KLM trigger status

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KLM status

- KLM trigger logic was not touched for some time;

- Works stably, is configurable, provides a lot of debugging information;

- Only small differences between BKLM and EKLM due to different hardware configuration;

- Occasional freezes are cured by soft reset;

- BKLM UT3 is connected to GDL and GRL;

- EKLM UT3 is connected to GDL, no connection to GRL is planned;

- KLM trigger not usable because of large trigger jitter;

- NSM2 module was written.

KLM trigger as seen in GRL

- KLM trigger is received in GRL with a huge jitter (~1500ns) relative to L1 timing.
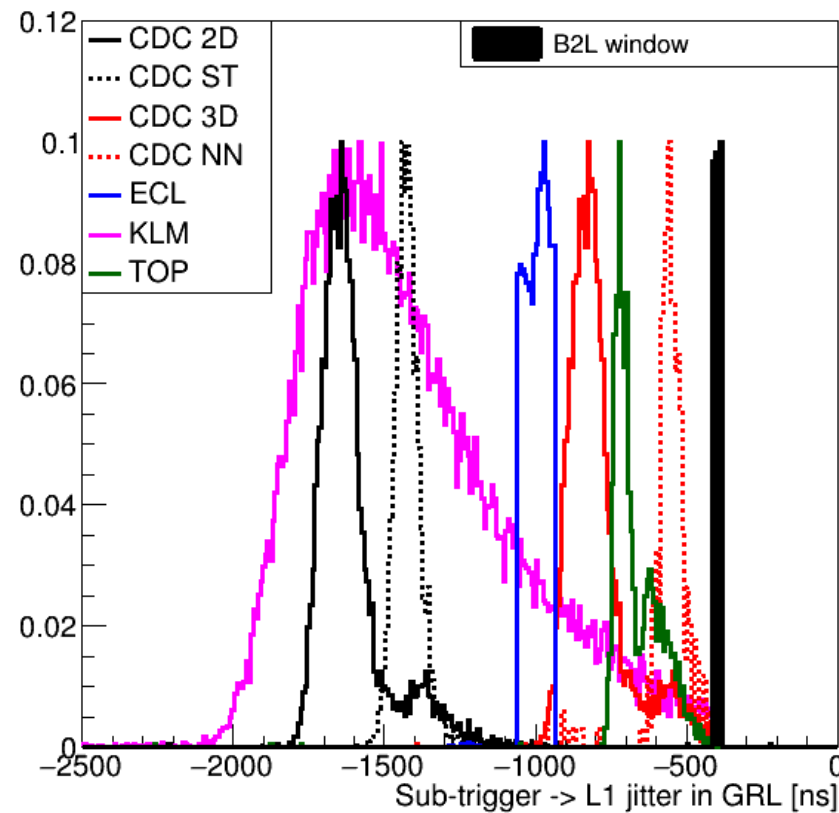
KLM trigger path

- Muon creates a bunch of hits;

- Hits are registered in FEE at once, TDC assigned;

- Hits are sent to DC, sorted and processed one by one, Revo9 reset CTIME assigned;

  - ✔ at least five clock cycles between two 1D hits;

  - ✔ processing time in DC is constant;

- Hits sent from DC to UT3;

- In UT3 2D hits reconstructed from 1D hits;

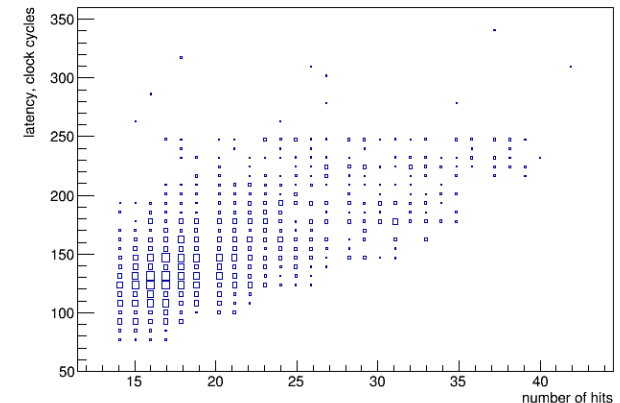- When simultaneous 2D hits found in seven layers, trigger generated.
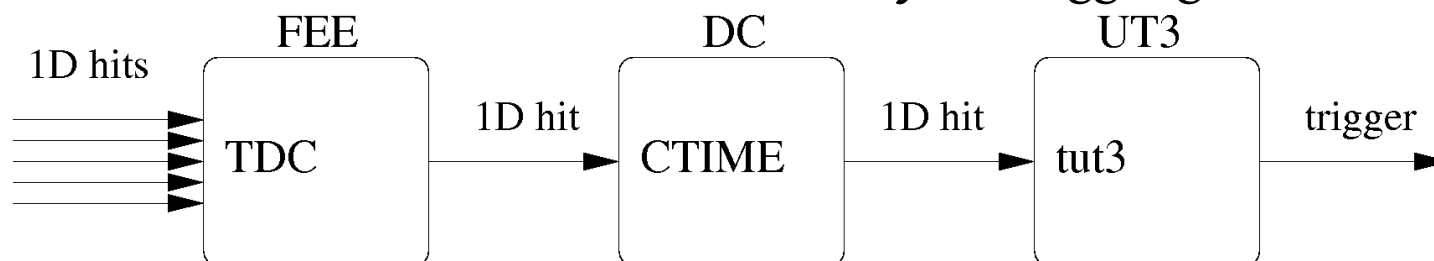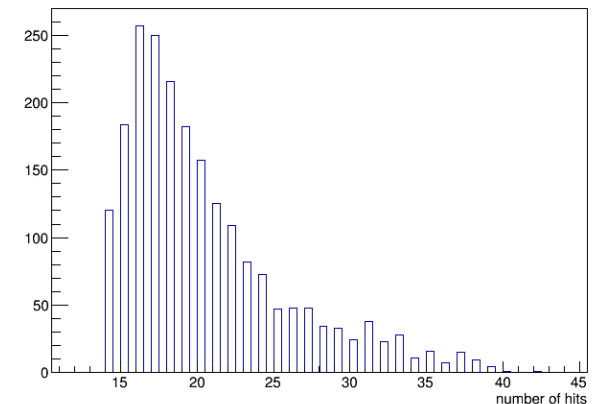
KLM trigger jitter

Trigger latency
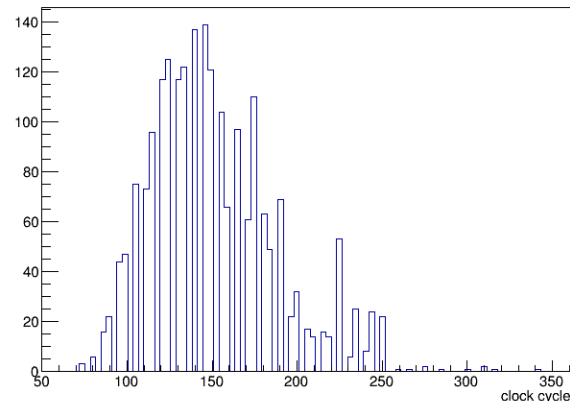
Number of hits vs trigger latency

Number of hits

- Different number of 1D hits may be needed to generate trigger;

- Trigger latency calculated as difference between minimum and maximum tut3 in series of hits;

- Jitter is about (250-80)*8=1360 ns;

Recent progress

- To mitigate huge jitter, we may delay triggers to fixed latency, say 250 clock cycles;

- To realize it, we need

  - ✔ Separate CTIME and TDC (at present combined variable used);

  - ✔ Calculate length of trigger series;

  - ✔ Delay trigger to fixed (changeable) value;

  - ✔ Everything is done, need to compile and test.

- BKLM UT3 connected to L1 signal from GRL, will investigate KLM trigger generation time relative to L1 timing.

KLM NSM2 module

- KLMTRG NSM2 module was written;

- At the moment only monitor functionality is realized:

  - ✔ 1D hit rates for endcaps and barrel halves are archived;

  - ✔ 1D hit rates from outermost layers to monitor background are archived;

  - ✔ KLMTRG status.

- Plan to add at least basic run control functionality (parameters loading, logic reset);

- Stable, works without problems.

KLM plan

- Compile and test delay functionality;

- Add trigger latency counter using L1 trigger signal from GRL;

- Add RC functionality to NSM2 module;

- Prepare documentation to add more developers.