The ALICE TRD Global Tracking Unit
- Cosmic Trigger -

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Cosmic Trigger Setup

Other ALICE Systems

TRD Systems

CTP

GTU

L1 contrib, Busy

TGU   SMUs   TMUs

Modified
Tracklet Data

TTC (L0, L1, L2, …)

L0 contrib, Busy

Outside Magnet

Busy

Inside Magnet

Other Detectors

| T0 | TOF |
| V0 | ACORDE |

Szintillators

Pre-Trigger
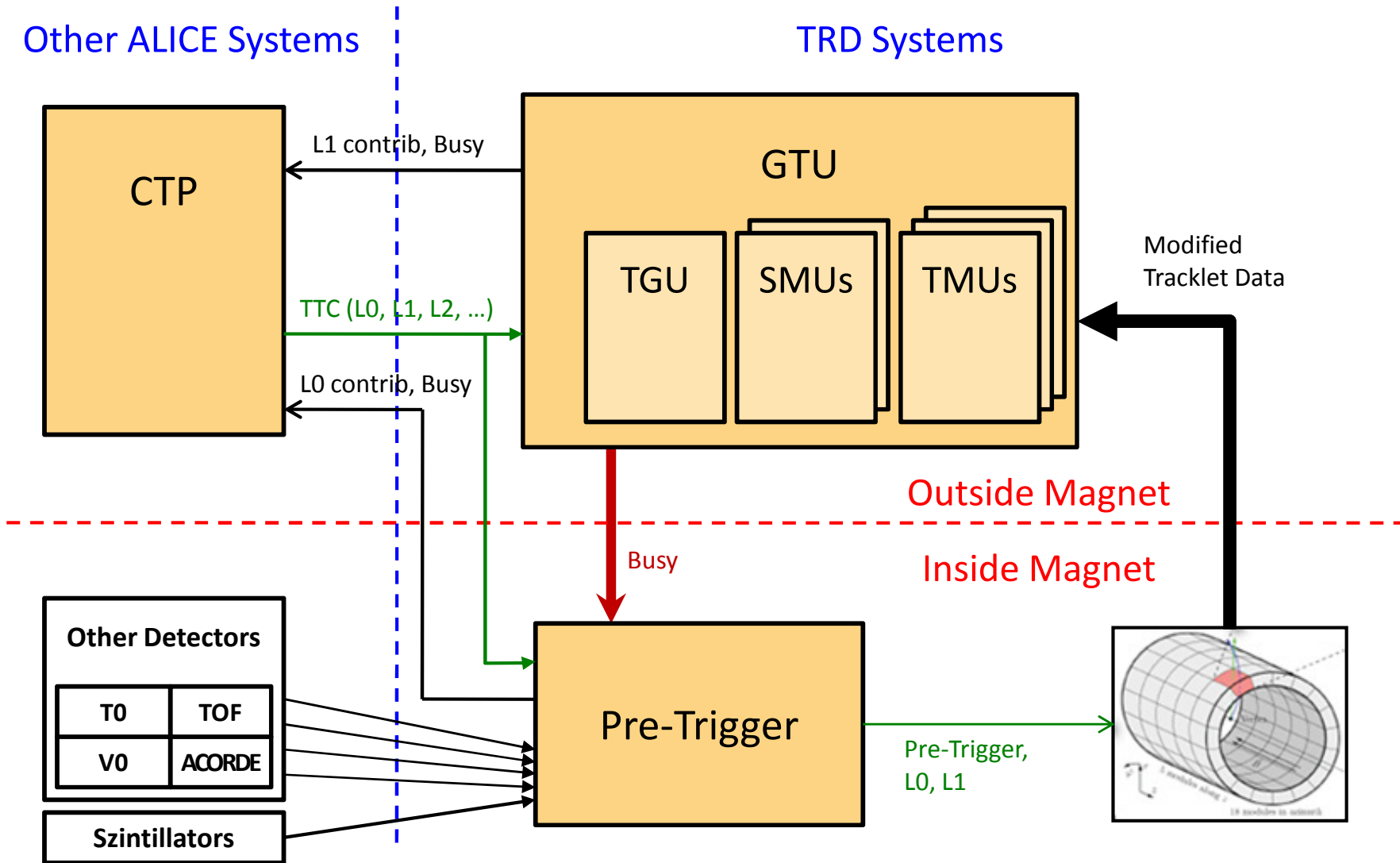
Pre-Trigger,
L0, L1

Pre-Trigger based on TOF, L1 contribution based on GTU Cosmic Trigger

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Cosmic Trigger – Purpose

Purpose:

Final GTU tracking/trigger algorithm is not yet ready to use

→ a simple trigger using tracklet-based heuristics

Chamber granularity
charge deposited, number of hits, no
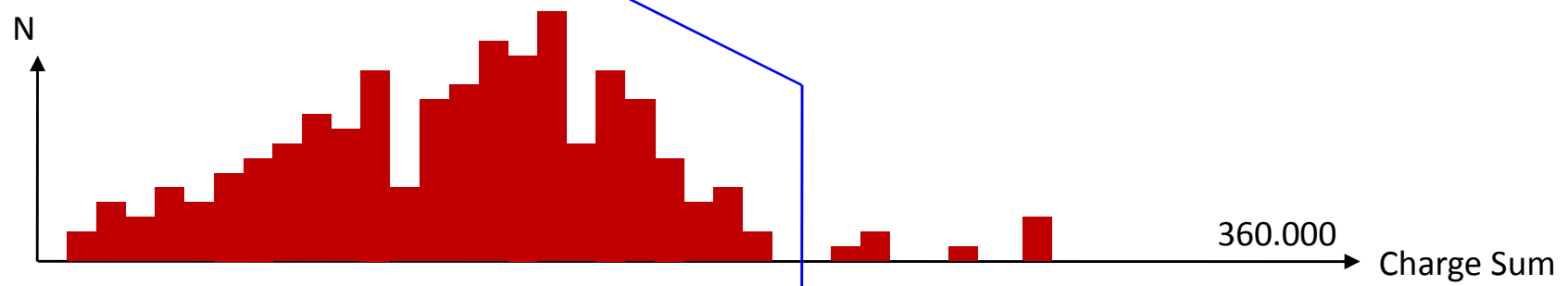positional/directional information usable
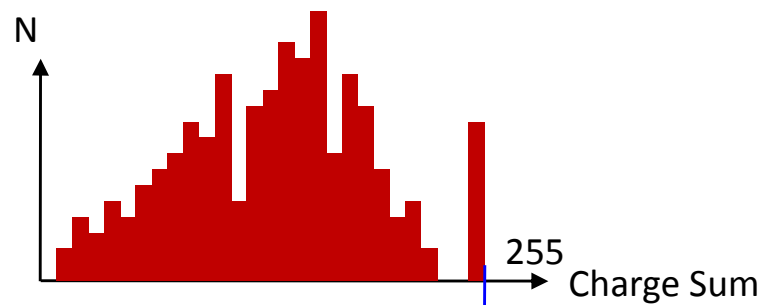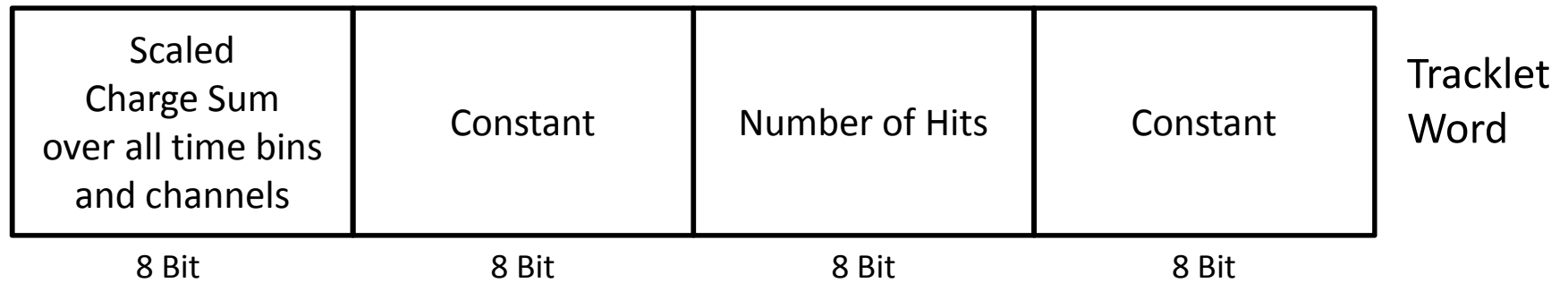
Advantages:

Deliberately unspecific, broad selection of "non-empty" events

→ much less bias than final algorithm will provide,
because of geometrical limitations in tracking

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Cosmic Trigger – MCM Level

Modified tracklets for cosmics trigger: no tracklet parameters, instead…

Scaled Charge Sum over all time bins and channels	Constant	Number of Hits	Constant	Tracklet Word
8 Bit	8 Bit	8 Bit	8 Bit	

Cosmic Trigger – Chamber Level (TMU)

Summation of tracklet numbers, charge and hit numbers
over all tracklets from both half-chamber links of each chamber.
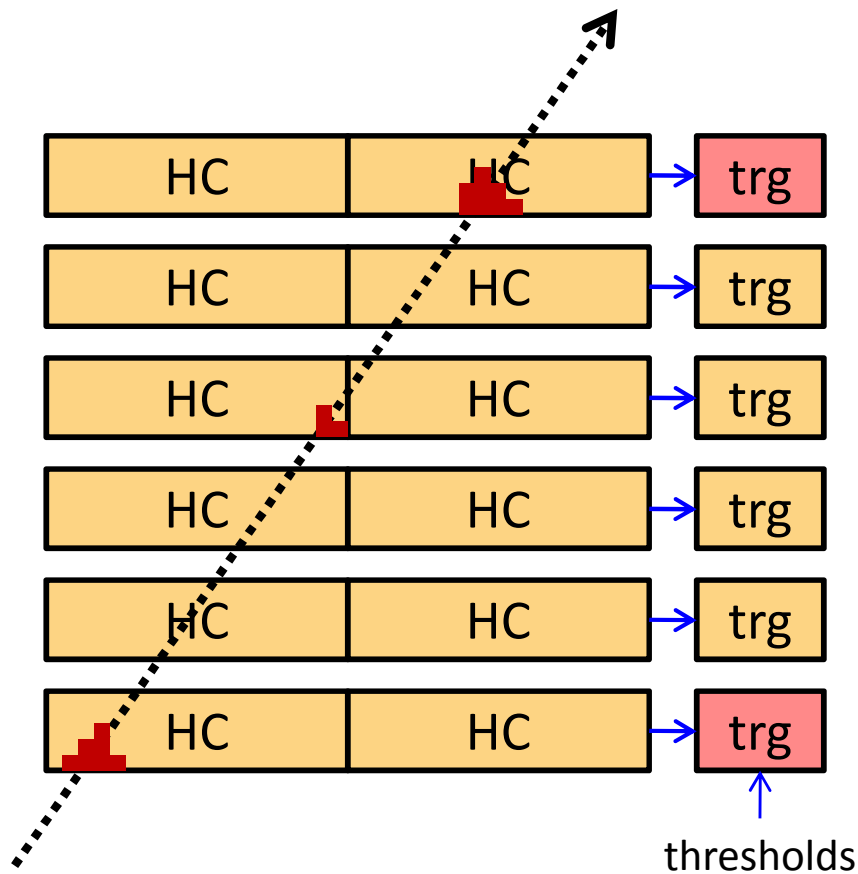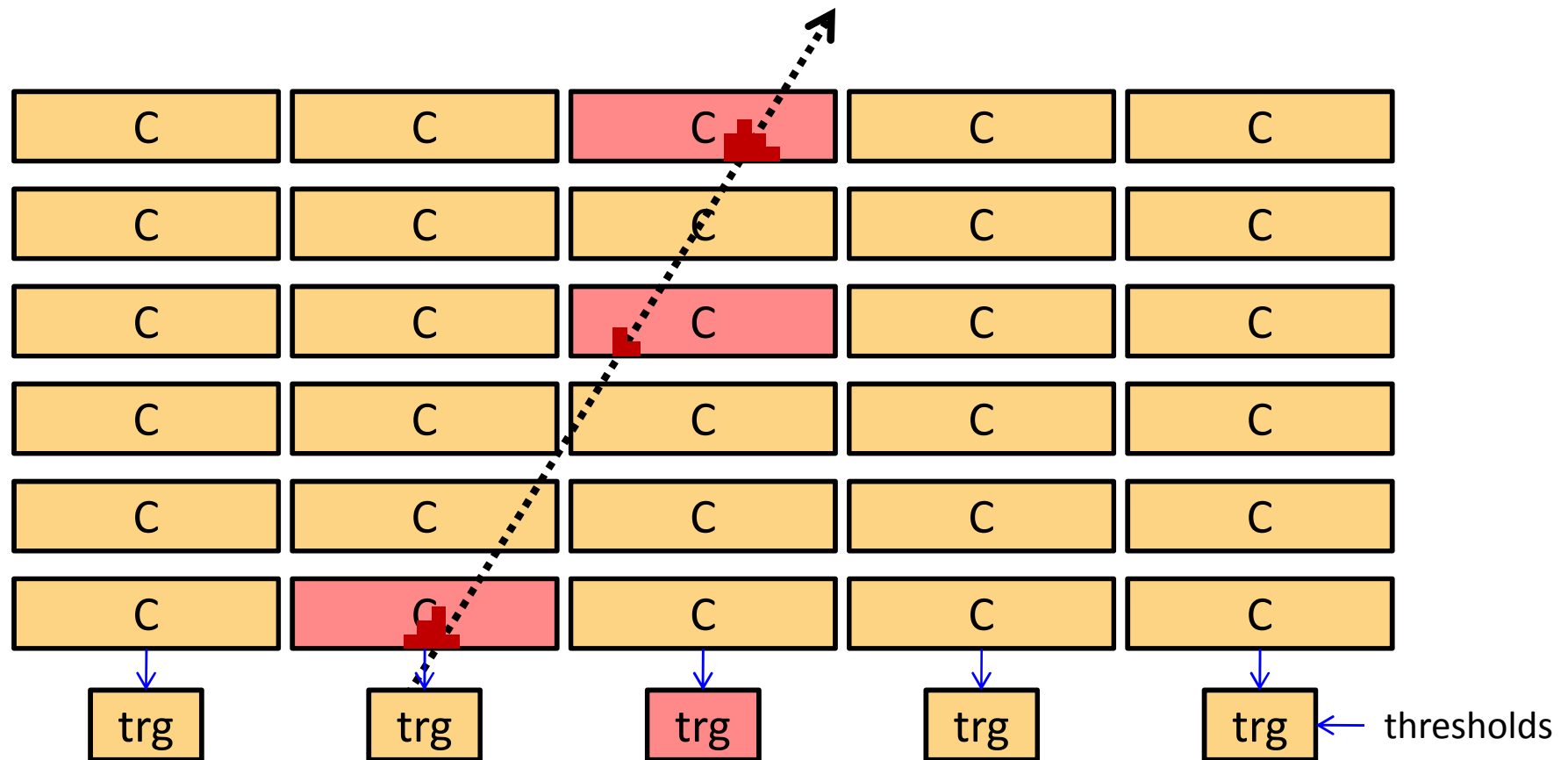

Threshold conditions for trigger:

- Number of
  Tracklets per chamber

- Charge summed up over all
  tracklets per chamber

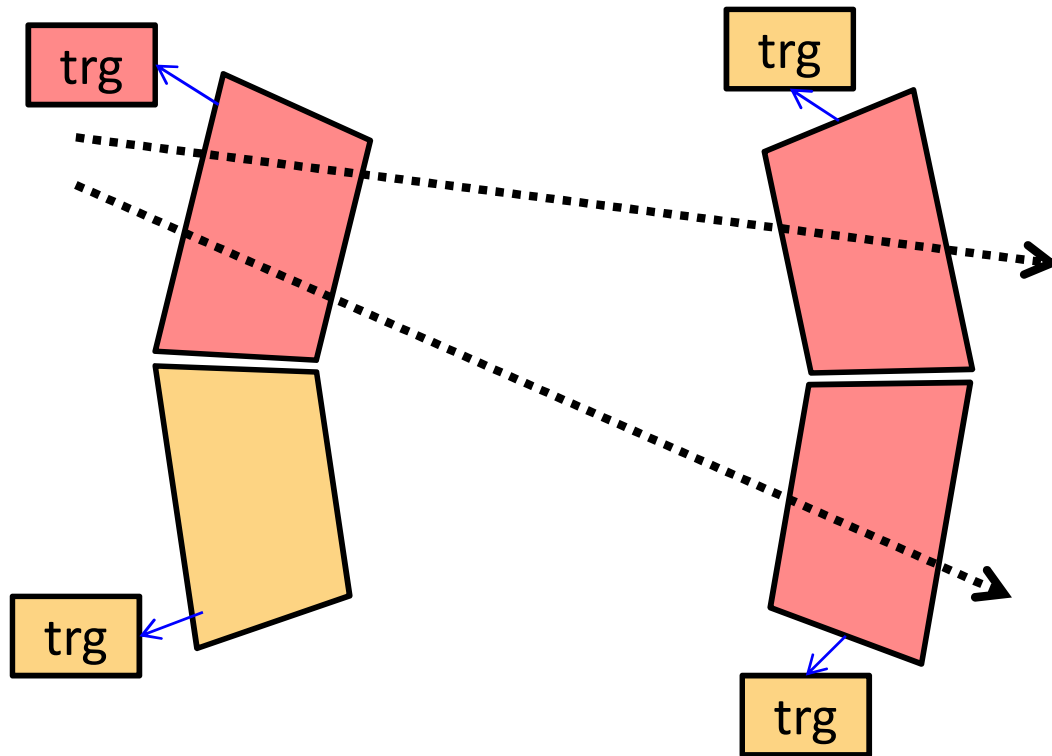- Hits summed up over all
  tracklets per chamber

Cosmic Trigger – Stack Level (SMU)

Trigger condition: number of "active" chambers per stack

Optionally: minimum/maximum limit for number of stacks hit

Cosmic Trigger – Supermodule Level (TGU)

Trigger conditions:

- single supermodule

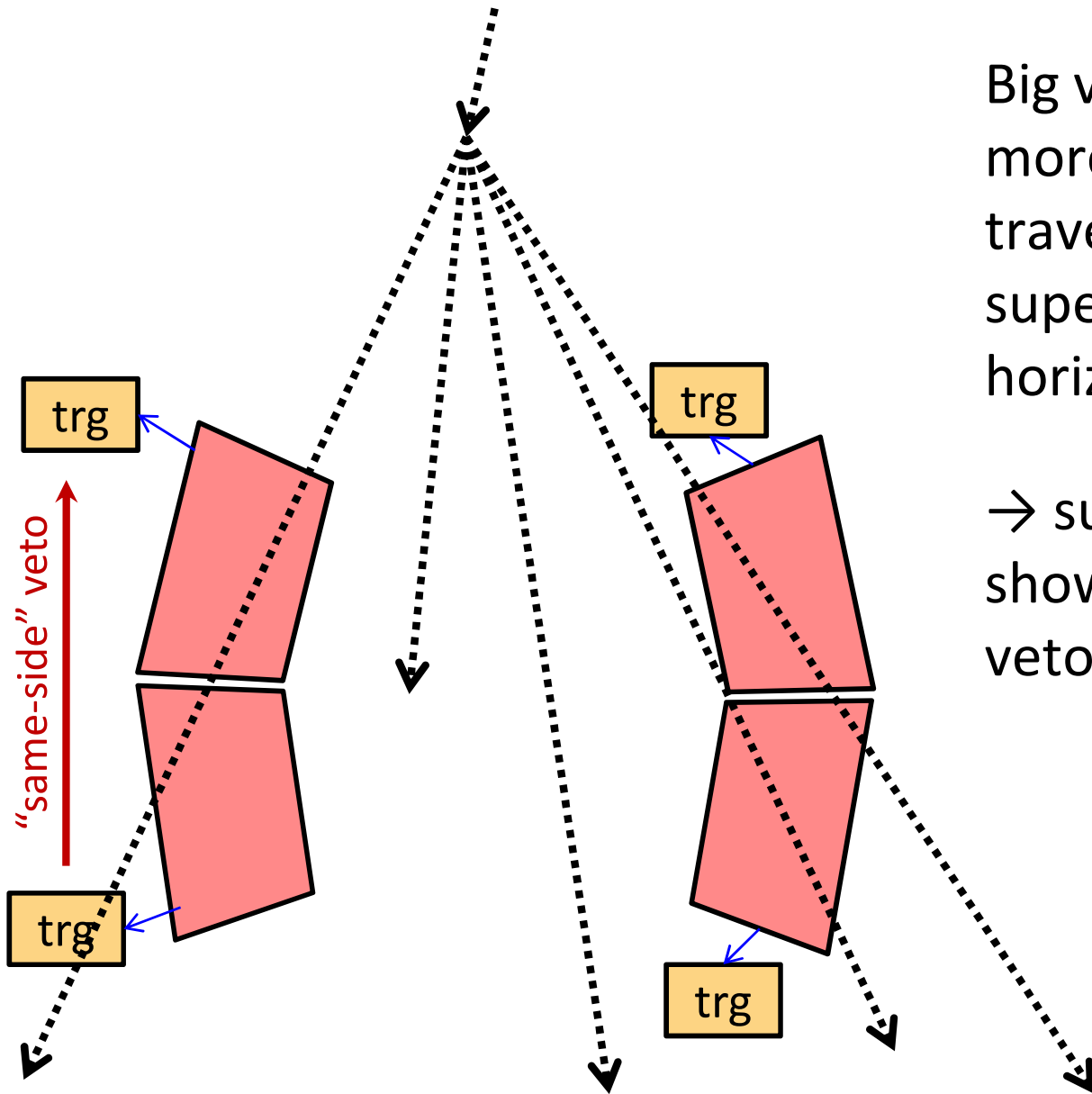- one-to-many correlations between supermodules

Optionally:

- "same-side veto" in one-to-many correlation

Events like shown above may be very rare → experience, rates?

Such events rejected by TOF-/ACORDE-coincidence settings?

Cosmic Trigger – TGU Level II

Big vertical showers are more likely than one track traversing two supermodules nearly horizontally

→ suppression of vertical showers by "same-side veto" possible?

Cosmic Trigger – Parameter Tuning, Data taking

- Huge configuration space (thresholds and masks)
  - How do typical events (single tracks, showers, …) look like in terms of the modified tracklets?
  - Tuning of GTU cosmics trigger configuration to properly select interesting events

- Joint effort: one or two days data taking/trigger tuning at CERN
  - TRD operator
  - GTU operator
  - Offline analysis support for immediate reconstruction and characterization of recorded events
    → assessment and tuning of cosmics trigger configuration
  - properly working Pre-Trigger-Box

- Selection of a few trigger configurations for subsequent use

Cosmic Trigger – Remarks

- New Supermodule Configuration / TRAP operation mode

  – Incorporation into databases and transfer to wingDB at CERN

- Modified tracklets and tracklet numbers

  – Zero suppression efficiency is different to case with "normal" tracklets

  – Modified tracklets cannot be used later on for
    offline simulation of GTU tracking and trigger operation

- HLT as additional trigger level could provide further selection

Cosmic Trigger – Typical Events

Which kind of events is to be selected by the trigger?

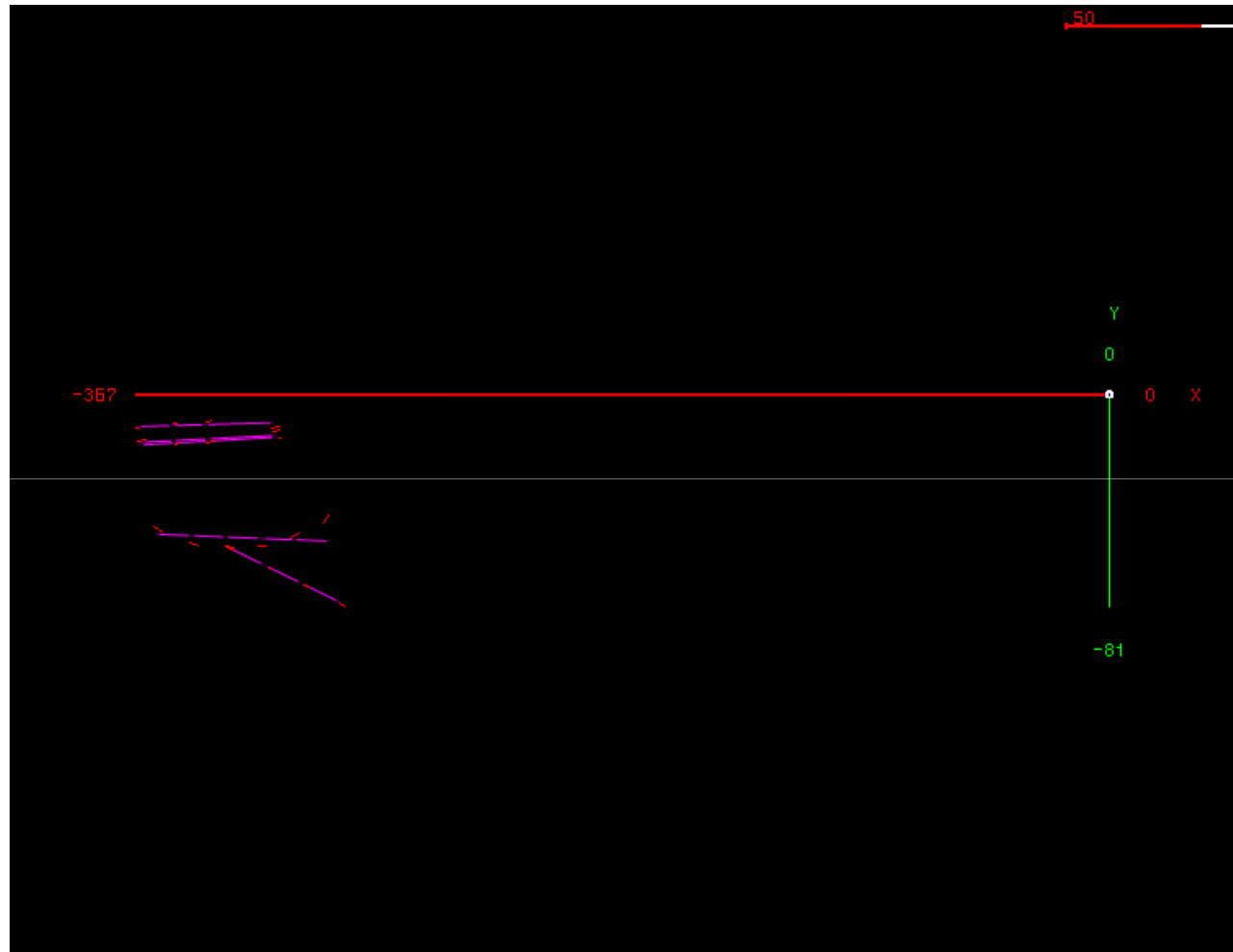Most events reconstructed by now look similar to these:
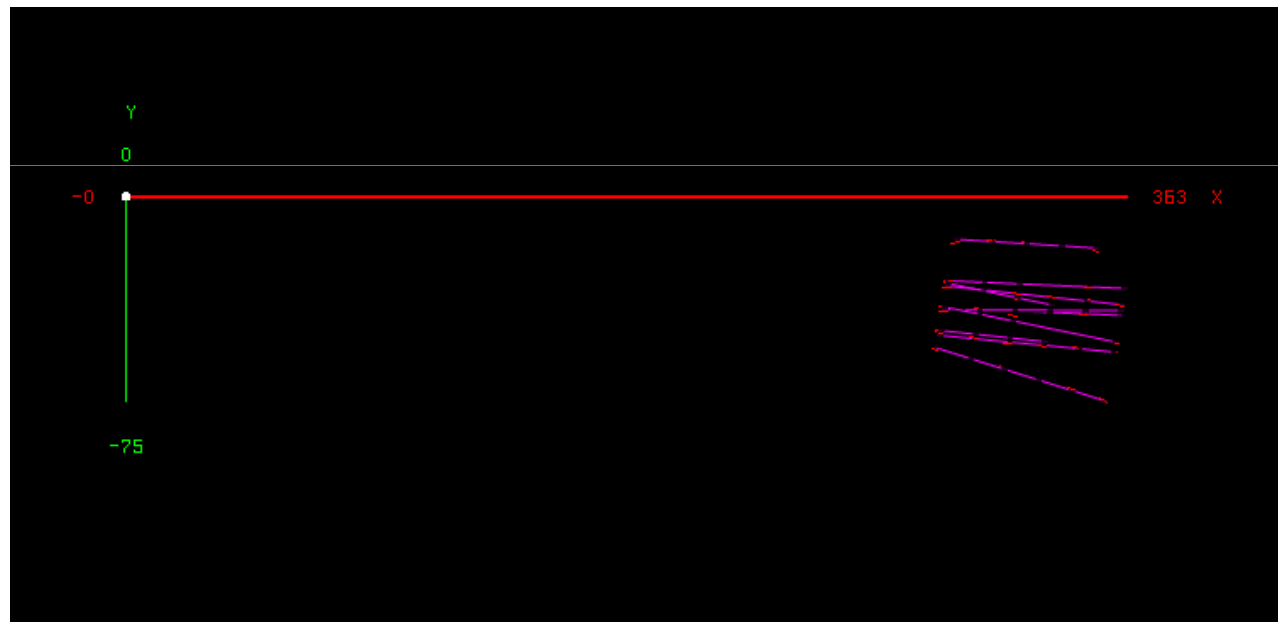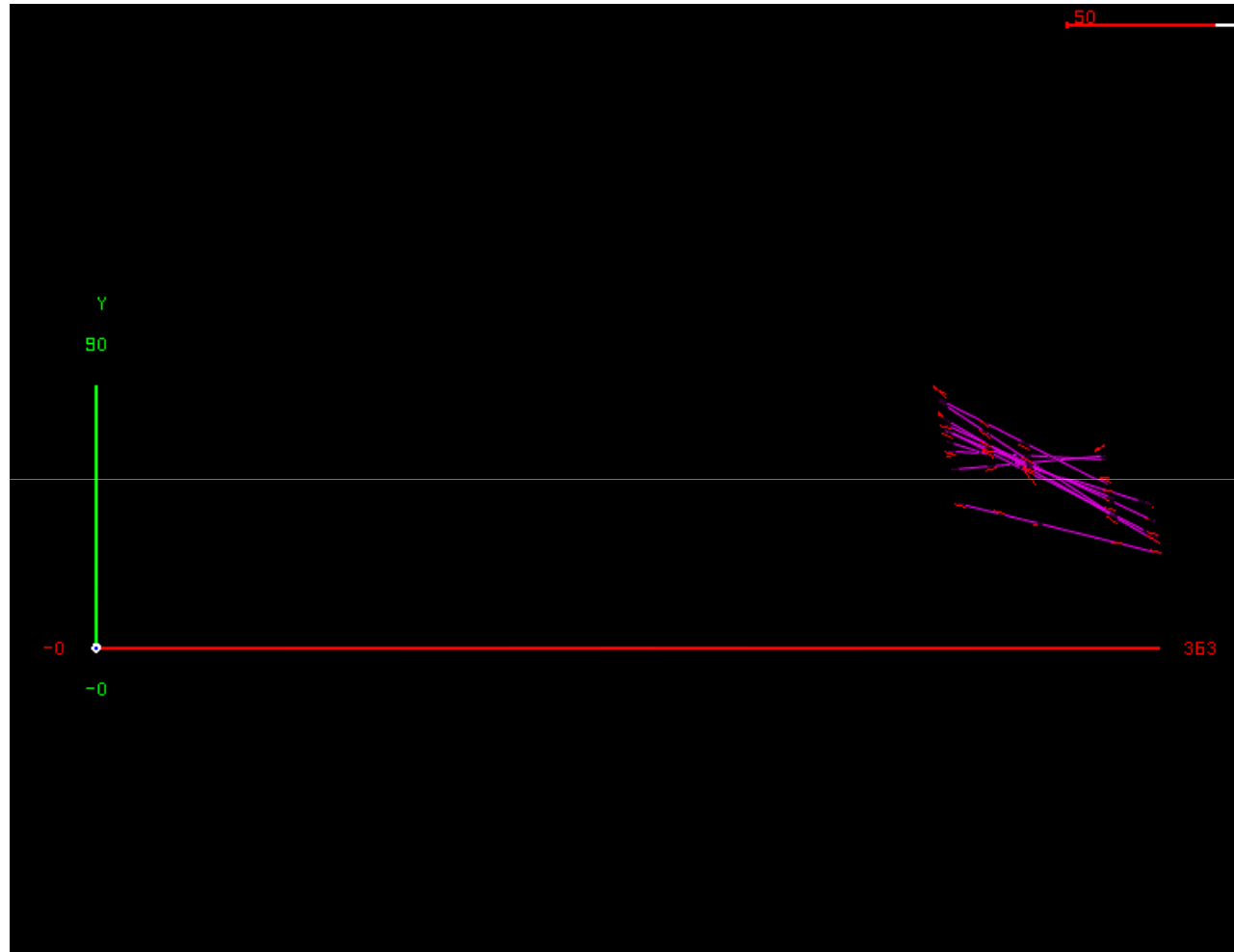

ev4 – ACORDE, 10 tracks

- Thanks to A. Bercuci

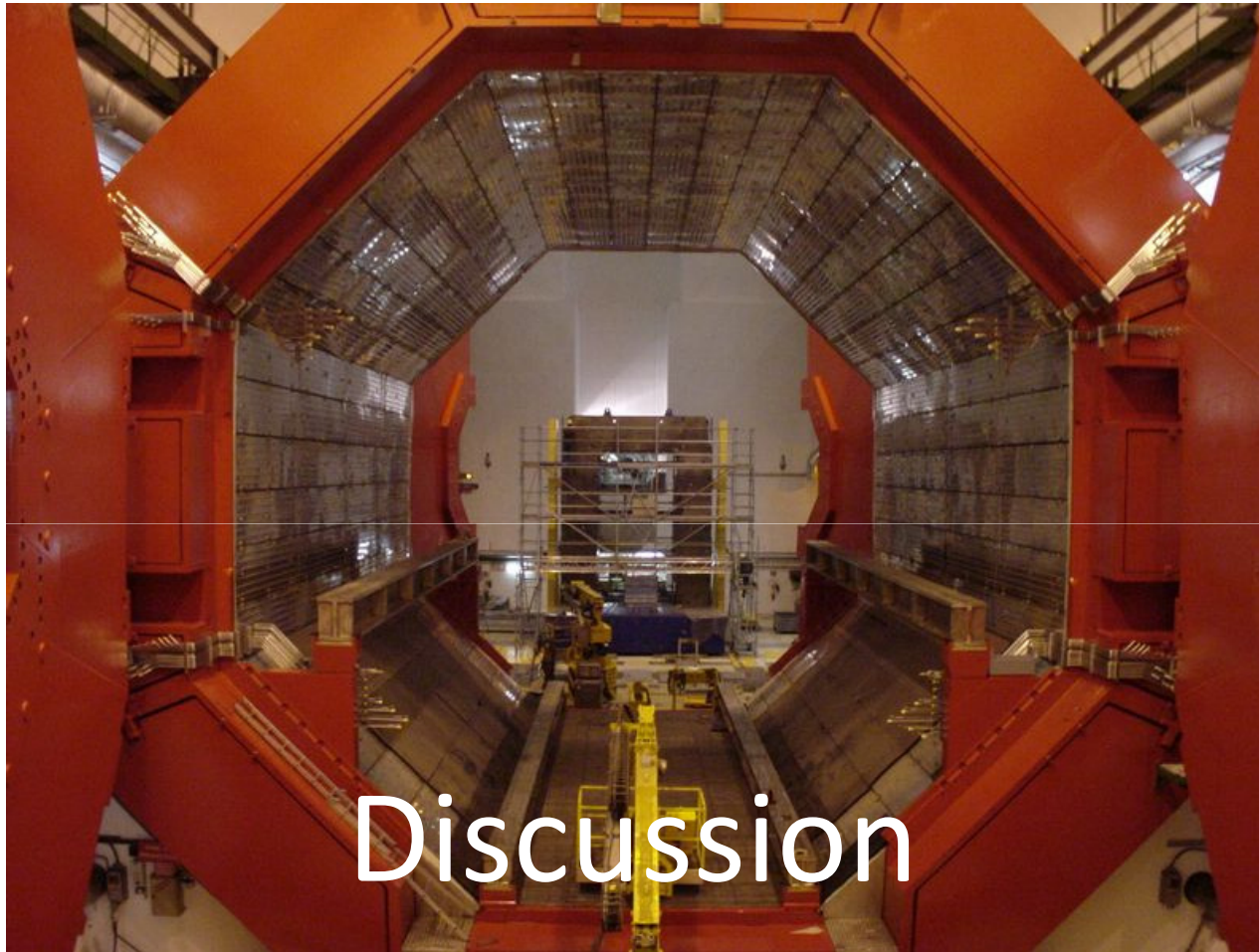# Cosmic Trigger – Typical Events

Ev2 – ACORDE, 5 tracks

Cosmic Trigger – Typical Events

ev6 – ACORDE, 10 tracks

Thank You for Your Attention

Picture taken 2004, by Timm Steinbeck

Discussion

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