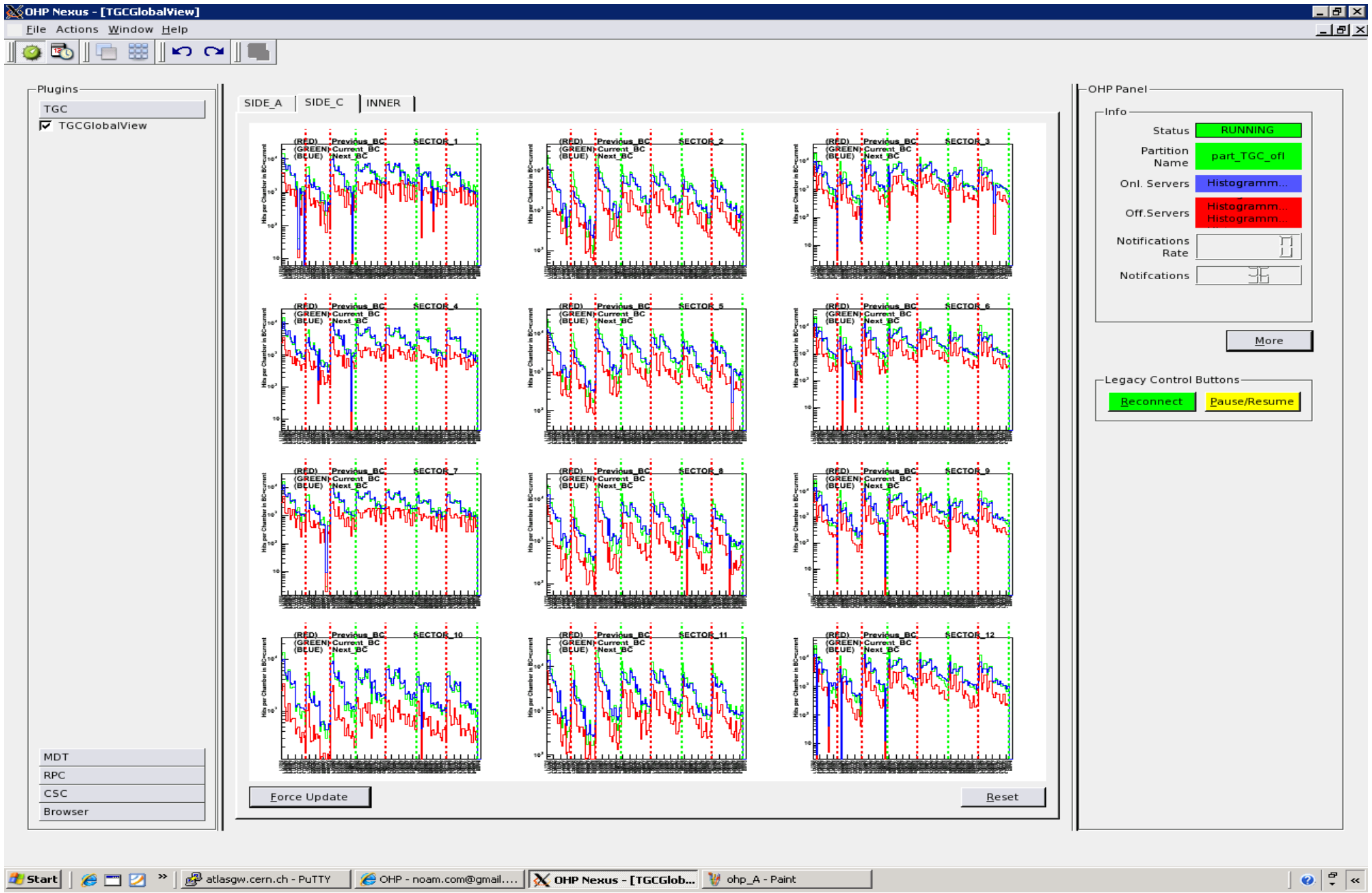
TGC Online Monitoring - Instructions for the muon SHIFTERs using OHP

March 2011

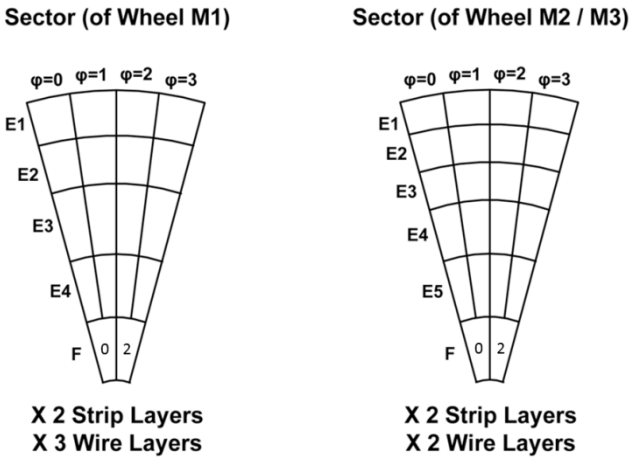
A minimized OHP structure

- The online data quality monitoring for the TGC, in the shifter's scope, is done at the chamber-level, with a total of 26 histograms.
- In OHP, one can choose between three histogram tabs - two per side (A and C) and another one for both the inner wheels.
- In the A/C tabs there are 12 histogram pads, one per sector.
- On every pad (sector), there are three overlaid histograms representing each a 1/3 of the possible bunch-crossings, i.e. *previous*, *current* and *next*.
- On each tab (sector), the overlaid horizontal lines represent the physical margins of the wheels (green) or layers (red) that composite the corresponding sector.
- In the third tab (inner wheels), the two sides are presented in two pads (per side).

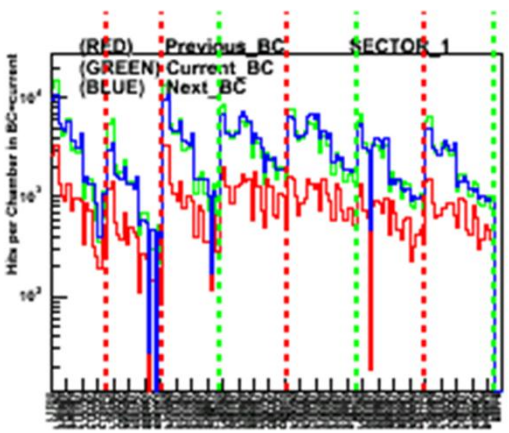
A minimized OHP example picture



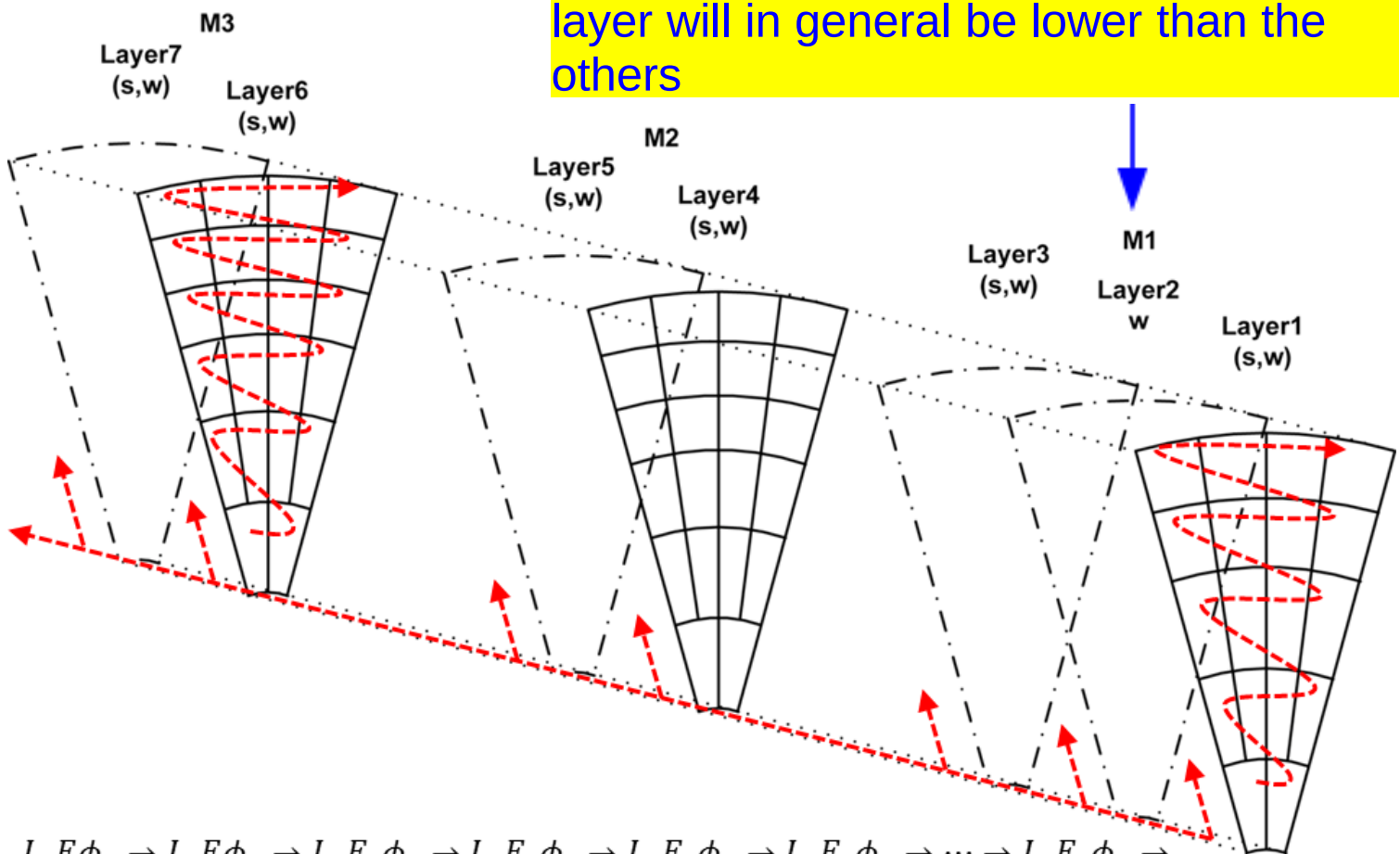
Histogram arrangement logic in OHP



For every layer in the profile histogram below, a peak in the first bins is expected since the first bins of the layer represent the forward chambers (closest to the beam-pipe) whereas the last bins of the layer represent the end-cap chambers



Note that there's no strip layer #2. Therefore, it is expected that this layer will in general be lower than the others

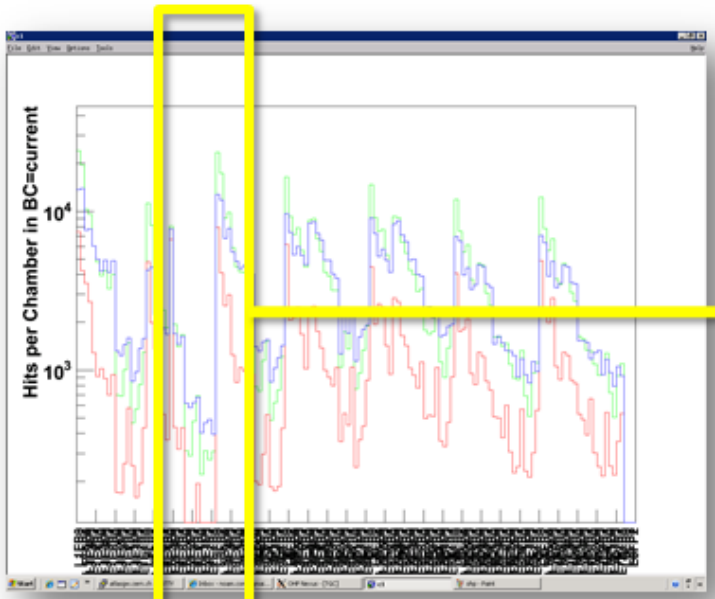


$$L_1F\phi_0 \rightarrow L_1F\phi_2 \rightarrow L_1E_4\phi_0 \rightarrow L_1E_4\phi_1 \rightarrow L_1E_4\phi_2 \rightarrow L_1E_4\phi_3 \rightarrow \cdots \rightarrow L_1E_1\phi_3 \rightarrow$$
$$L_2F\phi_0 \rightarrow \cdots \rightarrow L_2E_4\phi_3 \rightarrow$$
$$L_3F\phi_0 \rightarrow \cdots \rightarrow L_2E_4\phi_3 \rightarrow$$
$$L_4F\phi_0 \rightarrow \cdots \rightarrow L_4E_4\phi_3 \rightarrow L_4E_5\phi_0 \rightarrow L_4E_1\phi_3$$
$$L_5F\phi_0 \rightarrow \cdots \rightarrow L_5E_1\phi_3 \rightarrow \cdots\cdots \rightarrow L_7E_1\phi_3$$

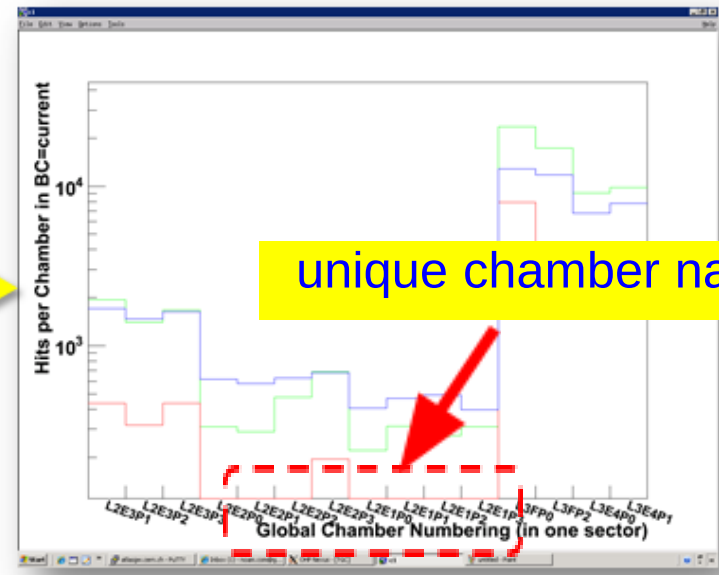
Zooming on the histograms

double click on the pad.
each pad represents a sector

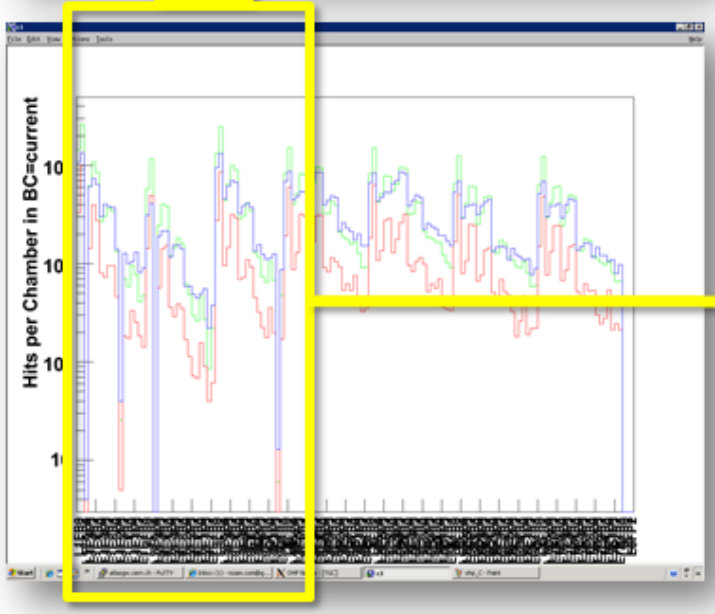
drag the marker around the range of interest on the X-axis (as in ROOT)



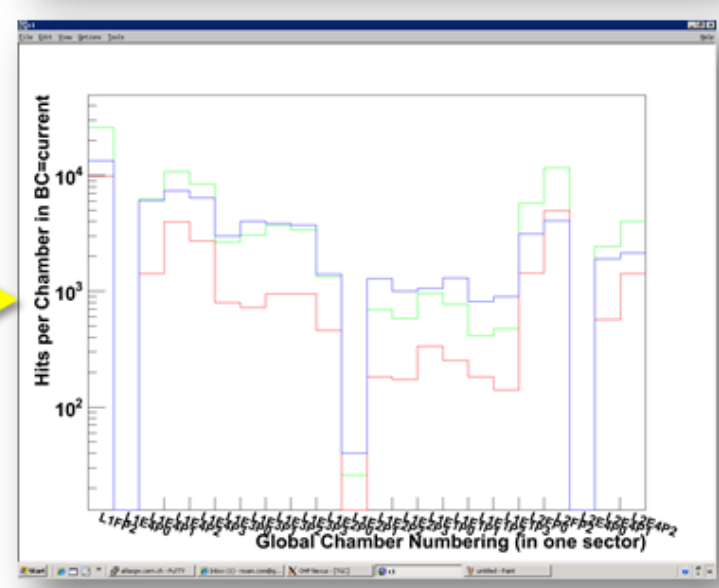
A08



unique chamber names



C12



In the zoomed histogram, see the exact chamber name in the labels that span the X-axis

Problems

Dead chambers (occupancy)

Bins (chambers) with zero entries in **all of the 3** BC histograms

Noisy chambers (occupancy)

Bins (chambers) with **extremely higher** number of entries than the overall-level of the histogram

Bad timing

The *current* BC histogram (green) is **much lower** than the other two (*previous* & *next*)

If I see "dead chambers" what should I do ?

- "Dead chambers": 0 entries in 3/3 overlaid histograms
- For about ~1-10 sequential and/or sparsely-spread "dead chambers", take the names from the X-axis and document these in the e-log by the end of the shift.
- For more than >~10 sequential "dead chambers", notify the shift leader immediately and call the TGC on-call expert.

If I see "noisy chambers" what should I do ?

- "Noisy chambers": $N_{\text{hot-bin}}/N_{\text{overall-level}} >\sim 10^3$
- For about ~1-10 sequential and/or sparsely-spread "noisy chambers", take the names from the X-axis and document these in the e-log by the end of the shift.
- For more than ~10 sequential "noisy chambers", notify the shift leader immediately and call the TGC on-call expert.

If I see "bad timing" what should I do ?

- Chambers with "bad timing": in a certain bin (chamber), the green histogram is much lower than than the red and/or the blue histogram, approximately like: $N_{red\ or\ blue}/N_{green} >\sim 10^3$
- For about ~1-10 sequential and/or sparsely-spread **"**bad timing" chambers, take the names from the X-axis and document these in the e-log by the end of the shift.
- For more than >~10 sequential "bad timing" chambers, notify the shift leader immediately and call the TGC on-call expert.

A note on the "bad timing" issue:
We are looking here on hit-readout logic timing and NOT on the trigger-readout logic. The later should be very good whereas the former may not, i.e. in a certain bin, the entries for *previous* and *next* will be ~<1% of the *current* for triggers while for hits they can be of the same order or even higher than the *current*.
The reason for that is due to the fact that a "trigger" is made by taking coincidence among chambers (5/7 wires and 4/6 strips) and the most of the triggers can be expected to be within the 25[ns] of the *current* BC while an unassociated "hit" may be found outside the current BC time window. **Therefore, the behavior of the hit-readout logic wont' be perfect but it is expected that the current (green) histogram will be mostly on top of the other two (red or blue).**