

Current Readout Rates

What other limitations are there?

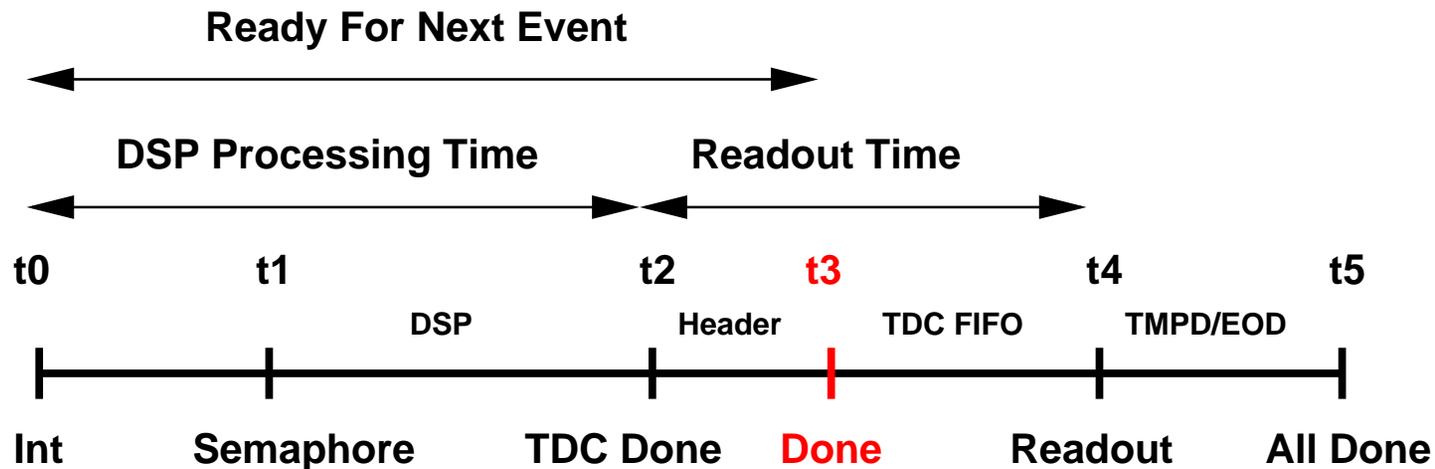
- Front End Readout
- Down Stream Limitations
- Other Worries...

MVME5500 Status

DSP V66 Readiness

VRB Data Rebalancing

Front End Readout



Maximum of “Time to set TRACER done” and readout sets the overall readout rate

After reading out formatting the data the TMPD diagnostic bank is created and sent out (small overhead).

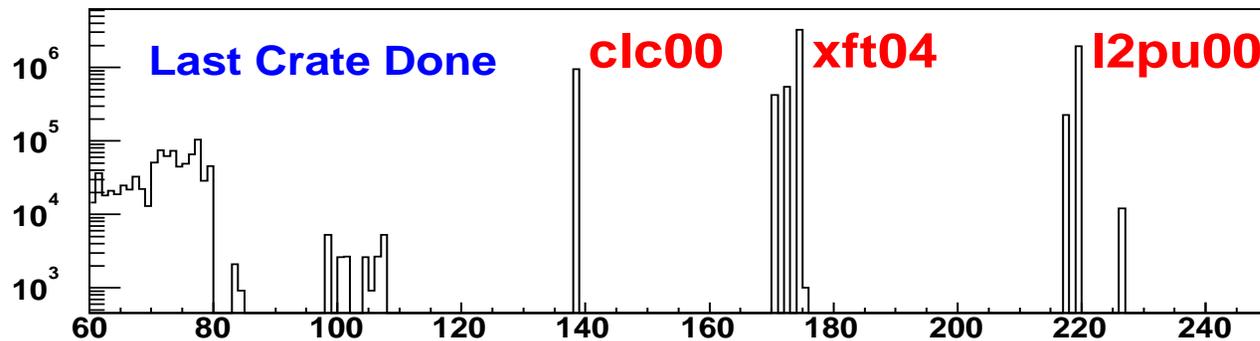
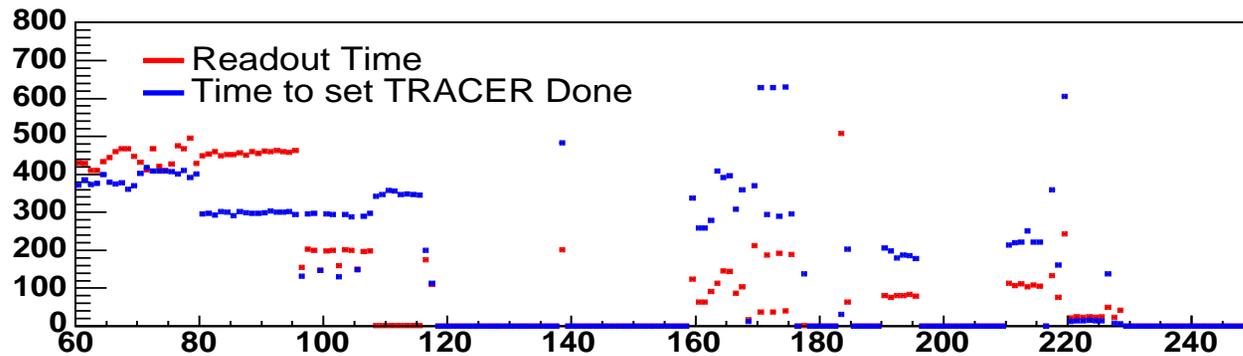
The Front End crate sets the TRACER done.

Readout/Reformatting is done after setting the TRACER done.

VME cards can process the next event while the current event is being readout

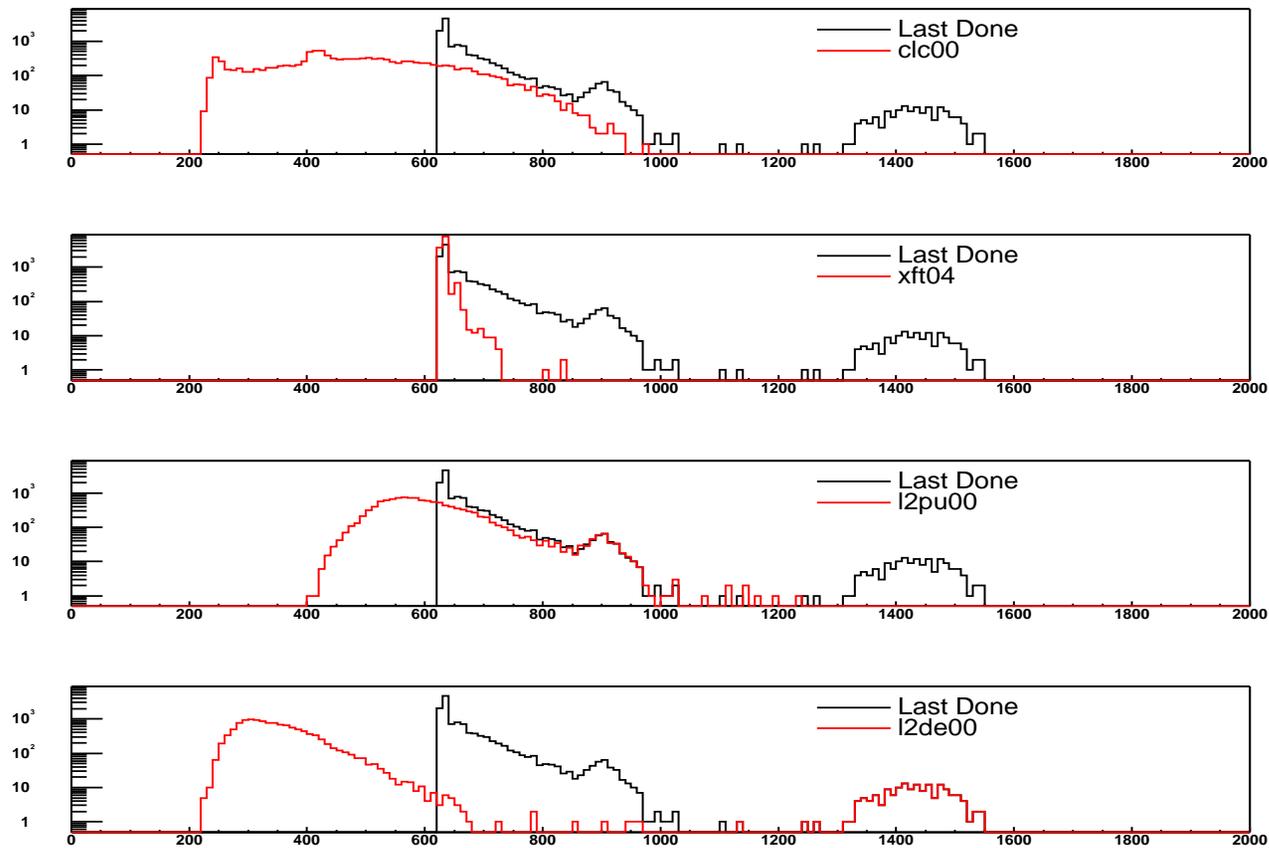
Processor needs to handle the current event before reading out the next.

Comparison of Readout time and the time to set TRACER done.
Plotted as a function of the crate's IP address...



- *The last crate to set TRACER done is clc00, xft and l2pu00*
- *xft and l2pu00 reading diagnostic information*
- *WCAL crates were set in synchronous mode...*

The CLC, XFT and L2PU were the slowest crates in the system

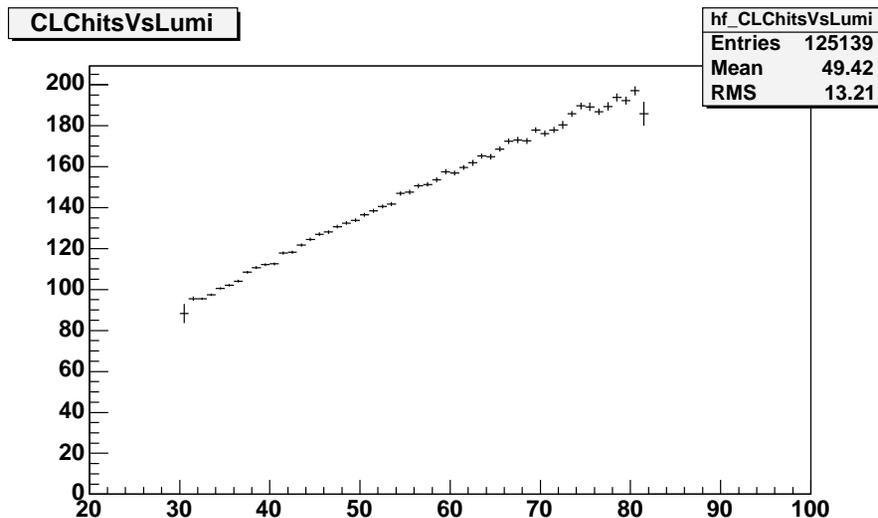


Large times are the result of reading out diagnostic information
→ *Diagnostic readout can be reduced by using "readout lists"*

CLC crate may be more problematic...

CLC Readout Issues

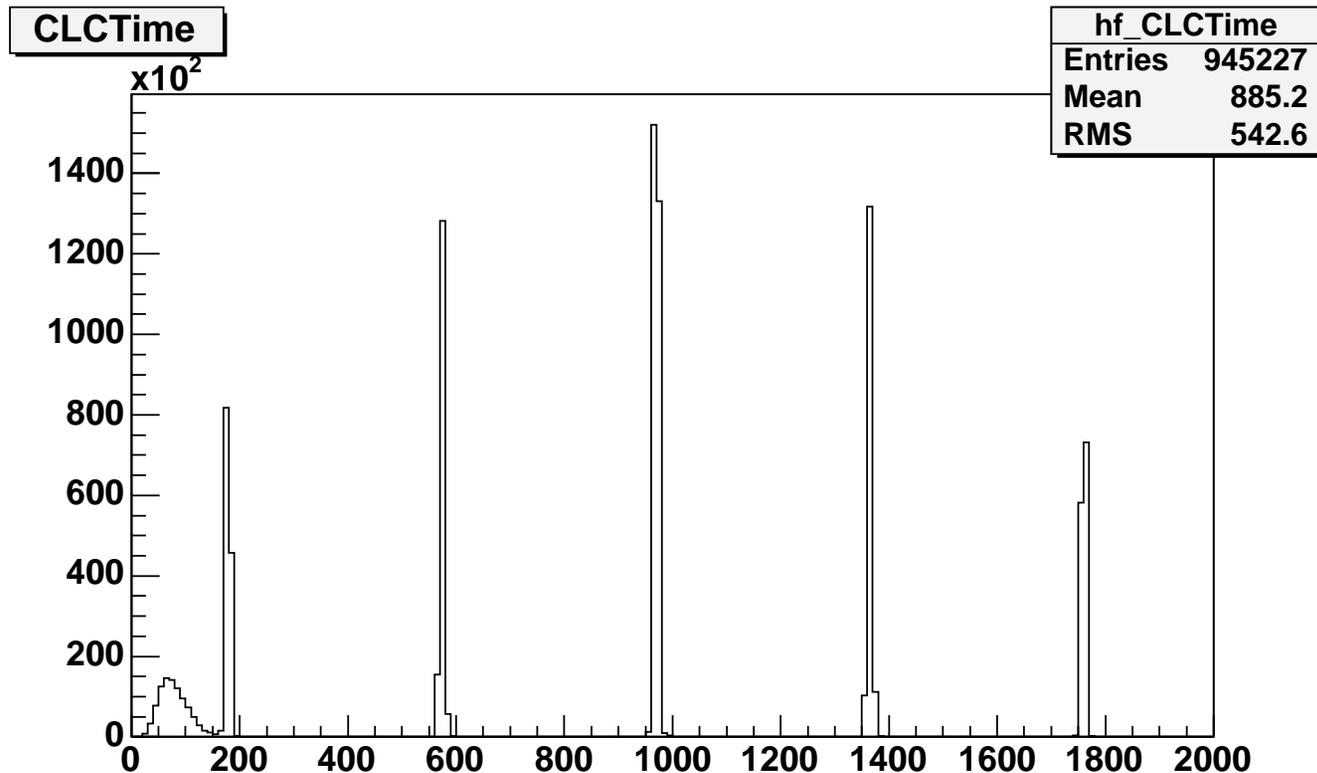
- Access to DPM was slow...
 - Optimize the readout. Bypass the DPM access saves $180 \mu s$
- The CLC crate has one TDC
 - The one TDC in the CLC crate can slow the whole readout....



Hits versus luminosity

Occupancy is growing rapidly with luminosity

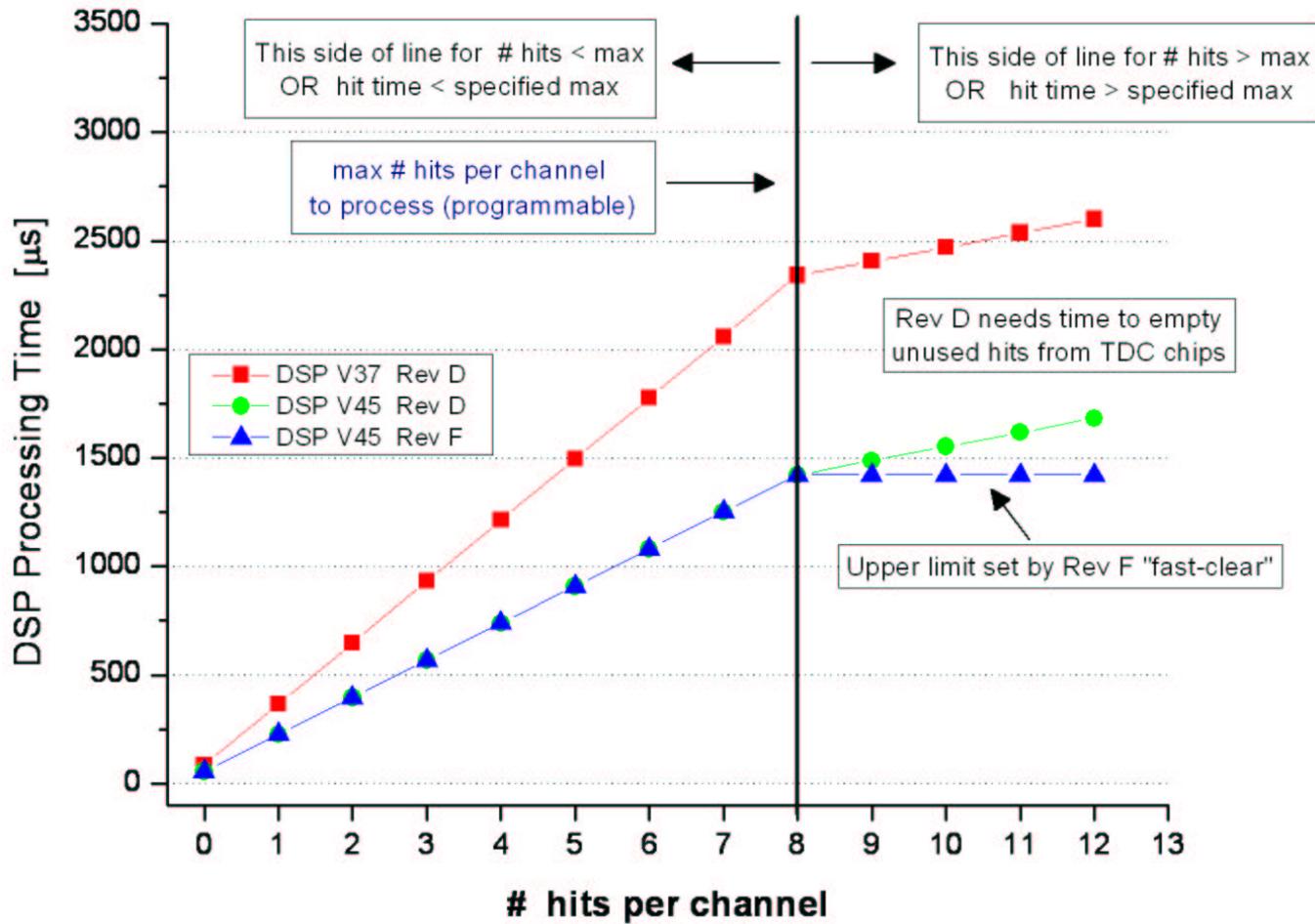
See hits from the crossing before and after the triggered crossing



→ Use TDC with fast clear to chop off the last two hits

→ Move the CLC crate to different TAXI group so that we can ignore the earlier hits

DSP Processing Time vs # hits per channel



For 6 hits/ch the DSP processing time would be $> 1000 \mu s$.

Improvements since the shutdown

- WCAL readout changed to asynchronous mode...
- Installed MVME5500 in several slower crates

	Index	189971	190003
b0tsi03	(183)	500	400 us
b0l2de00	(217)	220	146 us
b0l2pu00	(219)	720	360 us

Unfortunately we told them about it...

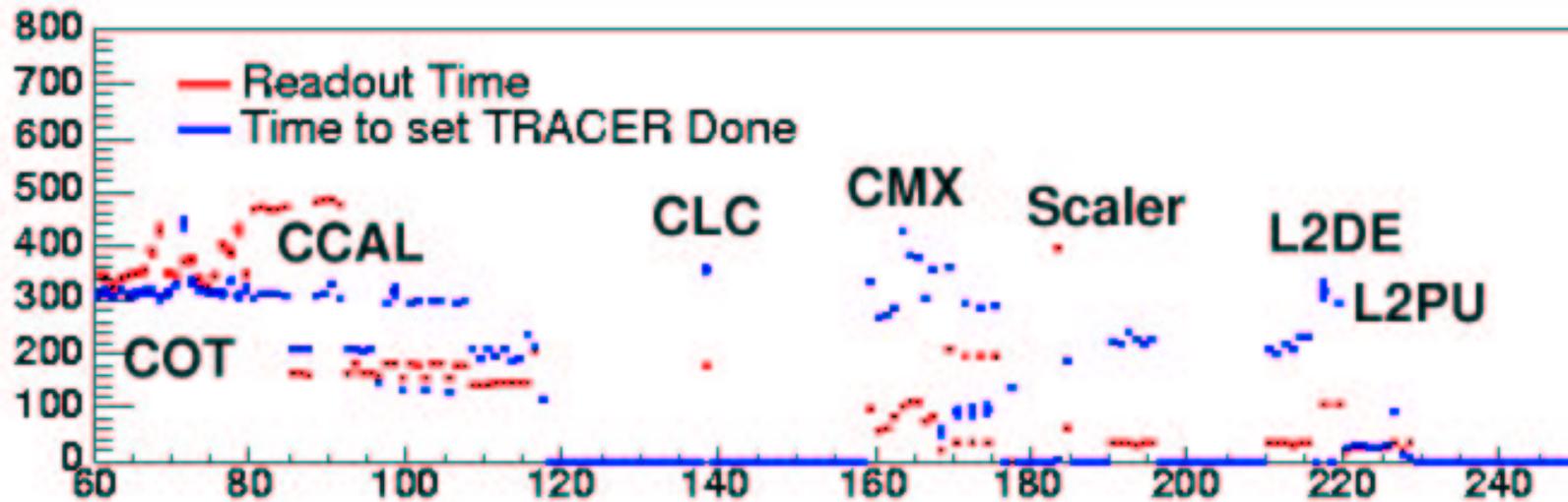
“With the new MVME processor, we are now able to turn on all diagnostic Pulsar DAQ buffers (with readoutList 0) and the readout time is about 700usec. Before we had to disable some DAQ buffers and put some on ROL=7 to get to 700usec. This full readout configuration is an overkill for us but we’ll probably keep running in this mode until the shutdown is over.”

- Installed MVME5500 in some CCAL crates

We have 15 more MVME5500 coming in and we will install them as we get the opportunity.

- XFT now uses readout lists to limit the diagnostic information (large events)
- I2pu trimmed some diagnostic information

Most crates are now well below 500 μs



Can expect some readout times to increase with increasing luminosity...

More improvements

- CLC readout improvements

→ Use TDC with fast clear to cut off last two extra hits...

We should go ahead and get this done..

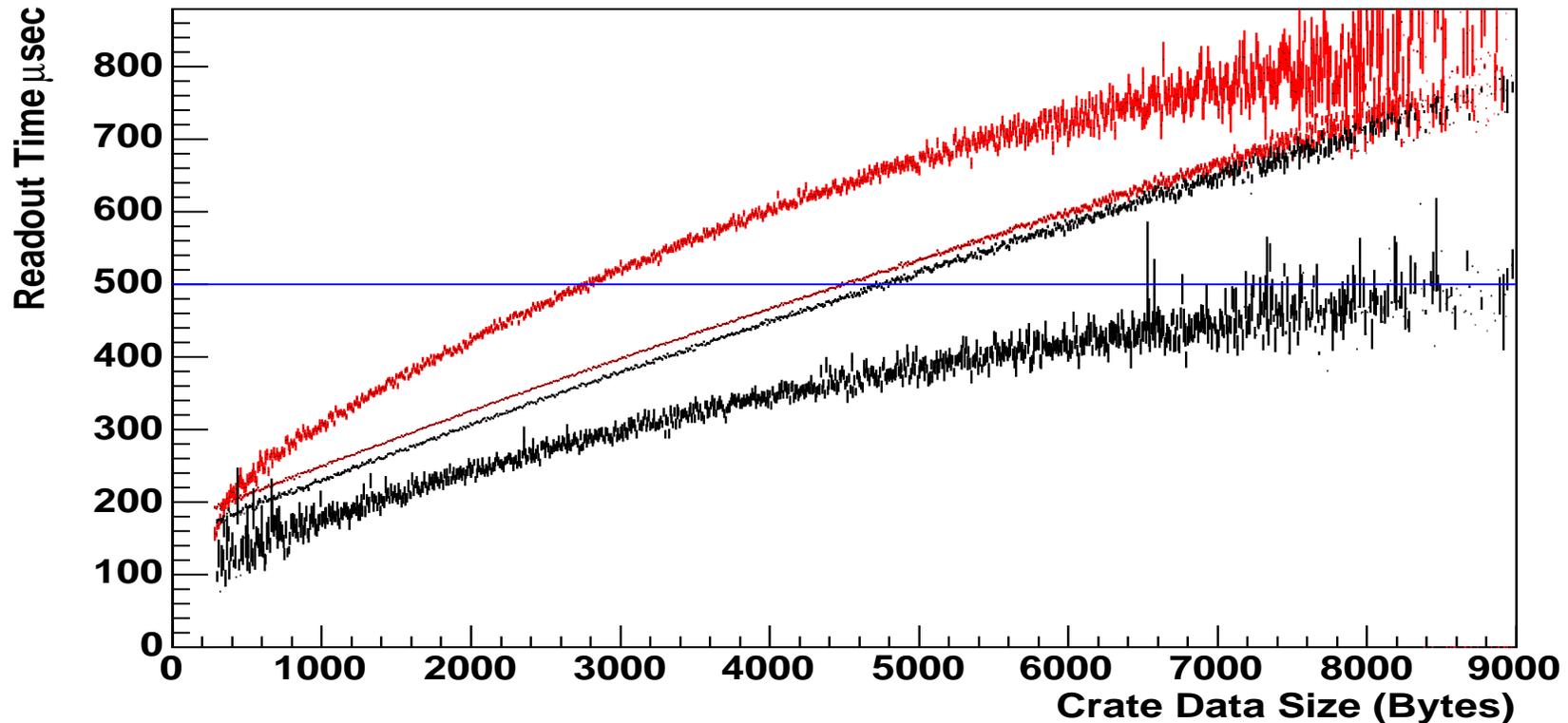
→ Move CLC crate to different TAXI group so timing signal arrives earlier... (can cut off two preceding hits)...

Should do this while experts are still around...

- Install remaining MVME5500s in CCAL crates

- Start using DSP V66 for the COT crates

DSP Improvements Over Time... V37 → V45 → V66



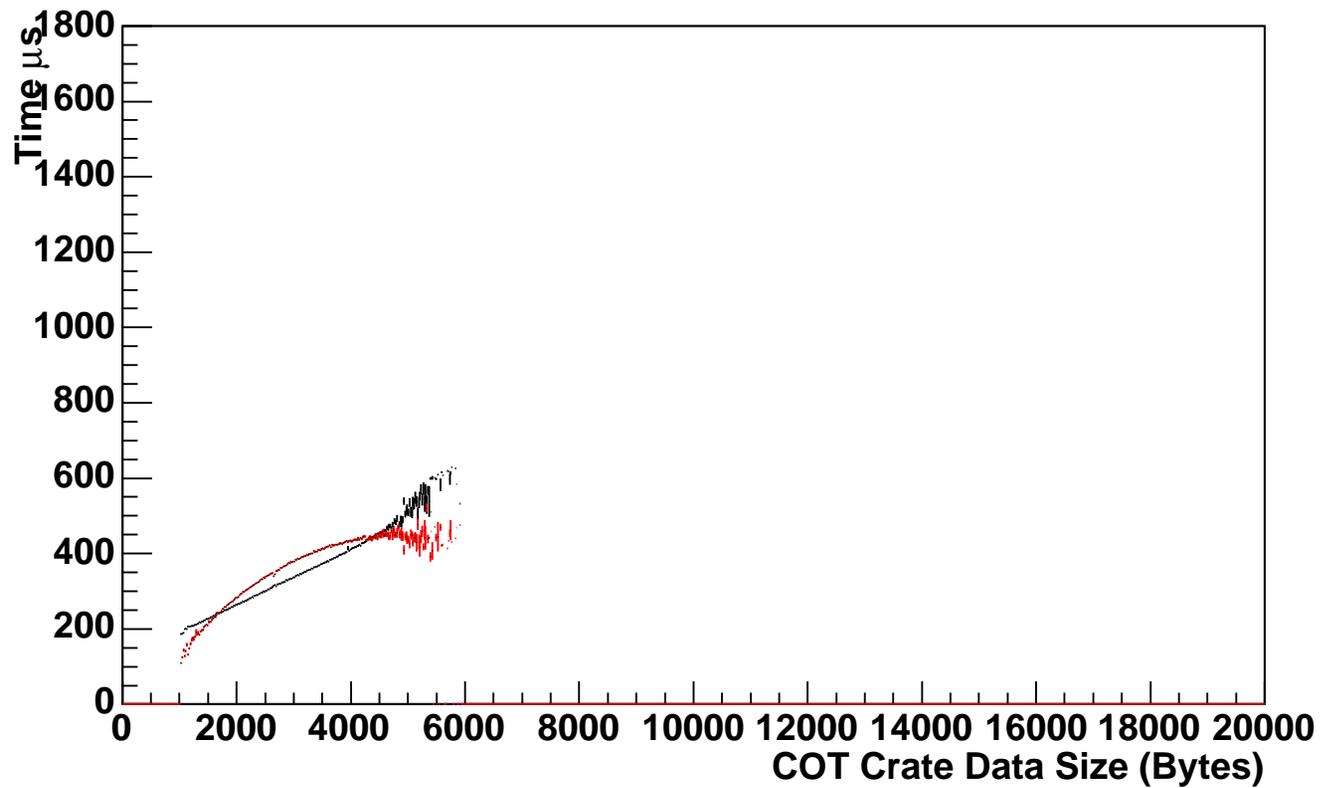
Red: V37 DSP

Black: V45 DSP

V37 → DSP processing is the limiting factor

V45 → Readout over VME is the limiting factor

Run 186318 (V65 similar to V66)



Data format changes in V66

→ DSP processing is the limiting factor

DSP V66 Readiness

DSP Code and front end readout is ready and tested. V66 is loaded in the database and we can switch between versions...

→ *Calibration consumer needs to be updated for new t0 and max width (minor)*

→ *TDC Test code needs to be updated*

Offline bank accessors has been updated and tested, tagged and in 6.0.0int3

Updated hit unpacking routine used at L3 (Aseet) done and tagged in 6.0.0int3. L3exe built and tests offline

Most consumers (except SVXMon) have been built and are available in 6.0.0int3.

Offline has done a 10K test using 6.0.0int3 and is starting to use this version for offline processing.

See problems offline...

Down Stream Limitations

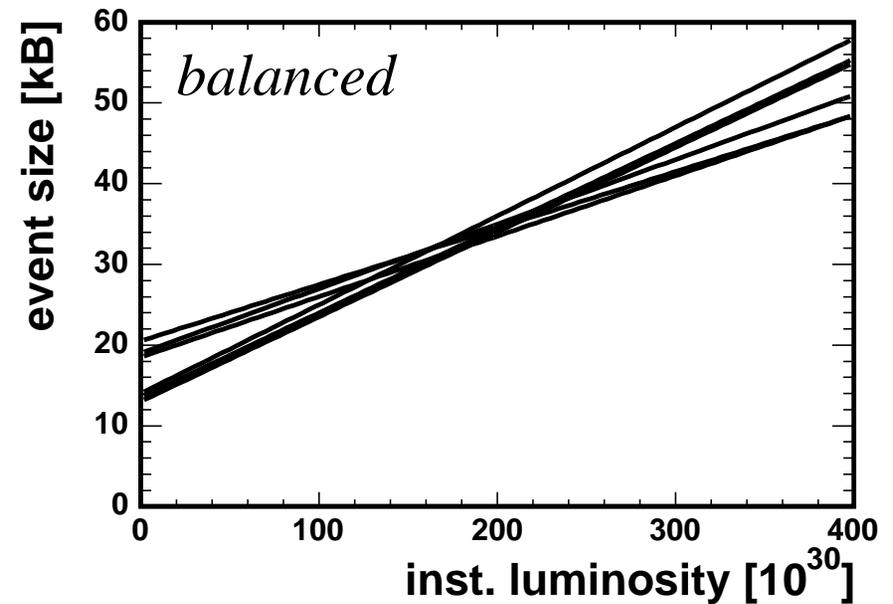
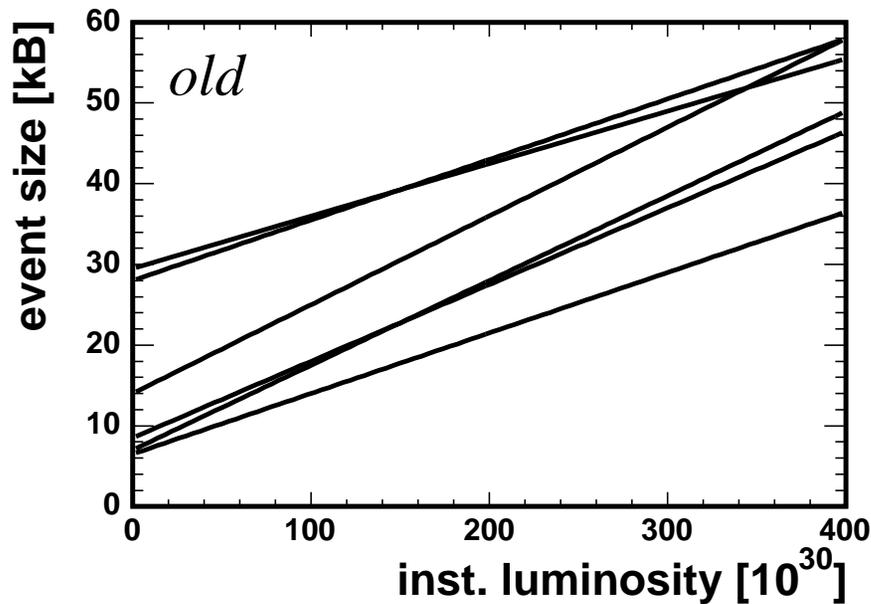
- EVB limits us to 400 Hz → 1000 Hz by 2005
 - L3 replacing 64 PCs expected to be in use coming out of the shutdown *850 - 1000 Hz PCs replaced with 3 GHz PCs*
→ Increase in about 3× processing power for the replaced PCs and greater reliability...
 - CSL using parallel logger, coming out of the shutdown 20 → 30 MB/s *New hardware 40 MB/s by 2005 and 60 MB/s by 2006*
- Recently reverted back to old version...*

MVME5500 Status

- We are now using the MVME 5500 in several crates
 - Problems we saw, freezeup/unable to reset, are fixed
 - Working well and we see a significant improvement for the crates in which they are installed
 - We are waiting for 15 more processors that we will install in the CCAL crates and where ever else we would benefit...

VRB Data Balancing

Markus Klute studied the distribution of data to the 6 VRB



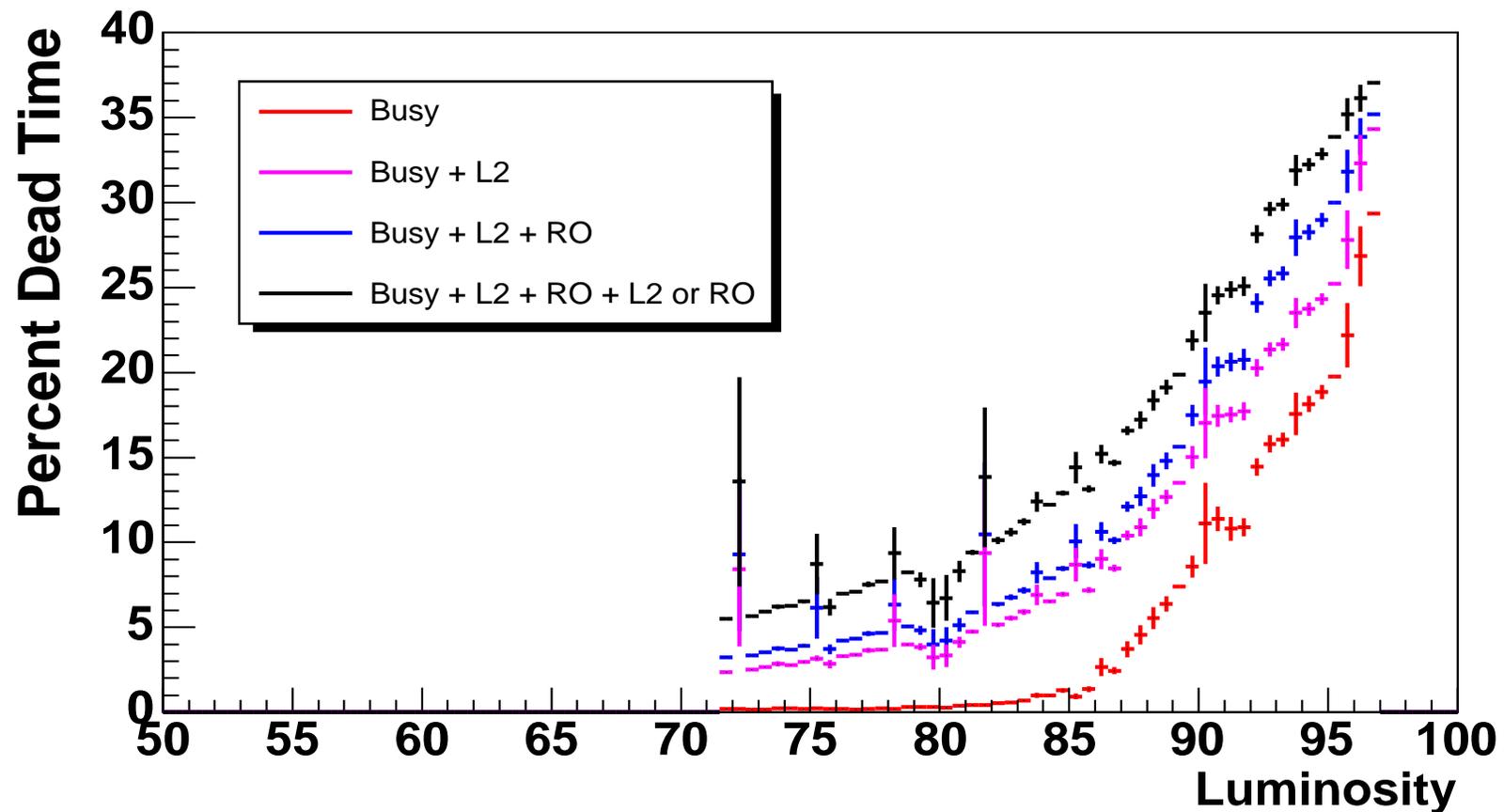
We changed the VRB channel assignment so that the data going to the VRBs is better balanced.

→ avoids problems with too much data in one VRB

Will need to increase the number of VRB crates 6 → 8

Details written up in a separate note...

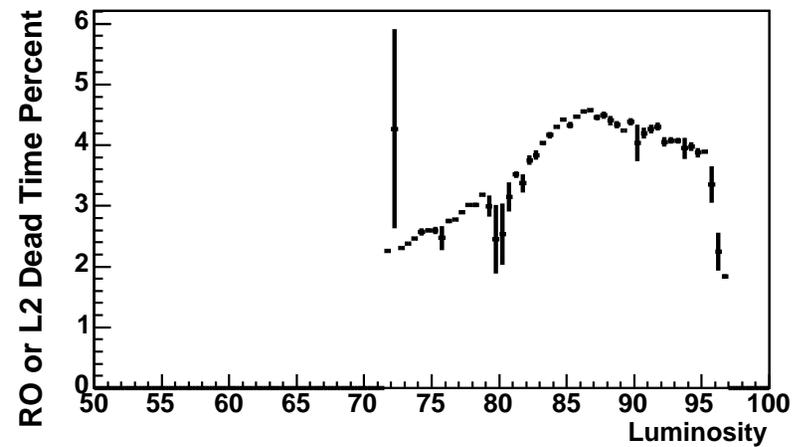
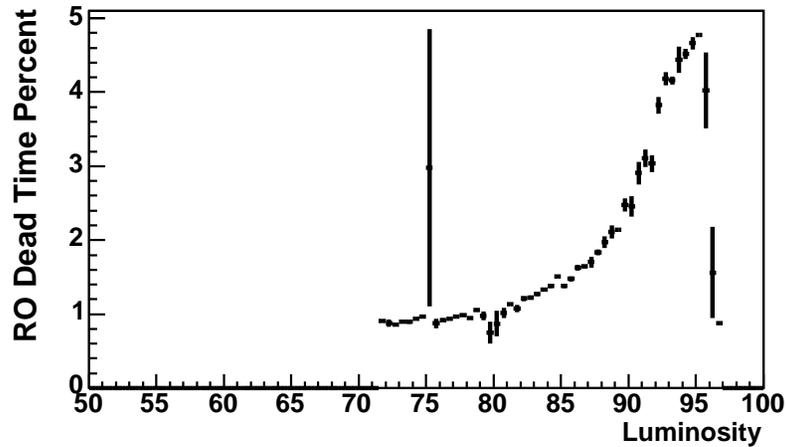
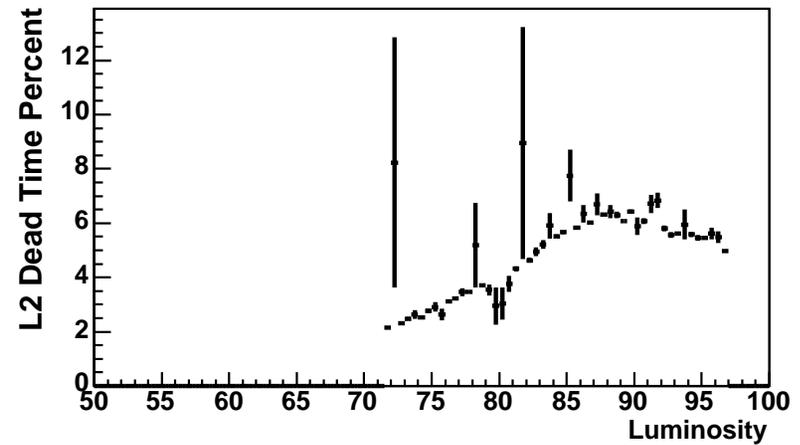
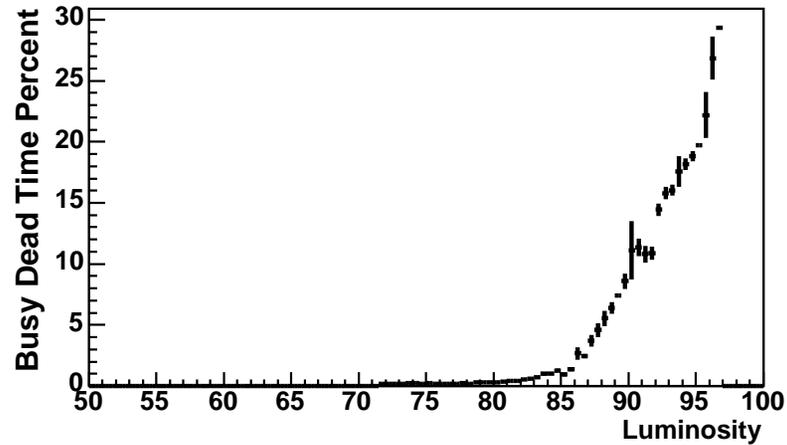
Other Worries



Busy deadtime is the main source of deadtime (400 Hz EVB)

Need to control the L2 rate with new trigger tables...

See that the L2 deadtime is also significant..



In order to get a more clear picture of the deadtime from the trigger we would need an updated simulation...

Summary

During the shutdown we have made several significant improvements that reduce the readout time.

- *We still have to install DSP V66*
- *Would like to use TDCs with fast clear in the CLC crate*
- *Plan to move CLC to different TAXI group*
- *Increase number of DAQ VRB crates*

Consider two modes of running

- **High luminosity/high occupancy**

Limited by COT/DSP processing

4 hits/ch on SL 1-4 L1A 948 Hz → L2A 880 Hz 6% deadtime

- **Low luminosity/low occupancy**

Not limited by COT/DSP

Can achieve rates > 1000 Hz