

Online Monitoring and plane checkout

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- Online monitoring is used at the mine for:
 - sanity checks - “is everything working”
 - diagnostics - rates, hot/dead channels
 - data quality - examine various distributions (ADC distributions, event length), event images (muon-like triggers?)
- Plane checkout procedure - specific set of runs, more detailed analysis of data:
 - diagnostic/summary plots for each run (see Roy's talk)
- How can monitoring be adapted to help plane checkout procedure:
 - need simple diagnostic plots for each run type - analysis will not be as detailed as Roy's (due to processing constraints) but should indicate whether the data is sensible or not
 - need a set of online “summary canvases” that allow the user to quickly get at the most relevant information

Run types to consider

- Pedestal runs
 - monitoring information: ADC distributions
- Charge injection runs
 - monitoring information: ADC dists, ADC vs time (see charge inject scan)
- Singles runs
 - monitoring information: plane/strip rates, hit maps
- LI runs
 - monitoring information: ADC vs time, LI hit maps, checkerboard pattern maps
- Plane trigger runs
 - monitoring information: trigger rates, event lengths, event images
- General information (5 summary canvases currently defined):
 - electronics canvas - Crate, VARC, VMM occupancies etc.
 - hit maps and last event canvases
 - plane/strip rate canvases, summary canvas: event length, number of hits etc...

General information on the run

- Three canvases are available (under “Status” in the monitoring GUI) that show:
 - how the monitoring process is currently configured
 - the block types that have been analysed
 - Status information: run number, run type, trigger source for the current record, number of records processed etc.

Online Monitoring Configuration

Histograms configured for : Far
Process all records
Pause of 0 msec between records
Update Histograms every 1 records
Process maximum 99999 records per run
Perpetual mode: on
Smart configuration: off

Record Summary

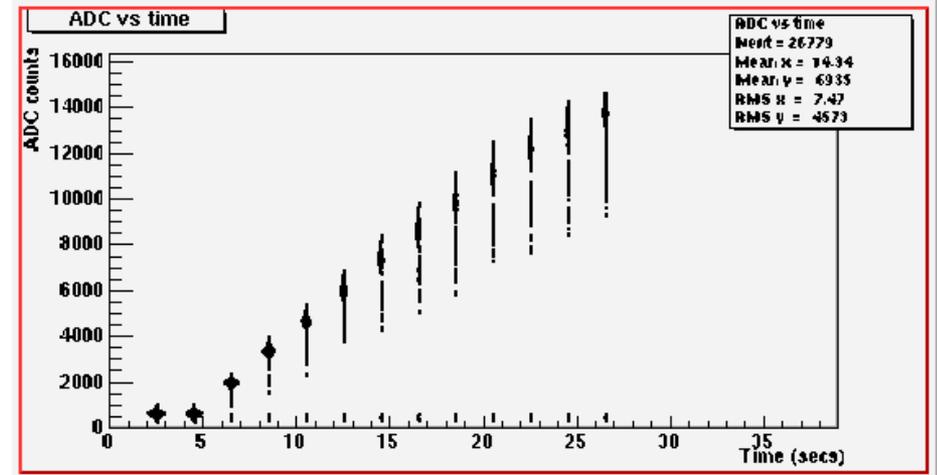
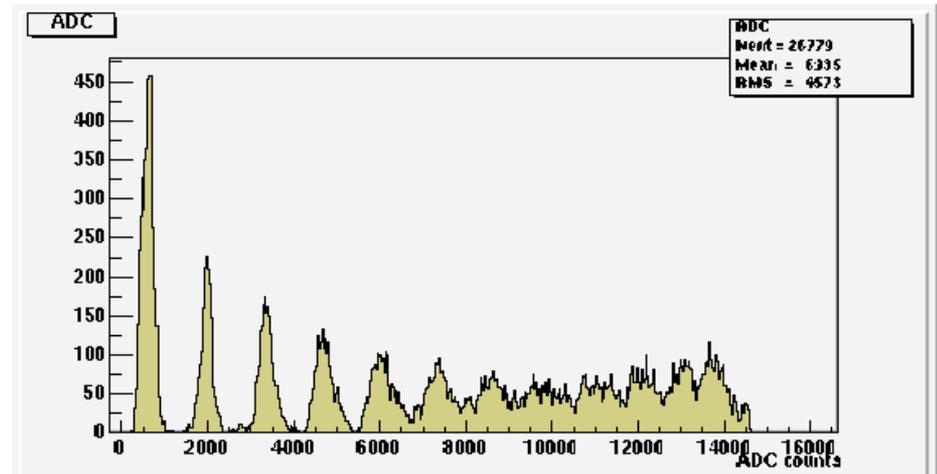
264 RawDigitDataBlocks
0 TpSinglesSummaryBlocks
0 LIAdcSummaryBlocks
0 LITimingSummaryBlocks
0 RawVarcErrorInTfBlocks

Online Monitoring Status Frame

Current run = 1708
Run type = 2 (Normal data)
Trigger source = 4 (Plane Trigger)
Number of records read= 264
Processor occupancy = 8%
Wed Dec 19 15:13:53 2001
Status: No record since Wed Dec 19 15:09:24 2001

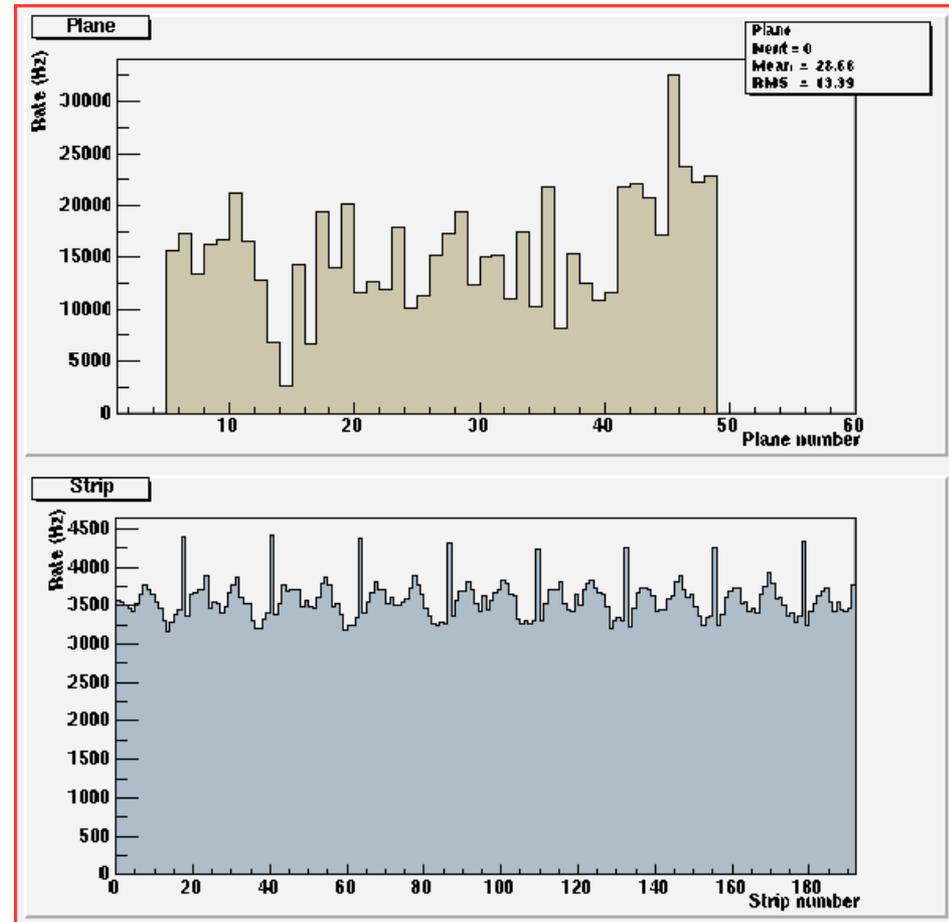
Charge injection plots

- Charge injection scan:
 - relevant monitoring plot is ADC vs time
 - shows a) whether charge injection scan is proceeding as expected, b) whether scan is exercising full range of ADCs
- Roy produces summary plots which show charge vs mean ADC for each VA chip
 - can't be done in real time - charge inject summary blocks don't appear until end of run.
 - Monitoring could produce similar summary plots automatically at end of run - work in progress...

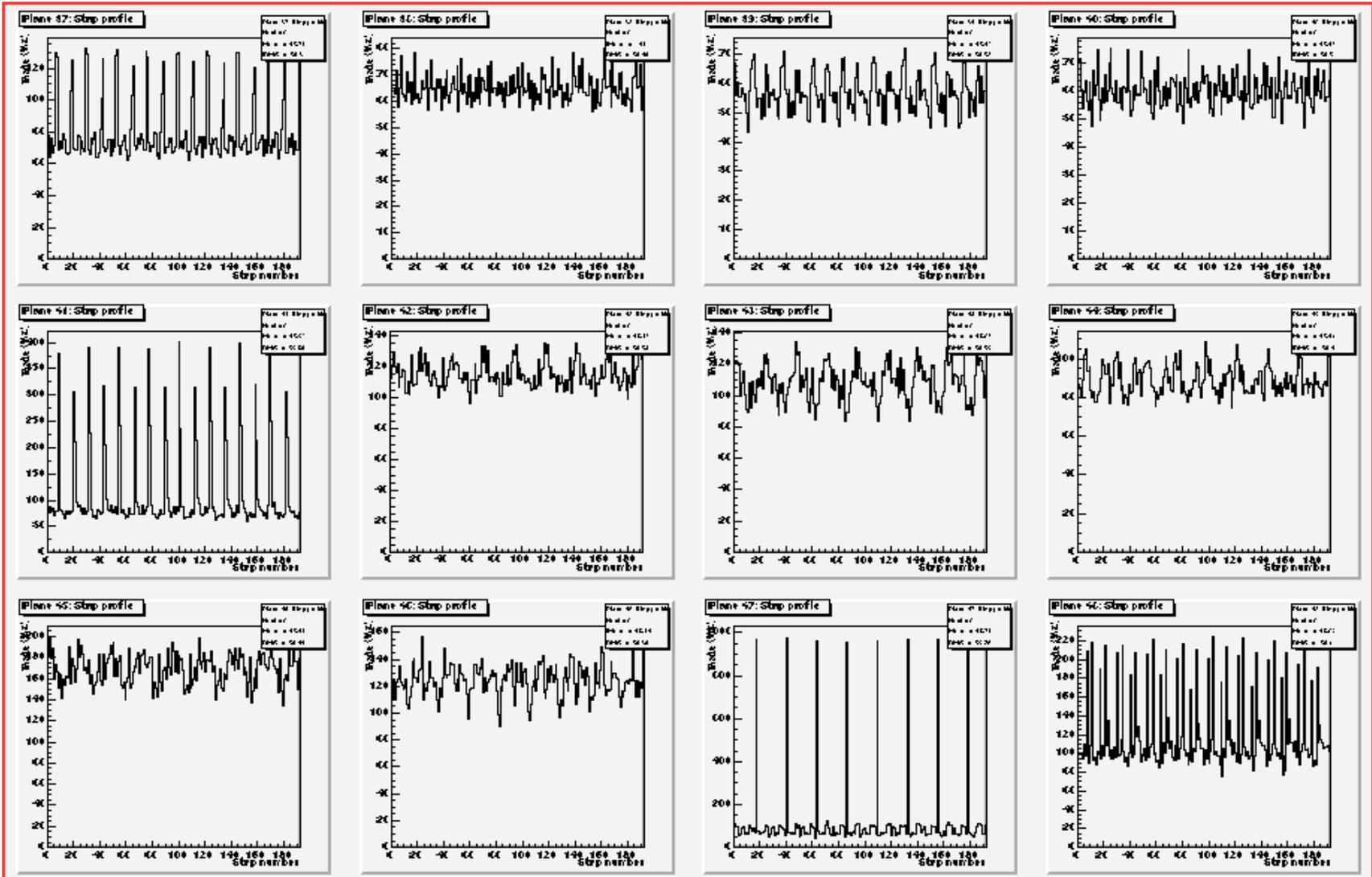


Singles data

- Plane and strip rates + dead channels
 - monitoring now displays rates (in Hz) rather than just occupancies
 - root files (containing all histograms) are automatically produced - can compare different runs
- Analysing singles data is slow
 - some runs contain $\sim 1\text{M}$ hits/second
 - can take >1 minute to analyse 1 sec worth of data
 - should be better with new trigger/4 plane readout

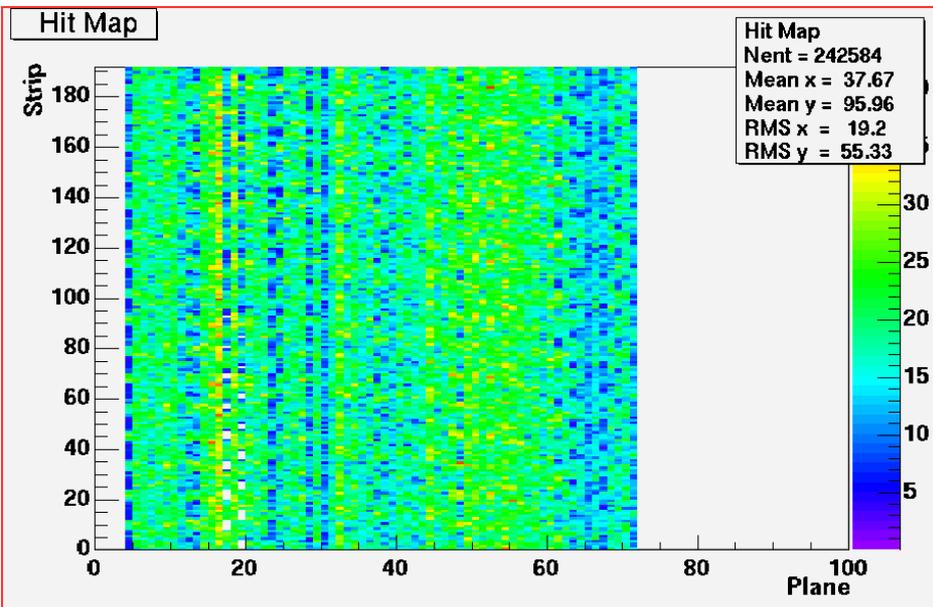


Rates per plane as a function of strip number



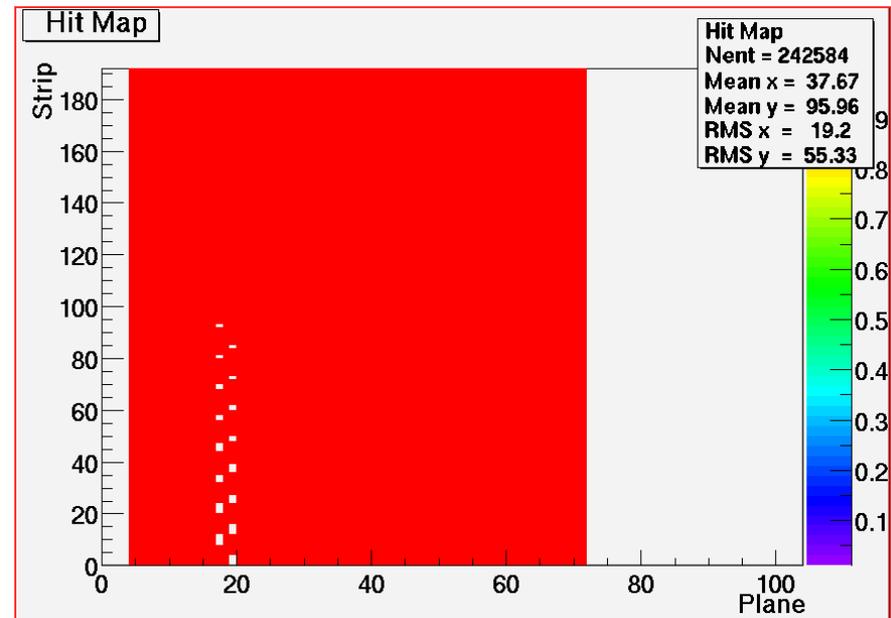
Canvases: distributions for 12 contiguous planes

Some tricks



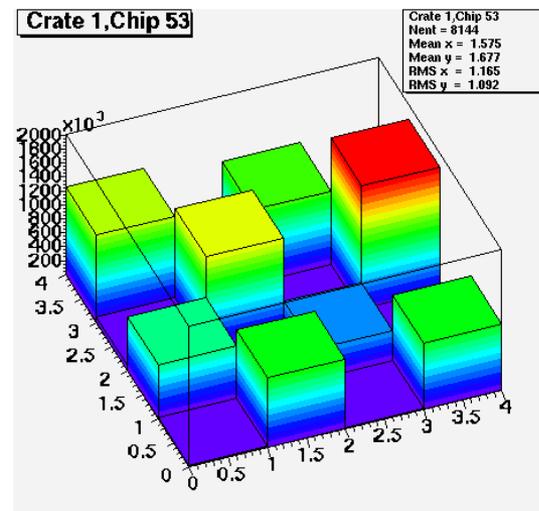
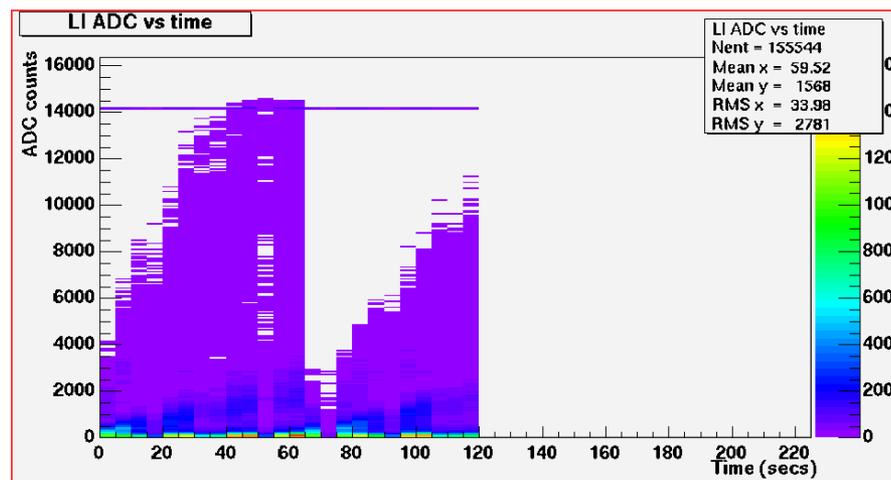
- By right-clicking on the histogram, selecting “Set Maximum” and entering “1” in the dialog box, the dead channels immediately show up (see right)

- Some neat ROOT tricks can be used to yield more information from the monitoring plots
- The plot on the left is a hit map (plane vs strip) for a plane trigger run



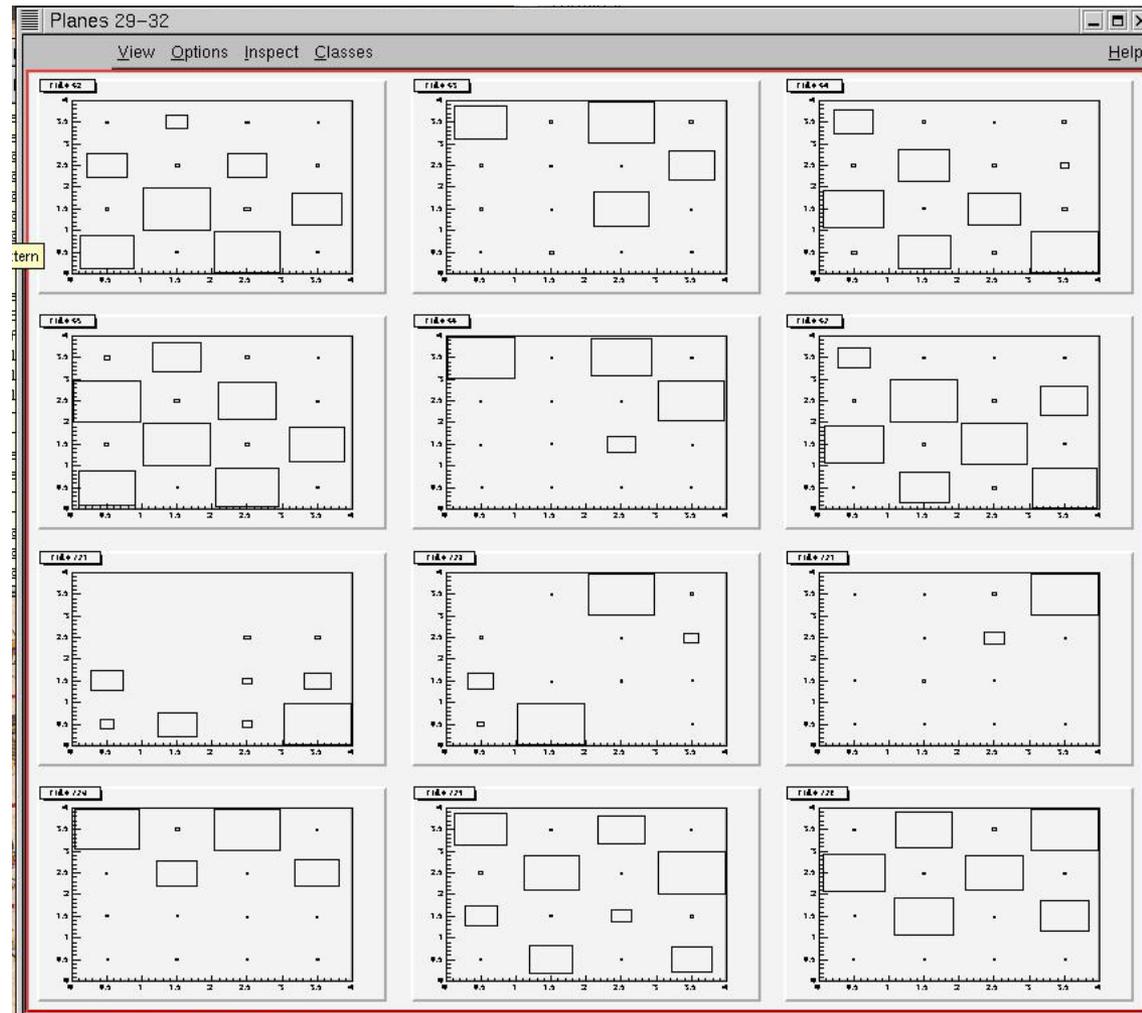
Light injection runs

- Usual armoury of plots useful for LI runs
 - ADC distributions
 - plane/strip distributions
- New plots added:
 - select on LI trigger and plot ADC vs time. Similar to charge inject plot. Can see light level scan
 - LI mean vs time and LI mean/rms distributions from summaries (useful if LI hits are not written out)
 - PMT (ADC weighted) hit maps to observe LI checkerboard pattern

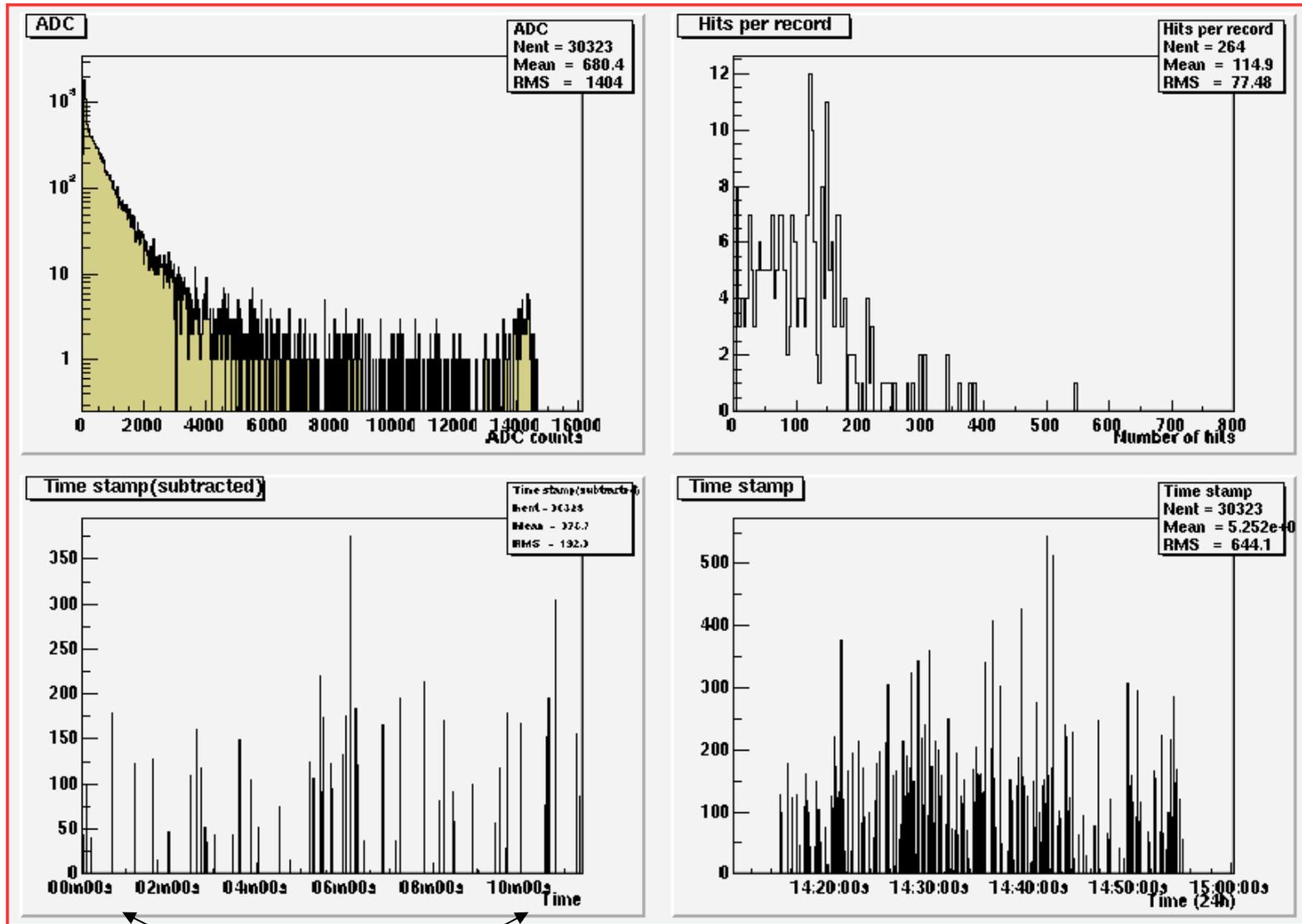


Checking the checkerboard

- Online canvases available for each PMT
 - grouped in 4 plane units
 - 1 mux box per row
 - top half - EAST, bottom half - WEST
- Monitoring GUI options add functionality:
 - use of “ZERO” option in GUI - zeroes all histograms in canvas, useful for monitoring checkerboard pattern as a function of time

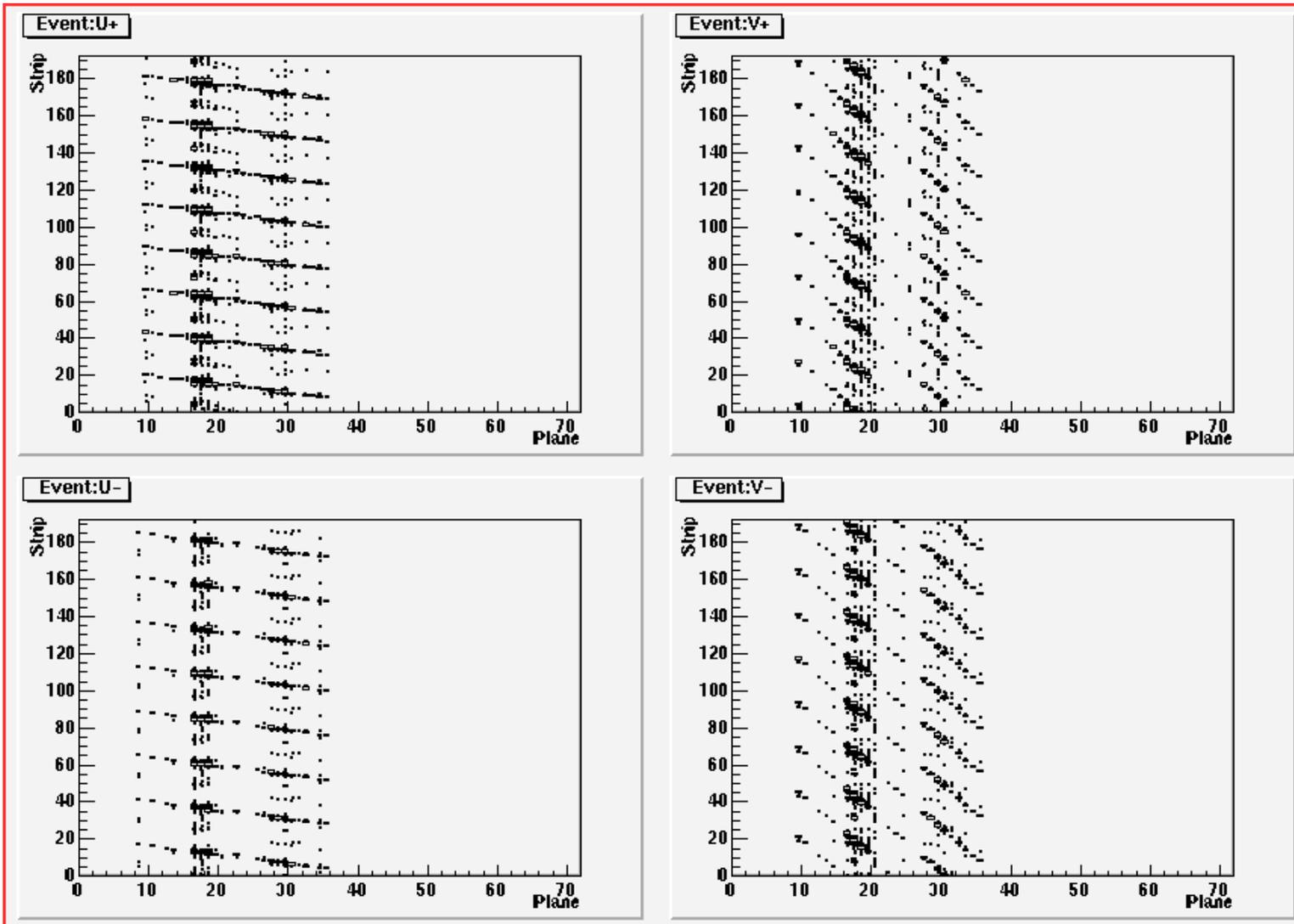


Plane trigger run - summary canvas



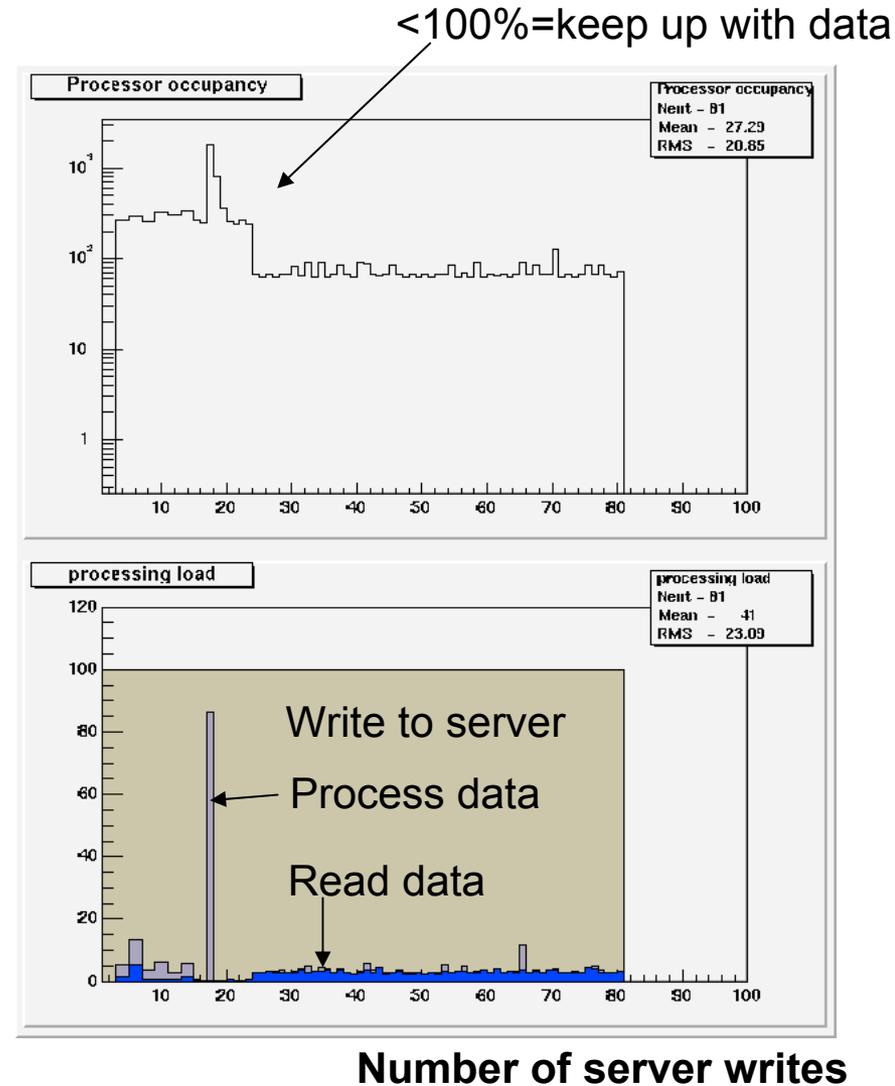
zoomed

“Event display”



Other features

- Online monitoring will go “fully” online in the new year
 - reading from open files rather than recently closed files
 - needs to be able to keep up with data taking
 - to that end I have written a function that monitors processor usage and reconfigures the monitoring (either longer wait between histogram updates or sample the records rather than processing them all)
 - This feature should probably be disabled for plane checkout runs



Summary + timescale for implementation

- Recent monitoring developments:
 - improve the presentation of data
 - 5 summary canvases have been defined
 - general status canvases - run/record information available
 - plane checkout quantities defined
 - new charge & light injection plots available - complementary to Roy's summary plots. Can only implement "processor-light" analyses online.
 - possibility of automatic summary plot generation - work in progress
- Timescale for monitoring upgrade at Soudan
 - version of monitoring with all the advertised features exists at RAL. Needs more testing before I am willing to upgrade the Soudan version - should happen early-mid Jan '02
- Suggestions/feedback always welcome!