

Spaced-row Charge Injection

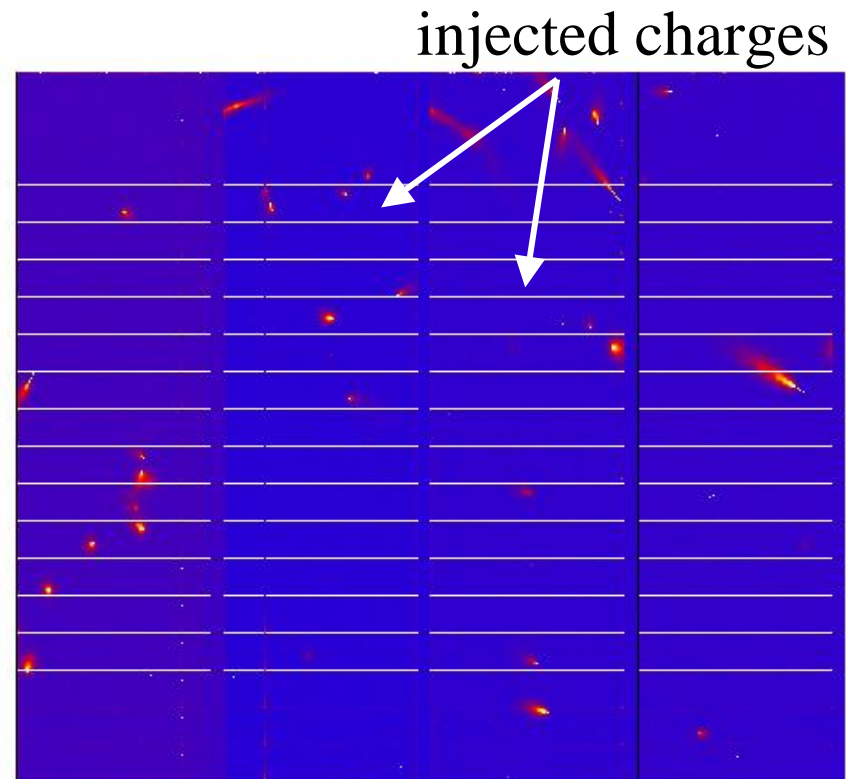
The XIS team 2006/11/28

What is the spaced-row charge injection?

The XIS has suffered the radiation damage, and the energy resolution has got worse.

To recover the degradation, we decide to employ a spaced-row charge injection as shown in the right figure.

Though this reduces the effective area, the energy resolution becomes much improved.

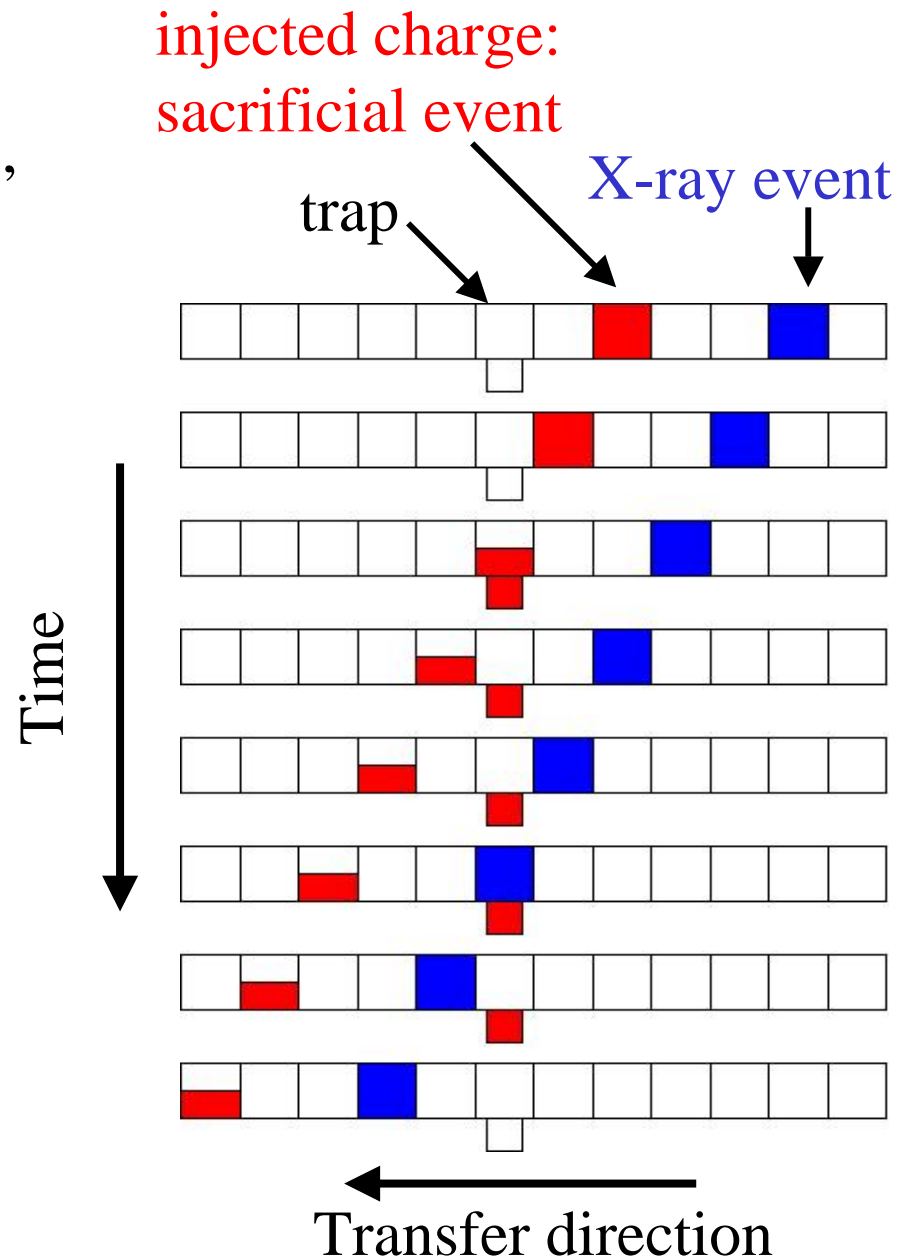


Frame image of the XIS doing the SCI

Principle

The radiation damage makes “traps” in X-ray CCD pixels. These traps obstruct the event transfer, which causes the degradation.

However, if we put charges in front of X-ray events, these charges work as “sacrificial” events; they fill the traps and the X-ray events are transferred smoothly. Then we can restore the energy resolution.

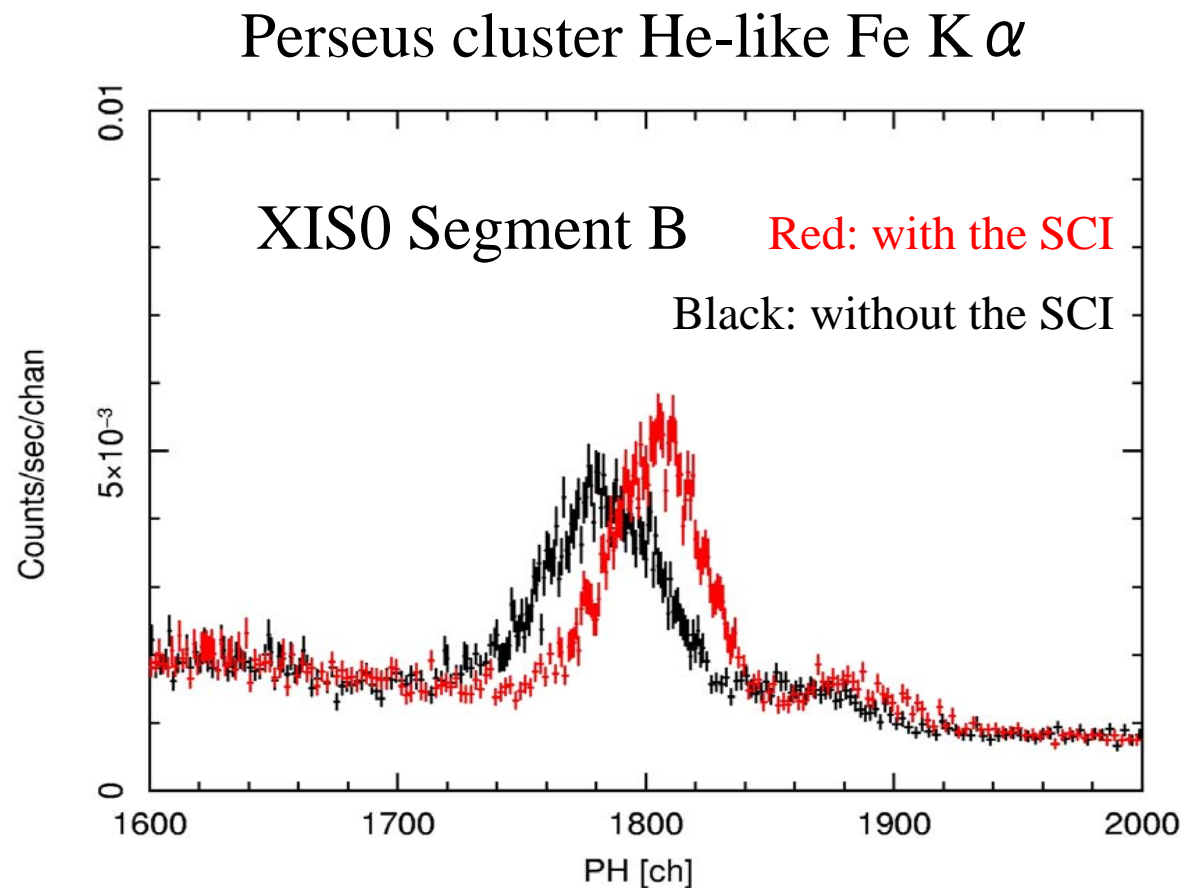


Example

We can see how the SCI works in the right figure.

The energy resolution is much improved!

The center pulse height of Fe K α line becomes large when we use the SCI. This means X-ray events are transferred with little charge loss.



Energy Resolution (FWHM)

205 \pm 6 eV

without the SCI



157 \pm 4 eV

with the SCI