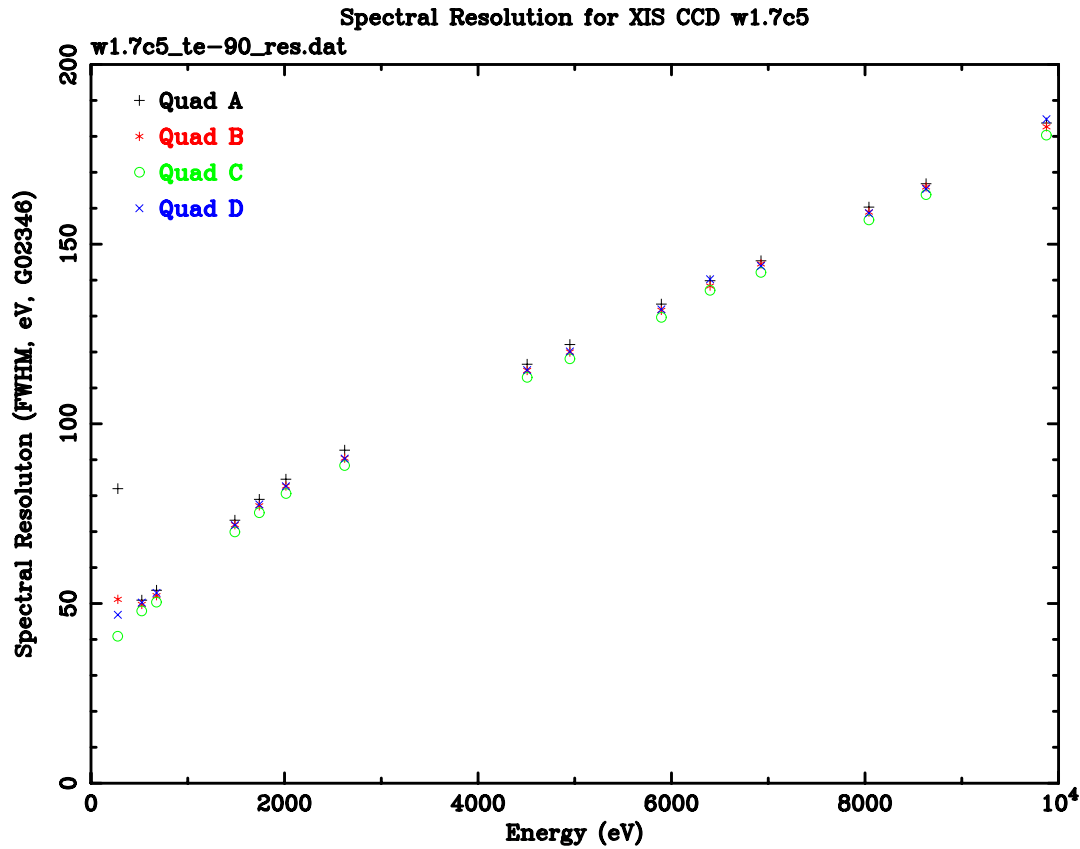


Figure 1: Absolute detection efficiency (for ASCA grades g02346) for w1.7c5 at focal plane temperature  $T=-90\text{C}$  in timed exposure mode. The reference detector was w168c2. To convert relative quantum efficiency to absolute quantum efficiency, the quantum efficiency of the reference detector was assumed to be identical to its sibling ACIS detector S0 (w168c4r); this assumption is probably accurate to within a few percent. The points show the mode of the distribution of detection efficiencies in 32x32 pixel blocks over the face of the detector. The line is a “slab and stop” model of the quantum efficiency.

## 2 Spectral Resolution



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Figure 2: Spectral resolution (FWHM) vs energy for ASCA grades g02346, spatially integrated over each quadrant, under approximately uniform illumination, in timed exposure, mode at CCD temperature  $T=-90\text{C}$ . Column numbers increase going from quad A to quad D.

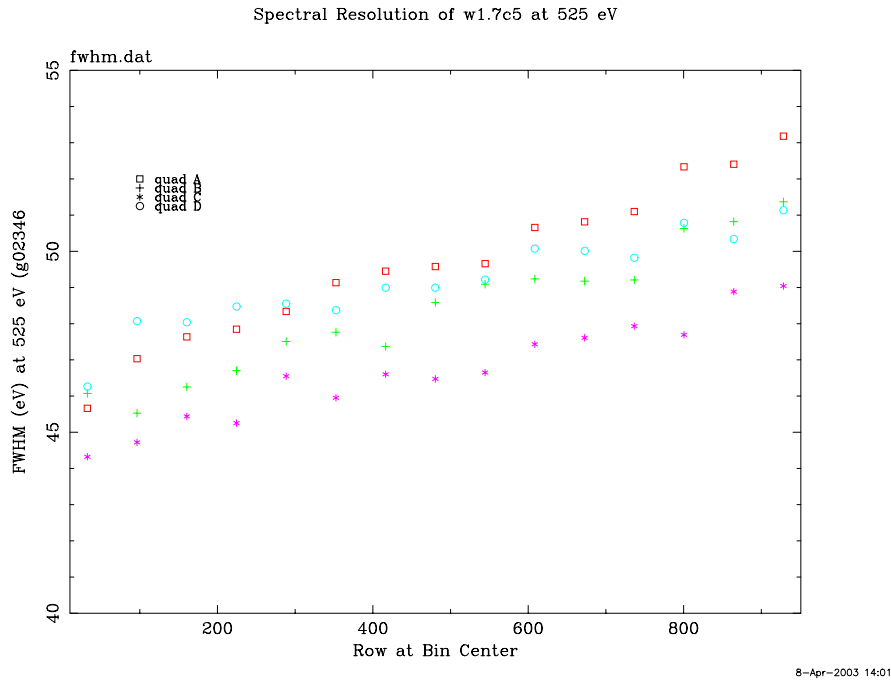


Figure 3: Spectral resolution (FWHM) at 525 eV vs row number for ASCA grades g02346, in 64-row-wide spatial bins in each quadrant, under approximately uniform illumination. CCD temperature is -90C. Charge transfer inefficiency causes FWHM to increase with row number. Column numbers increase going from quad A to quad D.

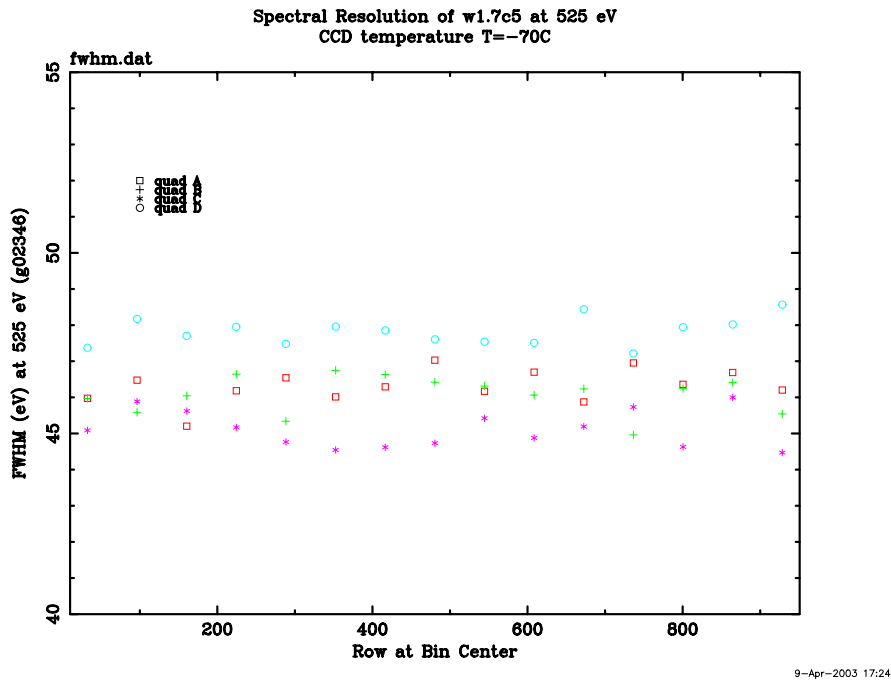


Figure 4: Spectral resolution (FWHM) at 525 eV vs row number for ASCA grades g02346, in 64-row-wide spatial bins in each quadrant, under approximately uniform illumination. CCD temperature is -70C. Charge transfer inefficiency is much smaller at this temperature than at -90C, so the spectral resolution is somewhat better, and more uniform, than at the lower temperature. Column numbers increase going from quad A to quad D.

### 3 Cosmetic Quality

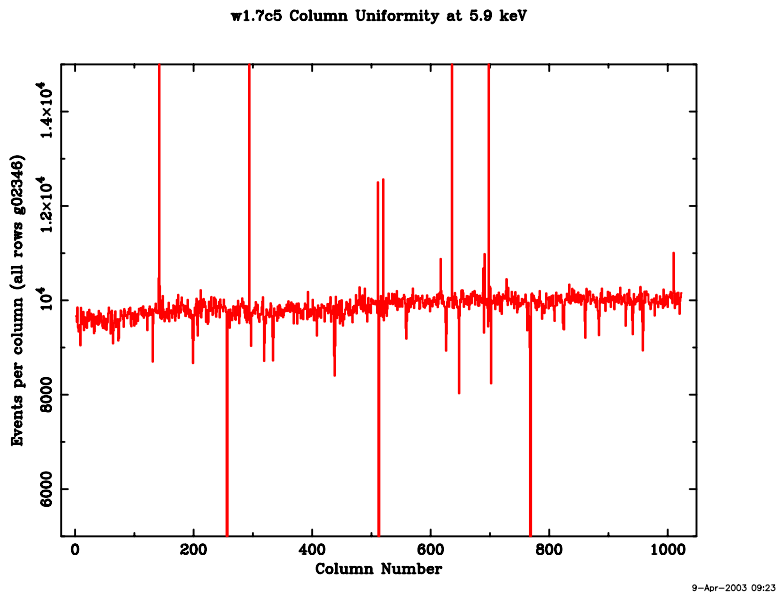


Figure 5: Number of events detected per column in a long exposure to a spatially uniform  $^{55}\text{Fe}$  source. The CCD temperature is  $-90\text{C}$ . Spikes below the mode show partially or fully blocked columns (but columns 256-7, 512-3 and 768-9 are empty due to an artifact of the event finding algorithm). Spikes above the mode show hot pixel locations. Some columns are partially blocked by hot pixels. CTI reduces the number of events detected at low column numbers.

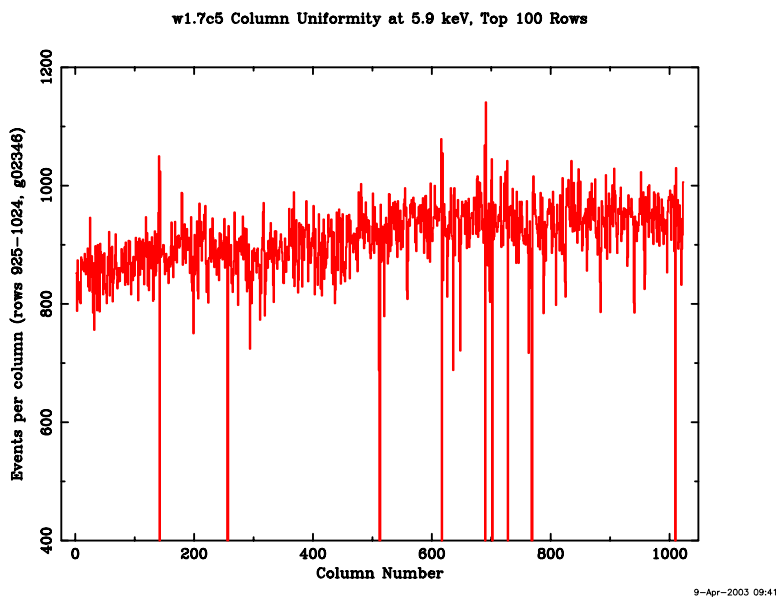


Figure 6: Number of events detected per column in the top 100 rows, in a long exposure to a spatially uniform  $^{55}\text{Fe}$  source. CCD temperature is  $T=-90\text{C}$ . Spikes below the mode show partially or fully blocked columns (but columns 256-7, 512-3 and 768-9 are empty due to an artifact of the event finding algorithm). There are more blocked columns evident in the top 100 rows than in the sum over all rows shown in the previous figure. The effect of the CTI on detection efficiency is especially obvious at low column numbers.

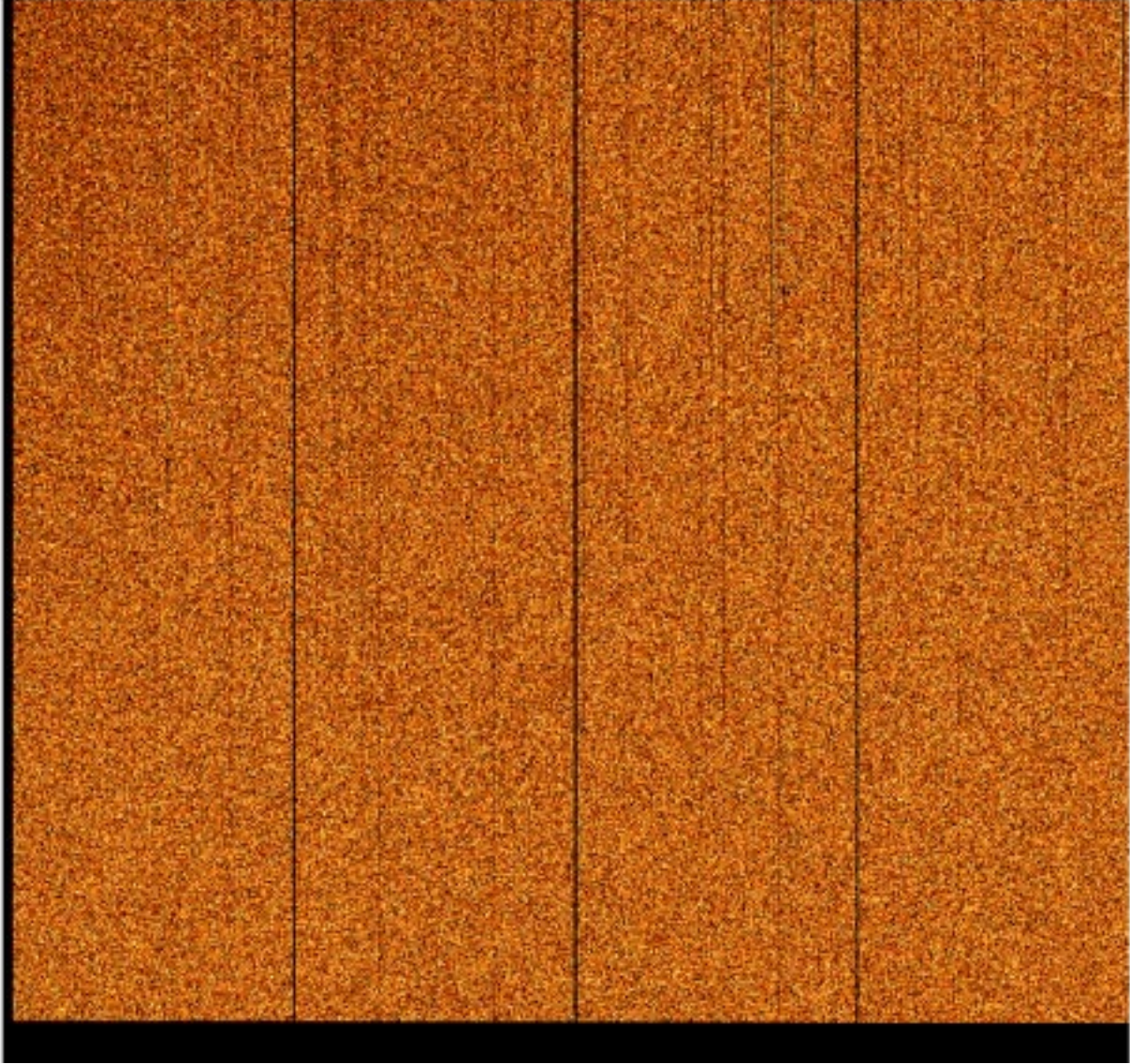


Figure 7: False-color image of number of ASCA grade g02346 events detected per pixel in a long exposure to a spatially uniform  $^{55}\text{Fe}$  source. The CCD temperature is  $-90\text{C}$ . Some blocked columns are evident (but columns 256-7, 512-3 and 768-9 are empty due to an artifact of the event finding algorithm). The output (serial) register is at the bottom in this picture; column 1 is at the left.