



University of
Leicester

Space Research Centre

XMM EPIC Cal-Ops Meeting

7 November 2001

Even Newer MOS modes since last meeting

Tony Abbey - Leicester University

Ed Serpell - ESOC

Graphics by Ed and Steve

Bright Timing Mode

- Written to cope with bright objects - eg Crab
- Allows detailed timing investigation by avoiding counting mode.
- Compare pile up & spectral performance with normal timing mode to help with calibration.
- Three 'flavours' of binning and discard:
 - Discard 9 rows, readout 1 row, cut 10:1, resolution 1.75ms
 - Discard 90 rows, bin 10 rows, cut 10:1, resolution 2.76ms
 - Discard 95 rows, bin 5 rows, cut 20:1, resolution 2.76ms
- Compared with normal timing:
 - Bin 100 rows and readout, no cut, resolution 1.75ms
- Tested on XMM on Crab during rev 333 - 3 October 2001

Crab - rev 333 - Bright timing mode tests

- Rev 0234 MOS1 - exposure id 0135730701- U009
Normal timing mode for comparison - excessive pile up and data rate
- MOS1 - exposure id 0137550801:
 - U002 - 10:1 br. timing short exposure - peripheral CCDs active
 - U003 - 10:1 br. timing peripheral CCDs disabled
 - U004 - 10:1 compressed br. timing mode, peripherals disabled
- MOS2 - exposure id 0137550801:
 - U003 - 90:10 br. timing - peripheral CCDs active for radiation monitoring.
 - U004 - 95:5 br. timing - peripheral CCDs active for radiation monitoring

Crab - rev 234 - Normal timing mode

MOS1 U009

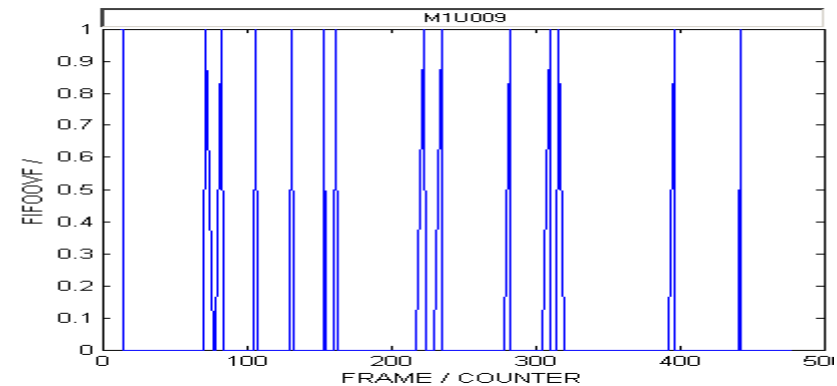
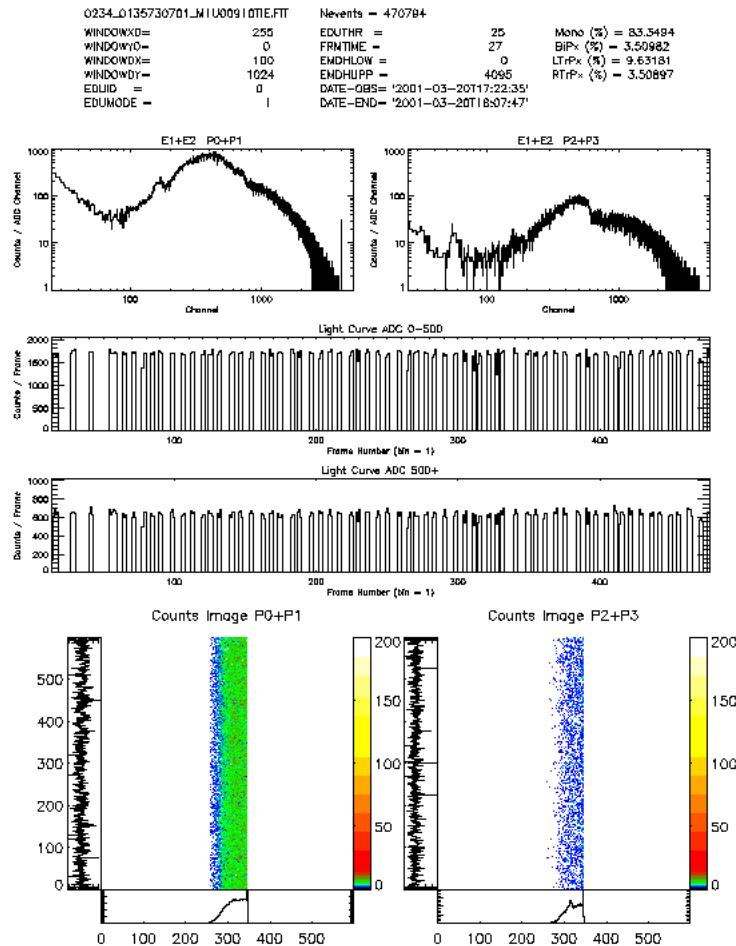
Normal timing bin together 100

rows

Event rate 1300/s, bit rate 64kb/s

Some low energy noise.

Counting mode and FIFO full errors.



Crab - rev 333 - Bright timing mode

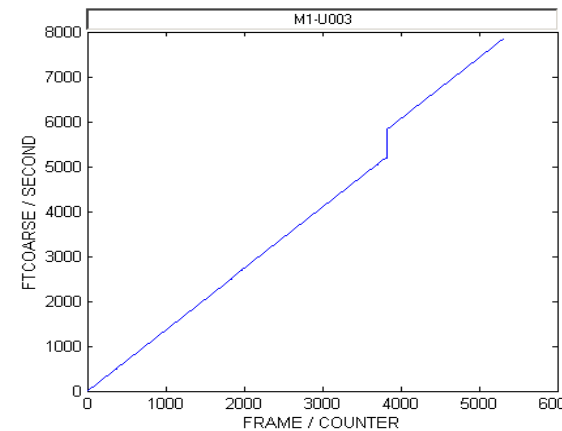
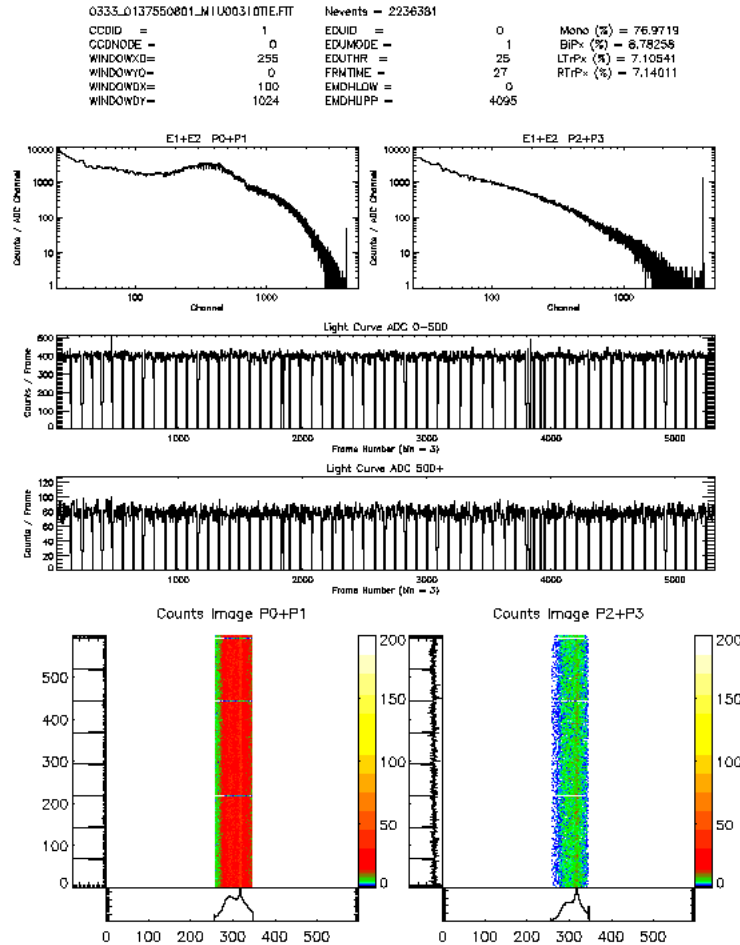
MOS1 U003

bright timing 10:1

event rate 3450/s, bit rate
17.5kb/s

Low energy noise and missing
rows - not yet understood.

Counting mode and FT-coarse
jump.



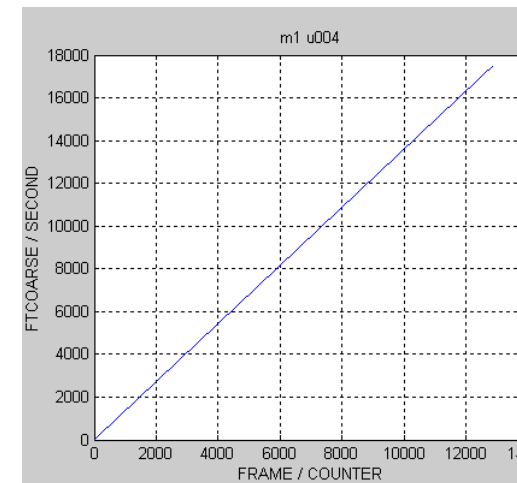
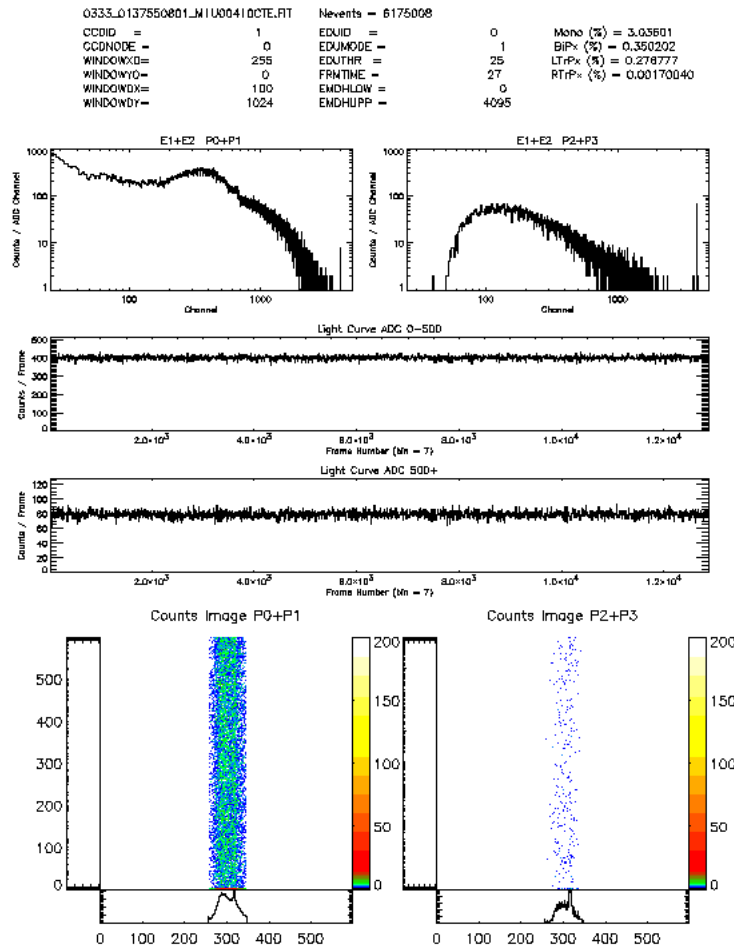
Crab - rev 333 - Bright timing mode

MOS1 U004

bright compressed timing 10:1

Low energy noise, but no missing rows.

No counting mode or FT-coarse jump



Crab - rev 333 - Bright timing mode

MOS2 U003

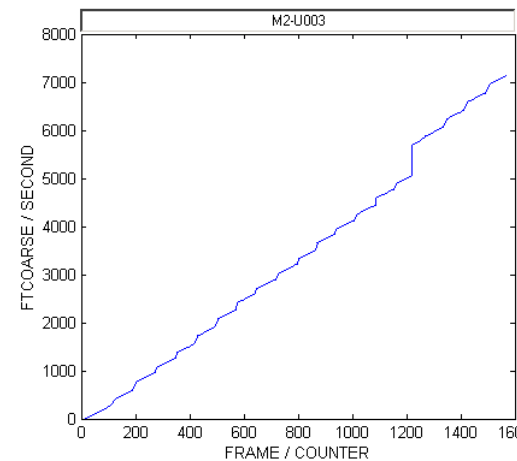
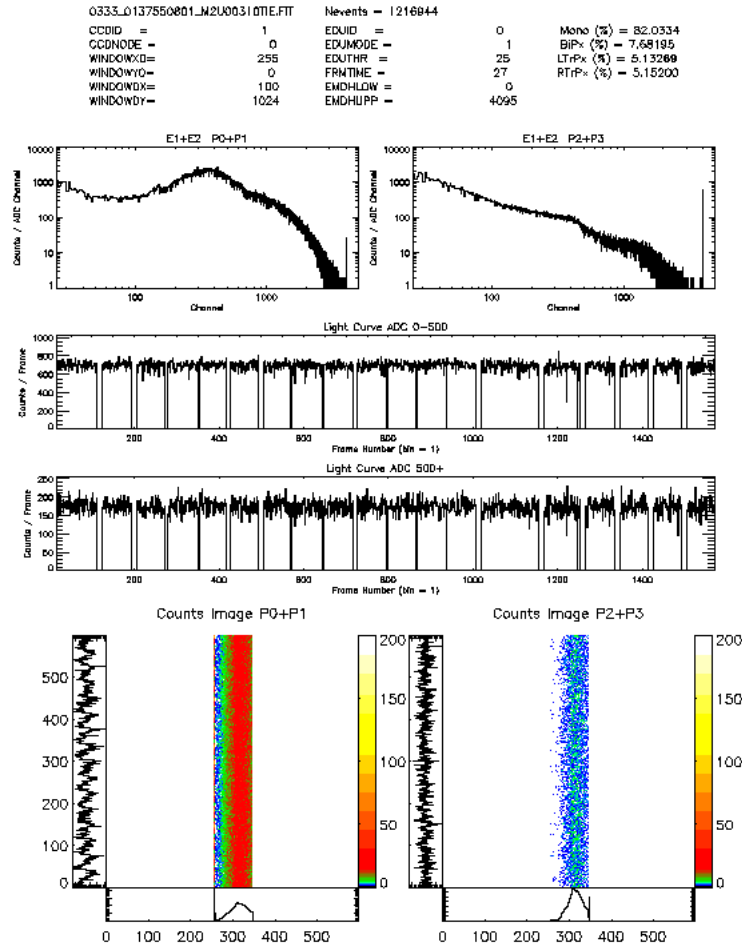
bright timing 90:10

Outer CCDs active

Event rate 3070/s, bit rate 14kb/s

Low energy noise

Counting mode and FT-coarse
jump.



Crab - rev 333 - Bright timing mode

MOS2 U004

bright timing 95:5

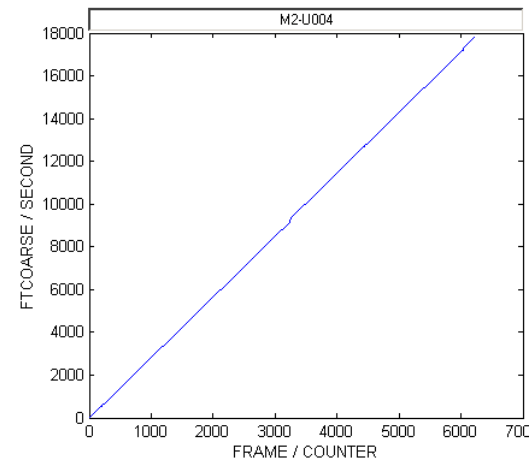
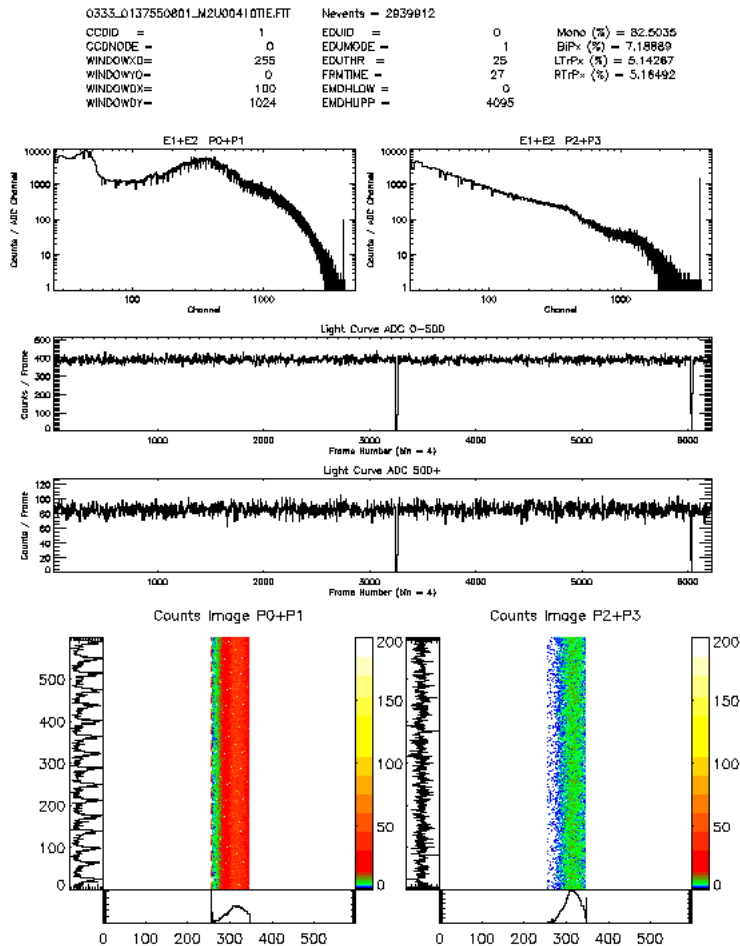
Outer CCDs active

Event rate 3350/s, bit rate 8kb/s

Considerable low energy noise

One counting mode glitch

No FT-coarse jumps



Crab - rev 333 - Bright timing mode

Comparison of pile up and performance in the different modes by comparison of pattern fractions.

Note that the pointing may have been a bit offset for the normal timing resulting in the left and right diaphragm.

Bright 95:5 nearly achieves the same ratios as normal mode, while dramatically reducing the data rates

<i>Timing mode type</i>	<i>Monopixels %</i>	<i>Bipixels %</i>	<i>Left tripixels %</i>	<i>Right tripixels %</i>
<i>Normal</i>	83.8	3.51	9.63	3.51
<i>Bright 10:1</i>	77.0	8.8	7.1	7.1
<i>Bright 90:10</i>	82.0	7.6	5.1	5.2
<i>Bright 95:5</i>	82.5	7.2	5.1	5.2

Crab - rev 333 - Bright timing mode

And finally, the next slide shows the Crab pulsar phases in 10:1 and 95:5 modes, showing it really works - thanks Ed!

Further work is required to investigate some of the noises seen in these modes, but the 95:5 mode looks set to be a useful tool for looking at bright sources with the MOS cameras and achieving good time resolution without exceeding the telemetry bandwidth.

Crab - rev 333 - Bright timing mode

