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XMM EPIC Cal-Ops Meeting

7 November 2001

Even Newer MOS modes since last meeting

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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

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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

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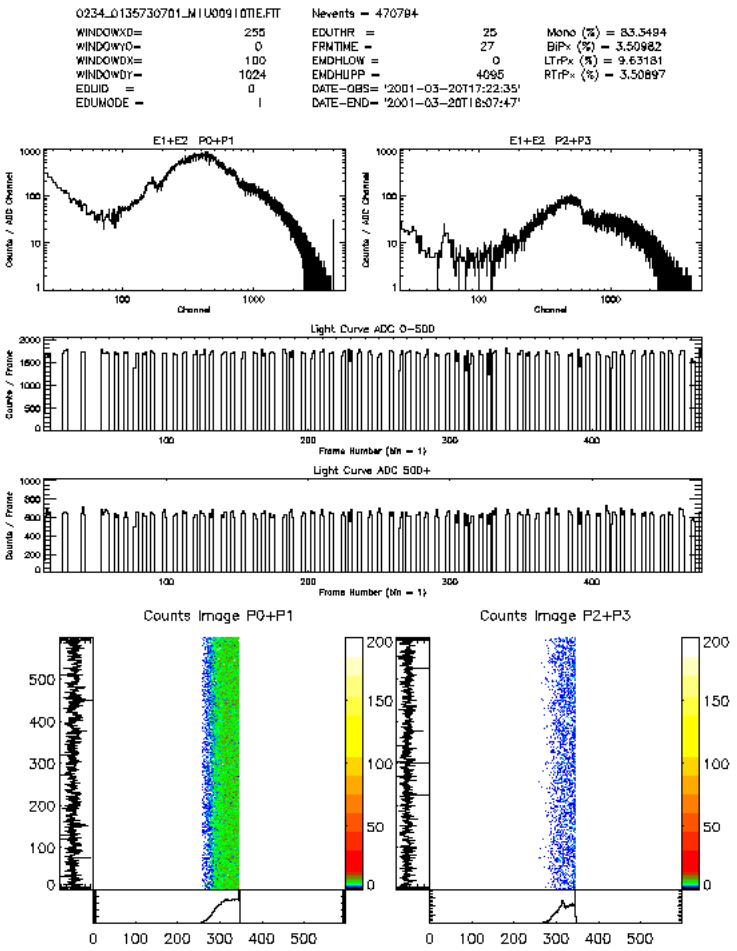
Crab - rev 234 - Normal timing mode



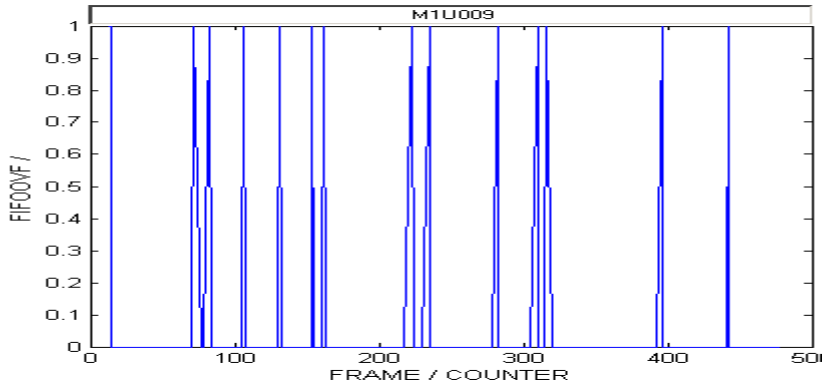
MOS1 U009

Normal timing bin together100 rows

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

Some low energy noise.

Counting mode and FIFO full errors.



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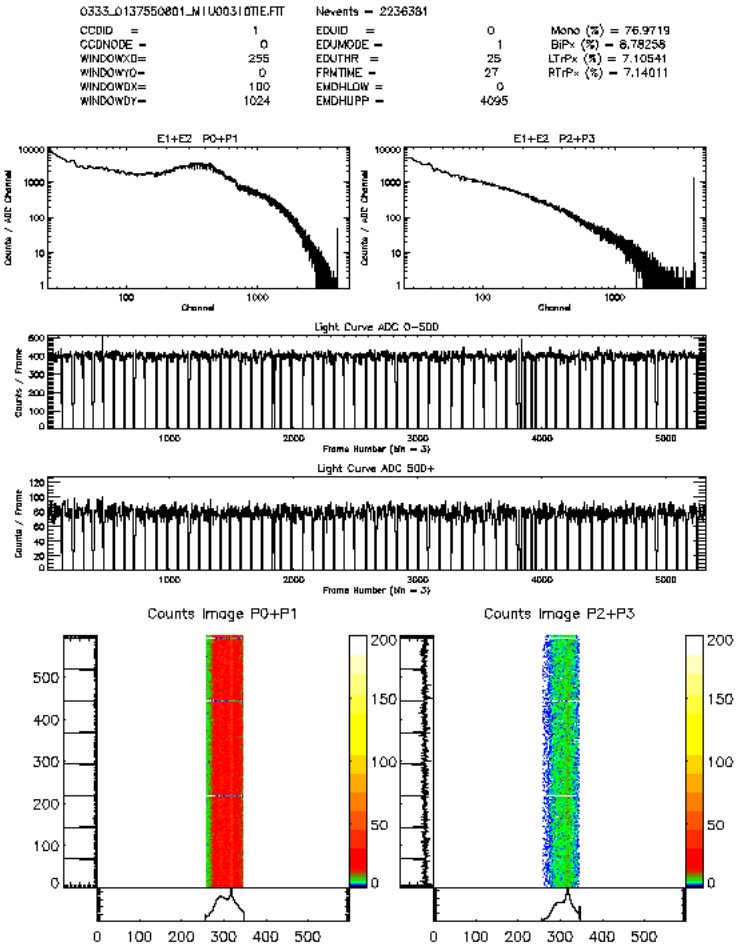
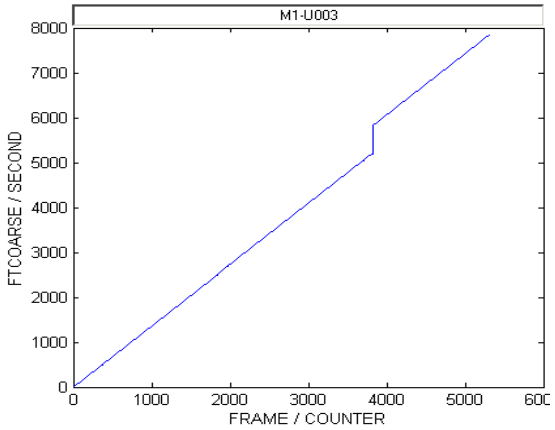
Crab - rev 333 - Bright timing mode



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.



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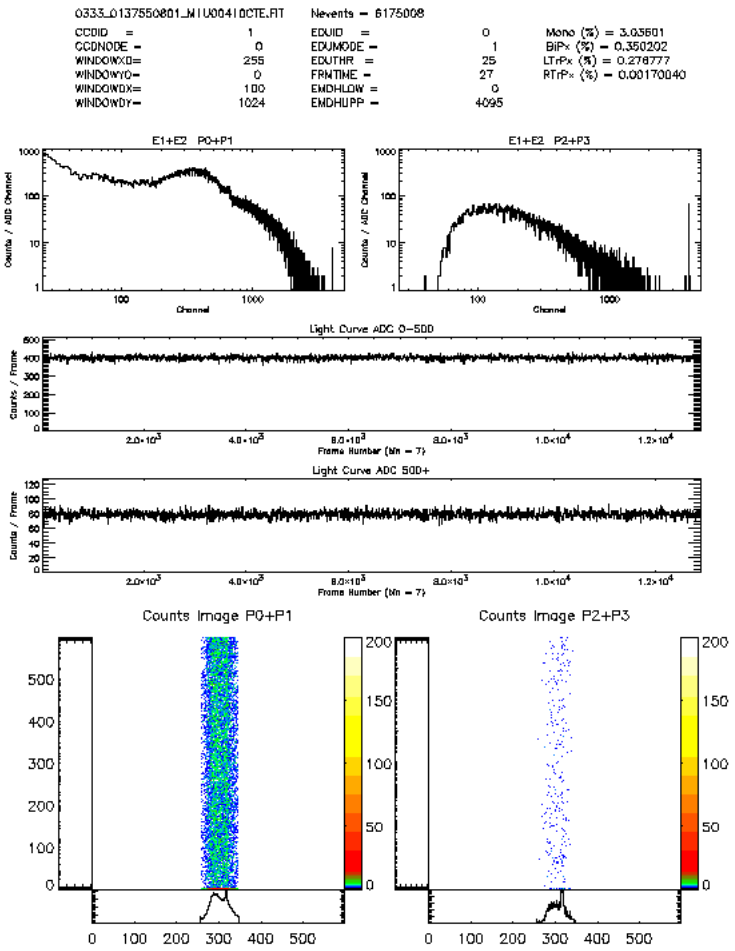
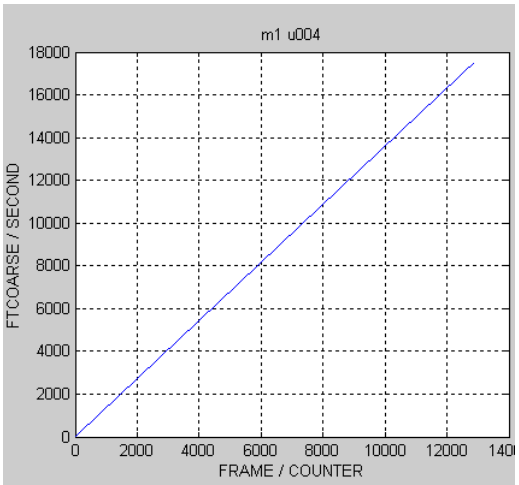
Crab - rev 333 - Bright timing mode



MOS1 U004
bright compressed timing 10:1
Low energy noise, but no missing rows.
No counting mode or FT-coarse jump



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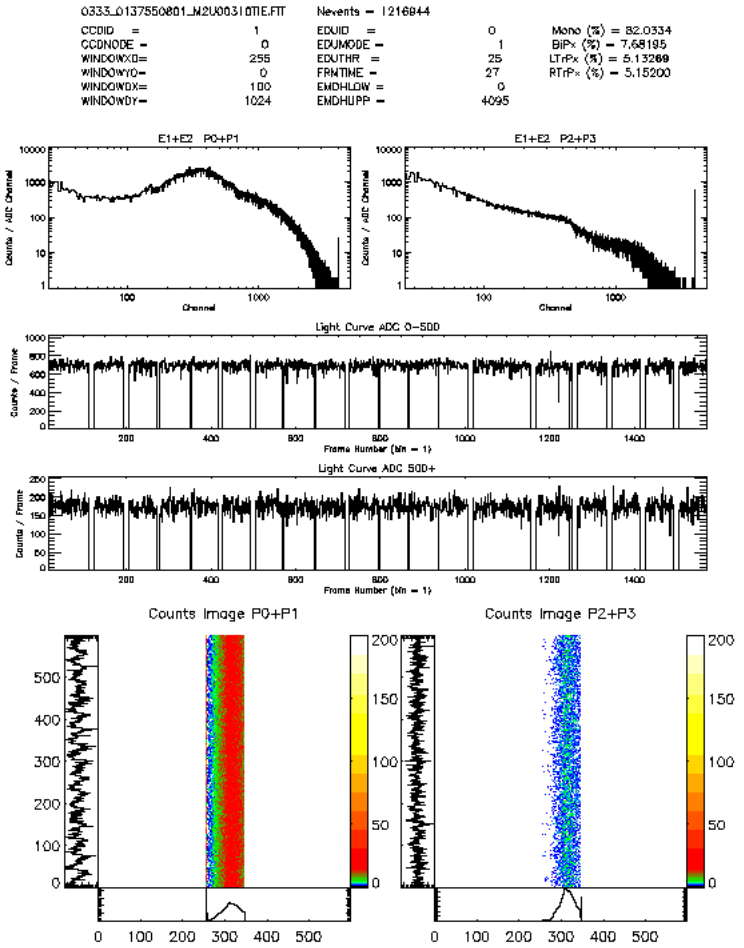
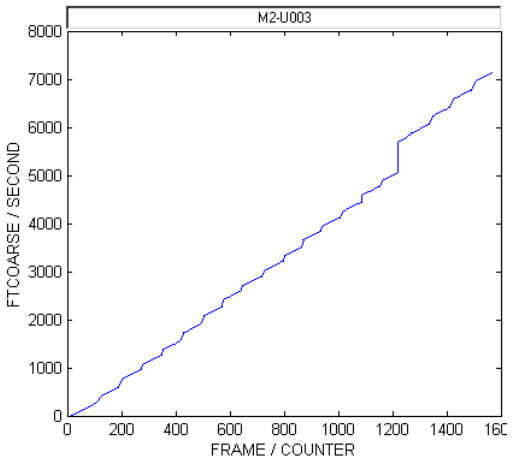
Crab - rev 333 - Bright timing mode



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.



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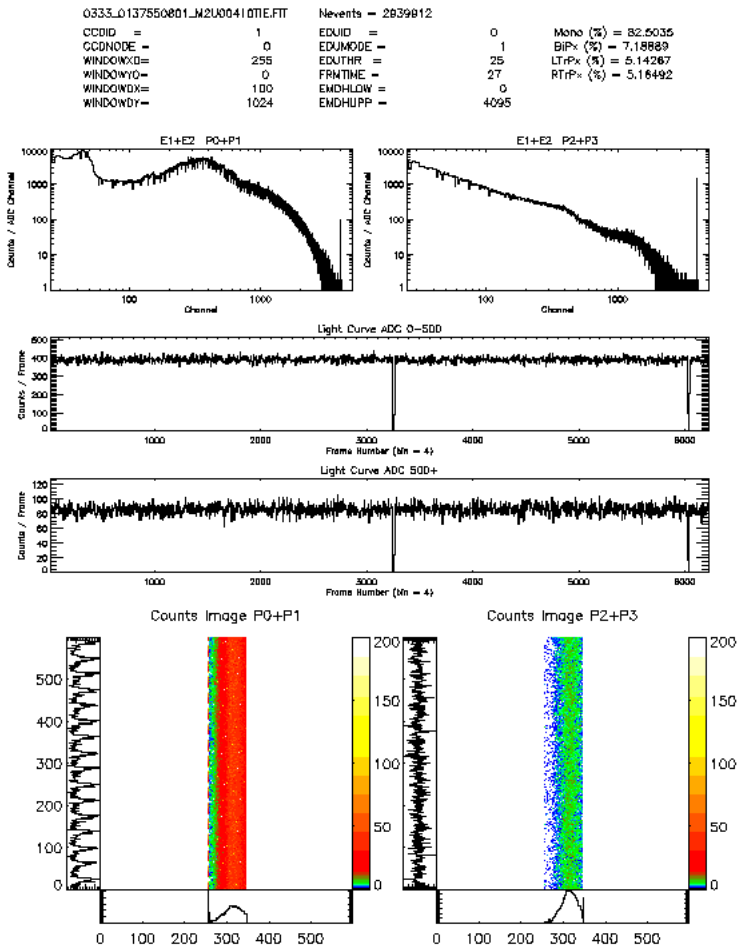
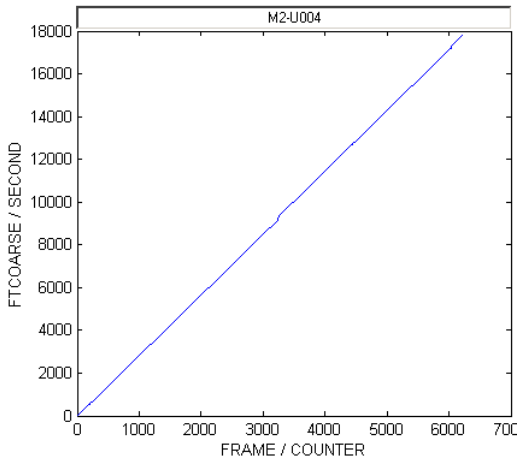
Crab - rev 333 - Bright timing mode



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



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

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

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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.

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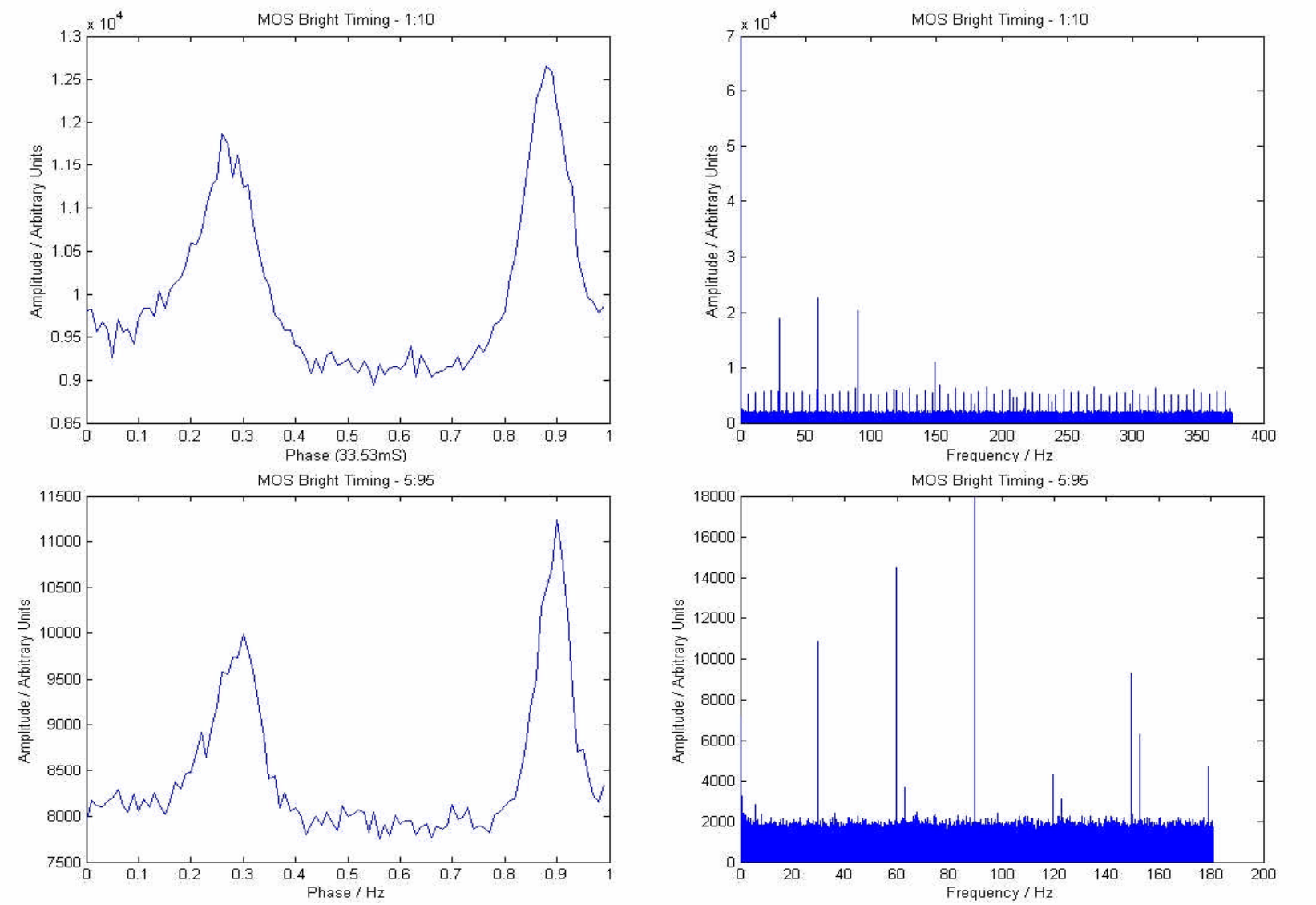
Crab - rev 333 - Bright timing mode



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